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WEBINAR

Communicating for Marine Conservation – Lessons from South Africa

Dr. Judy Mann-Lang

Senior Conservation Communication Specialist in Marine Education, Ocean Literacy, Behaviour Change, and Science Communication

The future of the ocean depends on people. This talk explores how human behaviour, connection, and communication shape the choices we make, and how we can inspire meaningful action for ocean conservation.

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A YouthxConservation & Ocean Stewards Collaborative Webinar Series Agenda

Date: 30 June 2026

Time: 12h30-13h30 SAST

Venue: ZOOM

Topic: Communicating for Marine Conservation – Lessons from South Africa.

Guiding Question: How can we communicate more effectively to inspire people to care for and protect the ocean in South Africa?

Purpose:

People are at the heart of marine conservation – both the greatest challenge and the most powerful solution in protecting the ocean. Between human need and human impact, it is one of the most pressing challenges of our time, requiring not only science and solutions, but also a deeper understanding of how people connect with the ocean and how this shapes behaviour and decision-making.

While we have the science, there is a growing need to translate it into effective communication that inspires awareness, shifts attitudes, and supports meaningful action, grounded in audience, context, and culture, especially in South Africa's diverse settings.

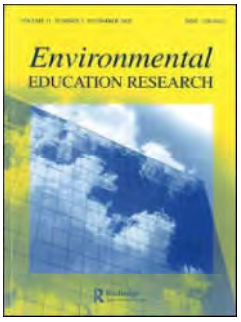
This webinar, part of the YouthxConservation & Ocean Stewards collaborative series, explores lessons from marine education, science communication, and behaviour change research on how to communicate more effectively for marine conservation and inspire ocean stewardship.

Drawing on over 30 years of experience, Dr. Judy Mann-Lang will share practical insights on what works in real-world communication and how to bridge the gap between knowledge and action in an African context.

With audiences ranging from learners and teachers to coastal communities, fishers, conservation managers, and scientists, the talk explores the challenges and opportunities of communicating across diverse groups to support more inclusive and lasting ocean action.

Facilitator: Nonkokheli Mdunjana (WILDOCEANS)

Time	Item	Responsible Person(s)
12h30-12h35	Welcome and Introduction	Facilitator
12h35-13h20	Communicating for Marine Conservation – Lessons from South Africa.	Dr. Judy Mann-Lang
13h20-13h25	Q&A	ALL
13h25-13h30	Closing and Reflections	Facilitator



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Penguin Promises: encouraging aquarium visitors to take conservation action

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ABSTRACT

This study investigates the impact of an innovative conservation action campaign called *Penguin Promises* implemented at uShaka Sea World in Durban, South Africa. Communication tools included interpretive signage, exhibits with and without animals, presentations, and personal interactions, along with a specially designed postcard, on which visitors could write a promise (pledge) to make a change in their daily lives to become more environmentally responsible. Visitors who completed a card were contacted a year or more after their visit and asked about the outcomes of their promise. The results ($N = 316$) showed that 49.4% of respondents could give an example of something positive they had done for the environment, that they attributed to the campaign. Based on the study, recommendations are provided for the design of effective visitor conservation action campaigns.

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Aquariums; conservation education; pro-environment behaviour; zoos

Introduction and literature review

Over the past decade an increasing number of researchers have investigated the effectiveness of wildlife tourism attractions such as zoos and aquariums in building the environmental awareness of visitors, influencing their environmental attitudes and encouraging pro-environmental behaviour (Ballantyne et al. 2007; Dierking et al. 2004; Falk and Adelman 2003; Gusset and Lowry 2014; MacDonald 2015; Miller et al. 2013; Pearson et al. 2014; Smith, Curtis, and Dijk 2010). Similar research has also been undertaken to investigate personally transformative learning in other environmental free-choice learning settings (Ardoin et al. 2015; Ballantyne and Packer 2009, 2011; Ballantyne, Packer, and Sutherland 2011; Falk et al. 2010; Tisdell and Wilson 2005). Actual engagement in environmental behaviour is considered to be one of the most difficult aspects of environmental literacy to test (Stern 2000). Understandably therefore, few studies have attempted to assess long-term changes in everyday environmentally responsible behaviours after a visit to a zoo, aquarium or other wildlife tourism setting (Ardoin et al. 2015), despite the fact that research of this nature is essential to determine achievement of institutional goals (Schultz and Joordens 2014).

In previous research a common finding has been that although a visit to a free-choice environmental learning site, such as a zoo or aquarium, has a significant impact upon visitors' behavioural intentions (they leave highly motivated to make environmental behaviour changes), the visit has a limited impact on their long-term adoption of environmentally responsible behaviour (Adelman, Falk, and James 2000; Ardoin et al. 2015; Ballantyne, Packer, and Falk 2011; Hughes 2013; Hughes, Packer, and Ballantyne

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2011; Pearson et al. 2014). For example, in a long-term study of four Australian wildlife tourism sites, only 7% of visitors reported that they had adopted a specific new environmental behaviour as a result of the visit (Ballantyne, Packer, and Falk 2011), while in another Australian study Hughes (2013) noted that three months after a visit to a turtle rookery, most participants had not acted on their intentions to increase their conservation actions. In the USA it was found that while conservation knowledge and interests persisted over six to eight weeks, the experiences rarely resulted in new conservation actions (Adelman et al. 2001). More positive results have been found, however, when campaigns have targeted specific behaviours such as keeping cats indoors at night, selecting sustainable seafood, reducing use of products containing palm oil, or protecting birds and their habitats (Kemmerly and Macfarlane 2009; MacDonald 2015; Pearson et al. 2014; Smith, Broad, and Weiler 2008). Despite the generally disappointing research findings relating to the positive impact of a visit upon long-term environmental behaviour, there is evidence to suggest that zoos and aquariums have considerable potential to positively impact their visitors' environmental knowledge, attitudes, behavioural intentions, and ultimately, adoption of pro-environmental behaviour (Ballantyne et al. 2007; Falk 2014; Gusset and Dick 2010).

According to the Theory of Planned Behaviour (TPB) (Ajzen 1991), people behave in accordance with their intentions and their perceptions of their personal control over the target behaviour. Intentions are influenced by three factors: attitude towards the behaviour (how positive do I feel about the behaviour), subjective norms (what do other people expect me to do) and perceived behavioural control (how easy is it for me to do this behaviour) (Ajzen 2001). The use of commitments or pledges has been found to enhance the success of environmental behaviour change campaigns (Barata, Castro, and Martins-Loução 2016; Cobern et al. 1999; Lokhorst, van Dijk, and Staats 2009; MacDonald 2015; Osbaldiston and Schott 2012). It is suggested that by making a commitment people are taking a small preparatory step towards the behaviour. If the commitment is not coerced, the combination of a preparatory step and free will may enhance the long-term adoption of the behaviour, as the individuals' need for consistency (acting in a way that is consistent with their commitment) will support and maintain the behaviour (Barata, Castro, and Martins-Loução 2016; Cialdini 2001). As suggested by the TPB, facilitating an intention to behave in a certain way, through a commitment, should positively influence the intended behaviour.

This paper reports findings from a conservation action campaign designed to encourage visitors to uShaka Sea World (Durban, South Africa) to take positive post-visit action to help conservation in general, and the African penguin (*Spheniscus demersus*) in particular. The campaign, titled *Penguin Promises*, invited visitors to make a commitment in the form of a 'promise to the penguins' in response to the conservation-related interpretive messages provided at two exhibits (one with animals and one with no animals). Visitors were followed up 12–18 months after their visit to investigate the impact of the campaign. The research aimed to:

(1) Investigate whether the type of exhibit (one with animals and one with no animals) influenced the types of promises made and kept;
(2) Track the extent to which visitors reported that they had taken action in response to the campaign;
(3) Explore the situational variables (things that happened during or after the visit) that influenced promise-making and promise-keeping; and
(4) Provide recommendations for future conservation action campaigns in zoos and aquariums.

Method

Research site

uShaka Sea World is a 22,000 m^3 salt water oceanarium, situated in Durban, KwaZulu-Natal (KZN) on the east coast of South Africa. A single entrance fee allows between 700,000 and 800,000 visitors a year to view over 1000 species of marine animals in a range of specially designed exhibits, representative of the natural habitats of the animals. uShaka Sea World is operated by the South African Association

for Marine Biological Research (SAAMBR), a non-profit, non-government organization dedicated to marine conservation. The uShaka Sea World experience includes daily dolphin and seal presentations and a large underground aquarium. The educational approach is to inspire visitors to care for marine life through displays of animals in realistic exhibits; connect visitors to the oceans by building an emotional connection with the animals; and empower visitors through selected calls to action that inform them of conservation actions that they can undertake after their visit (Mann 2016). The aim of this approach is to empower visitors to make environmentally responsible decisions. Towards this end uShaka Sea World runs a number of different conservation action campaigns. Each campaign focusses on a different species and highlights different conservation actions. The focus of this study is the *Penguin Promises* conservation action campaign.

The Penguin Promises campaign

The *Penguin Promises* campaign aimed to encourage uShaka Sea World visitors to choose to make one change in their daily lives to become more environmentally responsible and asked them to record this as their 'Penguin Promise' (Mann 2012). African penguins were used as the target species for the campaign for four reasons: (1) the species is endemic to South Africa; (2) it is endangered – African penguin numbers in the wild have declined by up to 90% over the last 100 years (BirdLife International 2015); 3) penguins have visitor appeal (Carr 2016), and have been popularized through movies such as *Madagascar* (Darnell and McGrath 2005) and *Happy Feet* (Miller 2006); (4) uShaka Sea World has a thriving colony of breeding African penguins on exhibit to visitors. The campaign was conducted at two locations within uShaka Sea World – the African penguin exhibit and the Eco-house.

African penguin exhibit (animal-focussed exhibit)

The uShaka Sea World permanent penguin display houses a colony of up to 60 breeding African penguins in an outdoor exhibit comprised of a 120 cubic metre pool, with associated nesting and feeding zones (Figure 1). In addition to viewing the birds, visitors are provided with a photo opportunity

Figure 1. The uShaka Sea World penguin exhibit (pool on the right) and red post box opposite the viewing window. Source: © The Author. Reproduced with permission.

with life-sized penguin models of different species, a view into the nesting area of the birds, and an opportunity to see a functional animal health laboratory. Signage highlights the threats facing African penguins and provides visitors with suggestions of actions that they can take to help penguins and the environment. A total of 70% of visitors to uShaka Sea World report visiting the African penguin exhibit (Kortenbout 2013), and 34.5% of visitors report watching a penguin feed (Mann 2016).

For this campaign a large red post box was positioned adjacent to the seating area, opposite the exhibit viewing window. This position was chosen as it was the easiest location for visitors to access. Specially designed postcards (similar to the 'solicitation cards' used by Swanagan 2000), were printed and visitors were encouraged, through signage and during the daily penguin feed presentations, to write down and post their promise postcards into the post box. Promise suggestions, and the environmental rationale for the suggested actions, were provided adjacent to the post box and included: save water, save petrol, save electricity, recycle waste and choose sustainable seafood.

Eco-house (exhibit with no animals)

The Eco-house was an innovative, temporary exhibit situated at the entrance to the aquarium. Due to its location, all visitors to the aquarium saw the exhibit; however only about 30% of visitors entered the Eco-house (J. Porter, uShaka Sea World Education Director, Pers. Comm.). Using the African penguin as an icon, along with the tag line 'Do it for your pocket and the planet', visitors were given an opportunity to learn about easy ways to save money and reduce their impact on the environment. Interpretive signage provided visitors with information about current resource (water and electricity) use. For example – 'For every litre of beer that you drink, 10 litres of water were used in the fermenting process.' and 'Turn down the temperature of your geyser (electric water heater) from 70 to 60 °C. This will save you about 6% of your electricity bill.' The exhibit included a domestic electric water heater and solar panel, interactive electricity panels that showed how much electricity different appliances use, and toilets and showers that demonstrated water use. A kitchen filled with common household products provided visitors with information on eco-friendly options. The exhibit demonstrated that by decreasing their use of electricity, visitors would save on their electricity bills and decrease carbon dioxide emissions from coal-fired power stations. Visitors were informed that lower emissions would slow down the climatic changes that are thought to influence the distribution of the penguin's primary food source of small pelagic fish. At the exit to the Eco-house, visitors had an opportunity to make a promise on the same promise postcards as those at the penguin exhibit; however, here the post box was a larger than life penguin model (Figure 2). In this exhibit the interpretative signage throughout the exhibit, as described above, provided suggestions for promises. Promise suggestions focussed on saving water and electricity, with less emphasis on the use of eco-friendly products and recycling waste.

The promise postcards collected basic demographic data (age, gender, home province, home language) and visit characteristics on one side, and the visitor's hand written promise and e-mail address on the reverse. Participants were aware that if they provided their email address, they might be contacted in the future by uShaka Sea World. Over the 24-month period of the campaign, a total of 4490 postcards were collected by uShaka Sea World (2042 at the penguin exhibit and 2448 at the Eco House) and the various types of promises submitted at the two different sites were collated (Mann, Harris, and Kortenbout 2014). Visitors who submitted postcards were predominantly young, female South Africans (Table 1). It was apparent that in many cases, the postcards had been completed by or on behalf of children. According to the demographic information collated by uShaka Sea World, older, male, first-time and international visitors were more likely to submit postcards at the penguin exhibit than the Eco-house.

Research procedure

Visitors who had provided an e-mail address on their postcard (N = 4336) were contacted between 12 and 18 months after their visit and invited to participate in the research by completing an online

Figure 2. The Eco-house exhibit Penguin Promise model post box. Source: © The Author. Reproduced with permission.

Table 1. Demographic profile of visitors who completed a Penguin Promise postcard at the Penguin exhibit or the Eco House.

	Postcards penguins (N = 2042) (%)	Postcards eco house (N = 2448) (%)	χ^2 test results
Gender			χ^2 [1, 4369] = 8.62, p = .003
Male	34.8	30.6	
Female	65.2	69.4	
Age			χ^2 [5, 4206] = 28.88, p < .001
<20	**56.9**	58.9	
20-29	**14.5**	18.4	
30-39	**13.3**	11.5	
40-49	**7.8**	6.1	
50-59	**4.5**	3.5	
60+	**3.0**	1.6	
Visit frequency			χ^2 [1, 4437] = 20.99, p < .001
First time	**53.6**	46.7	
Visited before	**46.4**	53.3	
Visitor origin			χ^2 [1, 4360] = 20.06, p < .001
South Africa	**83.1**	88.5	
International	**16.9**	11.5	

Source: Mann, Harris and Kortenbout (2014).

questionnaire. This wide margin of time was as a result of logistical issues. One reminder was sent to non-responders. A total of 316 completed questionnaires were received from participants aged over 20 years.

The questionnaire again requested the basic demographic data collected on the postcards, as well as asking respondents to report on the outcomes of their promises. Respondents were first asked if

they could remember their promise, and if they could, they were asked (a) what their promise was, and (b) whether they considered that they had kept their promise. Those who claimed to have kept their promise were asked to describe, in an open-ended question, what they had done to keep their promise, and what factors had influenced them to make and keep the promise. Those who reported they had not kept their promise were asked what had prevented them from keeping their promise and if they had undertaken any other pro-environmental actions as a result of their visit to uShaka Sea World.

Participants

A demographic profile of those who completed the online survey is provided in Table 2.

These participants were older than those who completed the postcards (for ethics reasons, those aged under 20 were excluded), were more likely to be female, more likely to be South African residents, and more likely to be repeat visitors to uShaka. Thus the online survey sample is not representative of all who submitted postcards, and is likely to be biased towards those who were more committed either to the environment, or to the institution.

Results

Influence of the type of exhibit on the types of promises made and kept (Aim 1)

Data from a total of 4490 postcards were collated by uShaka Sea World (Mann, Harris and Kortenbout 2014). As visitors sometimes recorded more than one promise on their card, a total of 5974 promises were made on these 4490 postcards. These were divided into those collected from the Eco-house exhibit (2944 promises) and those collected at the penguin exhibit (3030 promises). Each promise was classified into one of the seven categories listed below. The first two categories had been addressed in various ways in both of the exhibits and were the most frequently recorded promises at both sites (Table 3). 'Eco-Friendly Purchasing' was only mentioned in the interpretive signage at the Eco-house; and 'Buy Sustainable Seafood' was only mentioned during commentaries and in signage at the penguin exhibit. The final three categories were not explicitly mentioned as possible promises in either exhibit, however, encouraging visitor to take care of nature and animals is an underlying message communicated throughout the uShaka Sea World experience.

Category 1: Save Energy/Water, e.g. I will save electricity; I will save water; I will save fuel; I will use energy saving devices; I will install solar panels; I will install low flow showers.

Category 2: Avoid Litter and Pollution; Reduce, Reuse and Recycle, e.g. I will not litter; I will not pollute; I will keep the ocean clean; I will recycle; I will reuse products; I will not use straws; I will not use plastic bags.

Table 2. Demographic profile of online survey respondents.

	Percentage of online sample (N = 316)
Gender	
Male	18.9
Female	81.1
Age	
20-29	23.1
30-39	37.3
40-49	27.2
50-59	9.2
60+	2.8
Visit frequency	
First time	19.6
Visited before	81.4
Visitor origin	
South Africa	93.4
International	6.6

Table 3. Percentage of Eco-house and Penguin exhibit visitors who made each type of promise on their promise card.

Promise categories	Percentage of eco-house respondents (%)	Percentage of penguin exhibit respondents (%)	Comparison
Save energy/water	38	38	NS
Avoid Litter and pollution/ reduce, reuse and recycle	34	41	$\chi^2(1) = 31.99, p < .001$
Eco-friendly purchasing	6	2	$\chi^2(1) = 68.02, p < .001$
Buy sustainable seafood	1	3	$\chi^2(1) = 28.39, p < .001$
Care and conserve nature	8	6	$\chi^2(1) = 10.15, p = .001$
Care for penguins and animals	7	6	$\chi^2(1) = 7.39, p = .006$
Tell others	4	4	NS

Source: Mann, Harris and Kortenbout (2014).

Category 3: Eco-Friendly Purchasing, e.g. I will use eco-friendly products; I will think before I buy things.

Category 4: Buy Sustainable Seafood, e.g. I will use the South African Sustainable Seafood Initiative (SASSI) list when buying seafood; I will only eat SASSI green fish; I will limit my fishing.

Category 5: Care and Conserve Nature, e.g. I will care for the environment; I will conserve resources; I will look after the environment.

Category 6: Care for Penguins and Animals, e.g. I will always love penguins; I will care for penguins; I will love animals; I will help save penguins.

Category 7: Tell Others, e.g. I will tell others what I have learnt; I will pass on the message.

The two exhibits inspired a similar range of promises, but significantly more promises about litter, pollution and recycling were made at the penguin exhibit where this message featured prominently during feeding presentations (Table 3). The SASSI programme is also a feature of the penguin exhibit presentations, and this was reflected in a higher percentage of promises in the 'Buy Sustainable Seafood' category. Eco-friendly purchasing promises were made significantly more often at the Eco-house, where this message was featured. The Eco-house also inspired more general care and conserve nature promises, and care for penguins and animals promises. It would appear, therefore, that visitors responded to the content of each exhibit in the selection of their promises. However, as the exhibits were both part of the wider uShaka Sea World experience, visitors may have made a promise after visiting both exhibits and, therefore, it cannot be concluded that the promise was influenced only by one or the other exhibit, or by another aspect of the experience. There was no significant difference between penguin exhibit respondents and Eco-house respondents in the extent to which they either remembered or claimed to have kept their promise, χ^2 [1, 282] = 0.29, $p = .628$; χ^2 [1, 282] = 0.16, $p = .719$, respectively.

The extent to which visitors reported that they had taken action in response to the campaign (Aim 2)

Of the 316 visitors who completed the online questionnaire, 172 (54.6%) claimed they could remember their promise, and 159 (50.3% of all respondents) claimed to have kept it. A total of 156 or 49.4% of all respondents could give an example, in the open-ended questions, of something positive that they had done for the environment and that they attributed to their visit to uShaka Sea World. Analysis of the open-ended data revealed that visitors who remembered a specific promise (e.g. save energy/water; avoid littering/recycle) were the most likely to report having kept their promise, while those who remembered a general promise (e.g. care and conserve nature; care for penguins and animals) either reported no behaviour change, or reported having performed a different (more specific) behaviour (Table 4). This is consistent with previous studies that have proposed that general environmental concern is not a direct determinant of specific behaviour (Bamberg 2003). It should be noted that the percentages of remembered promises in each category (Table 4) are inconsistent with the percentages of initial promises in each category collated by uShaka Sea World (Table 3), thus suggesting either that

Table 4. Promises made and kept based on open-ended responses to online questionnaire.

	What was your promise? (% of all remembered promises)	What have you done to keep your promise?	
		Kept the promise (%)	Done something else (%)
Save energy/water	18	89	0
Avoid Litter and pollution/reduce, reuse and recycle	48	92	3
Eco-friendly purchasing	0.5	100	0
Buy sustainable seafood	5.5	91	0
Care and conserve nature	13	0	84
Care for penguins and animals	6.5	15	20
Tell others	8.5	65	12
Totals	100	72	16

Table 5. Examples to illustrate the types of behaviours reported by respondents in each category.

Category of promise	Example
Save energy/water	'Switched off the lights when we are not in the room, run shallower bath and switched off the tap when brushing our teeth'
	'Put a brick in the toilet, we have those special super energy saving light bulbs, when using water, I turn it off when not being used directly and when not used, I turn off the geyser, pool pump etc'
	'Using energy saving light bulbs, reducing their numbers in each room, switching only the necessary lights. Reducing the use of water by taking showers instead of baths'
Avoid litter and pollution/reduce, reuse and recycle	'Not thrown any litter out of my car. No littering at work. I did not leave any litter when at the beach. I picked up litter that was not mine at the beach. I picked up litter when I see it at work or when I am out. I stopped drunk people from littering'
	'Made sure no plastics flew away from us in the wind, which was not the case before'
	'I was at uShaka whilst on holiday – driving back I bought a little white figurine of a penguin. It now sits on my sink as a daily reminder of my penguin promise. I found a garden centre that recycles and I now collect all my items and take them twice a week'
Care and conserve nature	'It was more of a mental change than physical. I am more aware of nature now'
	'I have helped to clean a Nature park that was dirty'
	'Beach clean-ups'
Care for penguins and animals	'Conserve nature in a way so as to protect penguins'
	'Have donated money for penguins'
	'Watched more programmes to help me learn about penguins'
Eco-friendly purchasing	'I now check the labels when I buy detergents'
	'I try to stay away from insecticides and pesticides that harm the environment. Try to use natural fertilizers in my garden'
	'I don't buy plastic bags anymore'
Telling others	'I have told many people of the encounter that I had'
	'Talking to people. Trying to spark an interest within them about nature. Giving them links to follow and read'
	'I have told many people of the encounter I had with the penguins and told them that they are going extinct because of careless behaviour'
Buy sustainable seafood	'I carry my list of fish around with me at all times and always check it before ordering or buying fish'
	'Check the red list for the fish I am buying'
	'Looked at the packaging when buying fish'

some types of messages were easier to remember than others or that some participants who claimed to remember their promise had remembered it incorrectly.

The open-ended responses provided by participants supplement and confirm the quantitative data in Table 4. The details contained in these responses indicate that many participants had thought about their behaviours, and were able to describe specific actions they had taken which they considered to be a result of their promise. It is suggested that visitors who responded in detail to the open-ended question about the actions that they had taken are more likely to have genuinely undertaken the action than those who simply responded with one or two words. In this regard, it was found that 91% of those who claimed to have kept their promise were able to articulate an example of what they had done in five or more words. Examples illustrating participants' open-ended responses in each category are provided in Table 5. It is impossible to ascertain if making the promise caused the behaviour, as the

respondent may have already been engaged in such behaviour, but the fact that respondents could clearly articulate positive environmental behaviours and that they attributed these behaviours to their promise provides supporting evidence of the impact of the campaign. However, as with most studies of this nature, it is very difficult to directly measure the accuracy of the self-reported behaviours in the visitor's home.

It is interesting to note that, either as a part of their promise or in response to a question about other environmental actions taken at home, 21.2% of respondents reported that they had shared the environmental behaviour message with others. The following comments illustrate this point:

- 'I teach my grandchildren about the environment and why we are doing it. It is for the sake of our unborn children of the future as well as our animals. I always tell people to visit uShaka Sea World to see the animals and what they can do to help.'
- 'Talk to the kids at school where I work.'
- 'I have told people to stop using straws or to reuse them, and that in the office they should print documents on front and back of papers and that old paper that is blank on the back should be used for notes instead.'

Situational variables that influenced promise-making and promise-keeping (Aim 3)

Visitors' responses to the open-ended question about factors that influenced their promises were grouped into two categories: the first related to what visitors saw, felt, heard or did while on-site at uShaka Sea World and the second focussed on visitors' off-site experiences at home, work or other leisure settings. The major themes are reported in Table 6, and illustrated with examples from participants' comments. The on-site experiences that most influenced people included feeling an emotional connection with the animals; developing an appreciation for the animals; learning from the information or photographs on interpretive panels; and learning or gaining inspiration from staff. The off-site experiences that most influenced people included feeling a responsibility towards future generations; experiencing other wildlife encounters outside of uShaka Sea World; learning or gaining information from other sources; and gaining understanding through work or study.

Respondents were also asked to provide reasons why they had not been able to keep their promise. Although only 19 respondents answered this question the themes that emerged reflected the situational constraints described by Ajzen (1991) and included lack of time for, or inconvenience of the action (4 respondents); forgetting to take the action (6 respondents); feeling removed or distanced from the problem (e.g. living inland, away from the sea) (3 respondents); and lack of knowledge or resources (e.g. not knowing what to do, not having access to recycling bins, or not having adequate financial resources)(6 respondents). Five respondents commented on the value of the follow up survey in reminding them of their promises, as illustrated by the following comments: 'Thanks for interacting with me, just reminded me that I actually have a part to play in respecting our world' and 'The fact that I got a survey shows you really do care about the people as much as you care about the animals.'

Discussion

This study aimed to investigate the impact of a conservation action campaign on the post-visit environmental behaviour of aquarium visitors. The results showed that 49.4% of the visitors who responded to the post-visit questionnaire a year or more after their visit could mention at least one environmental action that they had undertaken and attributed it to the *Penguin Promises* campaign. This finding is encouraging and suggests that the campaign contributed towards promoting and sustaining visitor adoption of long-term conservation behaviour. In comparison, Ardoin et al.'s (2015) review of research found some evidence of visitor adoption of positive behaviour change in 7 out of the 10 studies but reported that behaviour changes were generally very low.

Table 6. Examples of on- and off-site responses regarding the factors that influenced promises.

Nature of comment	Example
On-site experiences	
Emotional connection with the animals: (19.7% of the comments)	'In general going to uShaka has influenced me greatly. I love animals, especially marine animals'
	'I love animals and feel connected to them like family. I wouldn't want my own family to be homeless or hungry'
	'My great love for all animals especially dolphins and penguins'
Appreciation for the animals: (15.1% of the comments)	'Seeing the penguins made me realise how precious they are to the environment and they should be treated with respect like human being'
	'The interaction between the animals influenced me the most as it was so beautiful and made me so emotional and made me want to help them'
	'The way those animals are treated is outstanding, it made me realise how important they are to our nature, I never really gave it that thought before and they are beautiful'
Learning from interpretive signage: (9.2% of the comments)	'The information boards on how little things we can do in our daily life to conserve this world encouraged me greatly to make the promise to the penguin'
	'The African Penguin being placed on the red list'
	'See pictures of injured penguins and dolphins'
Learning and inspiration from staff: (6.6% of the comments)	'The friendly staff around the uShaka Sea World who were keen to explain'
	'Seeing the passion that the people and trainers at uShaka have for the animals and the awareness they work so hard to create is really inspiring!!'
	'The passion of the staff at uShaka'
Off-site experiences	
Feeling a responsibility towards future generations: (19.7% of the comments)	'I have a responsibility to leave a legacy behind for the next generation'
	'The wish to preserve our wildlife for my children and to try and help right the wrongs that our generation have made'
	'The wish to preserve our wildlife for our children and to try to help right the wrongs that our generation have made'
Other wildlife encounters: (6.6% of the comments)	'Yes. When we were in Cape Town, we went on a boat ride around Robben Island. At that time, the crew had boxes of penguins which were cleaned from oil spills. They released these penguins to their natural environment in our presence. This really touched me'
	'Having seen penguins in their natural environment along the south coast'
	'Penguins are especially special to our family as it was at the 2000 penguin rescue that my husband and I met'
Learning from other sources: (6.6% of the comments)	'Just watching a lot of nature conservation programmes like 50/50 & National Geographic & I subscribe to the magazine as well'
	'Escalating cost of electricity'
Gaining understanding through work or study: (5.3% of the comments)	'Working in agriculture makes you aware of the close link between nature and man and how important this link is in the survival of both'
	'With my studies at varsity and understanding the history of our African penguins and how human activities played a role in their population decline'
Other comments (11.2% of the comments)	'It's the right thing to do'
	'It's something I wanted to do, the promise pushed me into action'

In this study, the category of behavioural promises that was most likely to be remembered and kept related to recycling, not littering, and/or not polluting. In South Africa, recycling and responsibly disposing of waste requires considerable effort. The high percentage of visitors who noted that they now avoid littering or practice recycling is thus important and indicates that this is a strong and enduring 'take home' message from a visit to uShaka Sea World. The data also support previous findings that specific behavioural intentions are more likely to be kept by visitors than general environmental behavioural intentions (Ballantyne and Packer 2008; Dierking et al. 2004; MacDonald 2015; Pearson et al. 2014). Visitors thus need to be encouraged to articulate their intentions in specific rather than general terms. Providing clear information regarding what visitors can do to help the environment, can encourage and empower visitors to take action that helps both the environment and animals.

When asked what influenced them to make a promise, visitors mentioned on-site aspects of the visitor experience, such as making an emotional connection with the animals, developing an appreciation for the animals, learning from interpretive signage, and learning from or being inspired by staff. As noted in previous research (Ballantyne, Packer, and Falk 2011; Ballantyne, Packer, and Sutherland 2011)

it is often the opportunity to reflect on and make meaning from the experience that leads to lasting changes in behaviour. It is possible that the process of making a promise to the penguins may have provided such an opportunity for reflection, thus enhancing and reinforcing the sense of emotional connection, appreciation and inspiration that had been elicited by the visit.

There was evidence in the data collected by uShaka Sea World that the interpretive information presented at two different sites had some influence on the specific promises that were being made, however, the commonalities in the promises made at the two sites suggests that the whole visit experience was important. Differences in the demographic characteristics of those who completed postcards at the two sites suggest that an exhibit with live animals may have an advantage in attracting harder-to-reach groups such as males, first-time visitors and international tourists, but the type of exhibit had no influence on the extent to which the promises were kept.

It is encouraging that 21.2% of respondents reported having conveyed information they had learnt at uShaka Sea World to others. Although a visit may only impact one individual, if that visitor is sufficiently motivated to spread information about environmentally responsible behaviour to others, the multiplier effect can have a considerable impact on community environmental behaviour. This multiplier effect has been noted in general environmental education, where mothers and/or children are considered to be powerful multipliers of information (Esson and Moss 2016; le Roux and Ferreira 2006), but the topic has rarely been addressed in research on environmental learning in zoos and aquariums and there is scope to investigate this further.

Barriers to action have been researched extensively in the past (Kollmuss and Agyeman 2002; McKenzie-Mohr 2000; McKenzie-Mohr and Oskamp 1995), and reducing barriers to action is obviously important for the development of successful conservation action campaigns (Kemmerly and Macfarlane 2009). In this study, visitors who had not kept their promise attributed their failure to a lack of time, money and knowledge, or simply forgetting their promise. While the first three are difficult to address and are common barriers to pro-environmental behaviour, the last item can be addressed through the provision of post-visit action resources and conservation learning reinforcement, as suggested by a number of researchers (Ballantyne and Packer 2011; Hughes, Packer, and Ballantyne 2011). These could play an important role by reminding visitors of their promise and providing further information regarding simple actions that they can take to address environmental problems.

Recommendations for the design of successful visitor conservation action campaigns (Aim 4)

From this study, a number of principles can be discerned that contributed to the achievements of the *Penguin Promises* campaign. The most important of these are provided below to guide conservation educators at zoos, aquariums and other wildlife sites that aim to encourage visitors to adopt conservation behaviours. Although some of these have been noted in previous publications (Ballantyne and Packer 2005; Ballantyne, Packer, and Falk 2011; Ballantyne, Packer, and Sutherland 2011; Ballantyne et al. 2007) the findings of this study serve to support, expand, and further illustrate these principles.

- *Encourage visitors to connect emotionally with the animals.* Emotional connections between animals and visitors are known to influence environmental learning and behaviour (Ardoin et al. 2015; Hughes 2013; Myers, Saunders, and Birjulin 2004; Smith 2008). As 19.7% of respondents noted that emotional connections to animals influenced their promise, the qualitative results of this paper reinforce the importance of providing visitors with an opportunity to feel emotionally connected with the animals, or to reinforce their prior personal connections.
- *Focus on specific pro-environmental behaviours and provide suggestions on how to undertake them.* Previous studies have noted the importance of giving visitors information about conservation problems and how they can contribute to their solutions (Swanagan 2000). The results of this study suggest that visitors who made specific promises (e.g. to save water or to recycle) were more likely to keep their promises than those who made general promises (e.g. to care for nature). Providing

specific information on problems and achievable solutions can contribute to empowering visitors to take action.

- *Provide opportunities for participants to reflect.* In order to make a promise visitors needed to think (reflect), before writing it down. This approach contrasts with most tick box campaigns that require little consideration on the part of the visitor. Reflection was noted by Ballantyne, Packer, and Sutherland (2011) as being important to the goal of supporting visitor adoption of environmentally sustainable behaviour. Luebke and Matiasek (2013) also found introspection and reflection were important components contributing to affective gains by visitors. The process of reflection was integral to most of the factors identified by participants as contributing to the making and keeping of their promise (i.e. feeling an emotional connection with the animals; developing an appreciation for the animals; learning from the information or photographs on interpretive panels; and learning or gaining inspiration from staff).
- *Consider visitors' motivations for conservation action.* Previous research has proposed that egocentric rather than altruistic motives may be more effective in promoting pro-environmental behaviour, and that parental concern could be harnessed to encourage parents to adopt environmentally friendly behaviour for the sake of their children's future (Levy, Orion, and Leshem 2016). The latter is supported by the results as 19.7% of respondents noted that feeling a responsibility towards future generations was the reason for keeping their promise. Focusing interpretive messaging on the need to care for the environment for the sake of future generations may, therefore, resonate with visitors. In addition, the tag line of the Eco-house 'Do it for your pocket and the planet' may also appeal to those with more egocentric motives.
- *Encourage visitors to commit their behavioural 'promises' to paper and provide post-visit resources to support behaviour change at home.* Cialdini (2001) suggests that the effectiveness of commitments can be enhanced if the action is voluntary, is made in public, includes some effort and requires some activity. These principles, as applied in this context, may have contributed to enhancing conservation action. However, a reasonably large proportion of respondents (45.4%) reported that they could not remember their promise, and some who claimed to remember may have remembered incorrectly. There is thus a need to remind visitors of their promise and continue the environmental learning after the visit (Ballantyne and Packer 2011; Hughes 2011, 2013; Hughes, Packer, and Ballantyne 2011; Smith 2014).
- *Use iconic, live animals as the focus for the conservation action campaign.* The fact that the African penguin is endemic to South Africa and endangered, as well as the publicity that surrounded two dramatic oil spills off the South African coast, meant that the South African public was more aware of the plight of the penguin than many other marine species. According to visitors' open-ended comments, learning from other sources and other wildlife encounters apart from their uShaka Sea World visit, helped to reinforce visitors' on-site learning and their desire to help the species. It was also found that the exhibit with live animals in this study (penguin exhibit) attracted a wider range of participants to complete and submit postcards than the exhibit without live animals (Eco-house), even though there were no differences between the two sites in their ability to encourage the adoption of conservation actions.
- ***Design interpretive experiences that help visitors** make connections between their visit and their daily **life.*** The barriers to action noted by visitors included the belief by some respondents that conservation action can only take place at uShaka Sea World or in Durban. This suggests that these visitors either did not see environmental behaviour as an action that could be done at home, or did not make the connection between the 'promise' to help penguins and the environment in general. It is suggested that exhibits that contain components of daily life may help visitors to see that what happens during a visit can be translated into action at home. An example of this may be to have more explicit examples of well-designed low-flow household items, such as showers or toilets, which would help visitors to view environmental behaviour as integrated into daily life. Similarly, Swanagan (2000) noted the importance of presenting real life conservation issues.

Limitations of the study

Inevitably a study of this nature is subject to a number of limitations. The study cannot generalise to all visitors, as those who made a promise and responded to the e-mail survey are likely to be more environmentally committed than other visitors. Also, those who had not kept their promise may have been reluctant to respond to the post-visit questionnaire. The challenges relating to measuring pro-environmental behaviour at home, viz., the absence of physical evidence and thus reliance on self-report data, limit the confidence that can be placed in the reported percentages of visitors who had made a positive change. For example, a social desirability bias may have influenced the results, leading respondents to report what they thought the researchers wanted to hear. However, the fact that so many visitors gave detailed comments on what they had, or had not done at home suggests a genuine engagement in or at least an awareness of environmentally responsible behaviours. It is also encouraging that many visitors who responded noted that they could not remember or had not kept their promise, indicating that they were trying to respond honestly. The influence of factors such as the frequency and difficulty of the pro-environmental behaviours was not addressed, nor was the issue of visitors reporting behaviours in which they were already actively engaged before their visit. These limitations have been noted in many studies of this nature (Ardoin et al. 2015; Hughes 2013) and they remain a challenge to researchers in this field. Further research is needed to test the concepts and recommendations discussed in this paper in other contexts, with different target species, and with more in-depth methods.

Conclusion

The *Penguin Promises* campaign has demonstrated that targeting aquarium visitors can result in an increase in environmental awareness and concern, strengthening of existing environmentally responsible behaviours, and the adoption of new everyday behaviours. People reported that feeling an emotional connection with the animals; developing an appreciation for the animals; learning from interpretive panels; and learning or gaining inspiration from staff had all influenced them to make and keep a promise. Very few studies have clearly identified the components of a successful conservation campaign (Schultz and Joordens 2014). This research has attempted to address this by identifying principles for supporting visitor adoption of conservation behaviour. It is hoped that the use of these principles in the design of similar campaigns in the future will help to achieve the mission of zoos and aquariums to positively impact visitors' adoption of environmentally sustainable behaviour in their everyday lives.

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Understanding and Influencing Perceptions about Marine Protected Areas Through an Aquarium Exhibit: A Multi-phase Case Study from South Africa

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Abstract

Visitors to Marine Protected Areas (MPAs) provide income and can help MPAs achieve their objectives, thereby contributing to the maintenance and restoration of ocean health. However, MPAs are less well known than terrestrial protected areas. Based at the uShaka Sea World aquarium in South Africa, this multi-phase case study sought to describe visitors' knowledge of MPAs; use the information to design a new temporary interpretive exhibit on MPAs and then use timing and tracking to assess visitors' engagement with the exhibit and a free response postcard system to assess the influence of the exhibit on visitors' perceptions of MPAs. Initial survey results showed that visitors had little knowledge of MPAs. Assessment after installation revealed some surprising levels of engagement and the free response postcards showed positive perceptions and a deeper understanding of MPAs. The results provide recommendations to enhance communication and engagement strategies both in aquariums and MPAs.

Keywords

Marine Protected Areas, interpretation, perceptions, knowledge, engagement

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Introduction

The first Marine Protected Area (MPA) was proclaimed in South Africa in 1964 and by 2015 a network of 23 coastal MPAs, protecting almost 18% of the coastline, had been promulgated (Branch & Branch, 2018). However, this was only 0.4% of South Africa's mainland Exclusive Economic Zone (EEZ) and South Africa had no offshore MPAs (Sink, 2016). In February 2016, the South African government announced a proposal to designate a network of 22 new or extended MPAs (Sink, 2016), which would increase spatial MPA coverage to approximately 5% of the EEZ. The proposed network of MPAs aimed to protect a representative portion of South Africa's marine ecosystems and went through an extensive public participation process (Sink et al., 2019). The MPAs were scheduled to be proclaimed in mid-2017. However, by mid-2018 there had been little progress with protracted negotiations stalling implementation (Findlay, 2020). In July 2018, to encourage the South African government to proclaim the new MPAs, the South African Association for Marine Biological Research (SAAMBR), in collaboration with the South African National Biodiversity Institute (SANBI), launched a temporary interpretive exhibit to highlight the role of MPAs in ocean management to uShaka Sea World aquarium visitors. The timing of the exhibit was important, as it spearheaded a national drive to build public support for the promulgation of the proposed MPAs, just before government deliberations regarding the new network were to take place.

This case study describes the process undertaken in the design, implementation and evaluation of the interpretive MPA exhibit. As the study by O'Leary et al. (2020) in Kenya was the only assessment of public knowledge and perceptions of MPAs in Africa (O'Leary et al., 2020), there was no information pertaining to South African's knowledge or perceptions of MPAs. Therefore, a baseline survey was undertaken (Phase 1). The results informed the development of the primary messages of the exhibit and their framing. The exhibit was then designed, constructed and installed. Summative evaluation provided information on visitors' use of the exhibit and perceptions of MPAs (Phase 2).

When designing the temporary exhibit, the following were taken into consideration: the location (halfway through the aquarium), the fact that the MPA exhibit was the only one in the aquarium with no live animals, the limited time people were likely to spend in the exhibit and that it would be manned by trained staff members. In line with the impacts of interpretation suggested by Hughes and Ballantyne (2013), the aims of the exhibit in this case study were for visitors to leave with -

i) A better understanding (knowledge) of what a MPA is; some of the benefits of MPAs to people; where some of South Africa's existing and proposed new MPAs are located and the fact that MPAs protect different ecosystems underwater, just as protected areas do on land.
ii) An emotional connection with the concept of MPAs and a sense of pride in South Africa's marine heritage (perceptions).
iii) No specific behavioral topics were addressed (behavior).

The following principles for effective communication contributed to the conceptualization and design of the exhibit: knowledge is necessary but should not be used in isolation; use emotional engagement, images, color, and a sense of pride; limit messages of loss; emphasize benefits; use persuasive communication; focus on future generations (Hesselink et al., 2007; Jenks et al., 2010; Mann et al., 2018, 2020; Maze et al., 2016; Moscardo et al., 2007; Salazar et al., 2019).

Three key research questions guided the case study:

a) What do visitors to uShaka Sea World know about MPAs? (Phase 1).
b) How did visitors engage with the MPA exhibit elements? (Phase 2).
c) What were visitors' perceptions of MPAs after visiting the exhibit? (Phase 2).

A Brief Background to Marine Protected Areas

South Africa is home to a network of terrestrial protected areas covering 9.2% of the land surface (Stats SA, 2021), and now a network of 42 coastal and offshore MPAs (Kirkman et al., 2021). Protected areas are popular tourist attractions and in the 2019 to 2020 financial year South Africa's national parks alone attracted over 6 million visitors, 73.6% of whom were South African (SANParks, 2020). MPAs play a similar role to their terrestrial counterparts in the conservation of biodiversity (Kirkman et al., 2021; Sala et al., 2021) and they contribute directly to human well-being through their roles in the local economy, tourism, education, emotional upliftment, research, and climate change resilience (Mann-Lang et al., 2021; Roberts et al., 2017; Sink et al., 2019). Unlike terrestrial protected areas, MPAs can also contribute to the productivity of adjacent marine areas through processes such as the spillover of fish from the MPA into adjacent fished areas, thereby directly benefiting coastal resource users and fisheries (Gell & Roberts, 2003; Kerwath et al., 2013).

The critical role of MPAs in the management of marine resources, the conservation of biodiversity, sustaining multiple ecosystem services and a myriad of social and economic benefits are well known within the marine science community (Grorud-Colvert et al., 2021; Sala et al., 2021). However, this knowledge needs to be shared more widely if the broader public are to understand and appreciate the role of MPAs in ocean conservation (Hawkins et al., 2016; Kotowicz et al., 2017). Internationally, calls for improved and more inclusive ocean literacy (Kelly et al., 2022; Worm et al., 2021), and specifically communication about MPAs, have been made for many years (Day et al., 2014; Grorud-Colvert et al., 2010; Martin et al., 2017). In South Africa, reviews of the state of MPAs (dating as far back as 1997) have reiterated the need for better public education and awareness (Attwood et al., 1997; Lemm & Attwood, 2003; Tunley, 2009). Improved communication with multiple stakeholders, is thus essential for the future of coastal MPAs (Pfaff et al., 2019; Uffman-Kirsch et al., 2020; Voyer et al., 2014).

Marine ecotourism, which takes place in marine and coastal environments, has grown faster than most other forms of tourism (Eagles & McCool, 2002). It has

been argued that both MPAs and aquariums could be considered to be on the continuum of marine ecotourism destinations (Mann & Vernon, 2013). Effective communication with such marine ecotourists—either in an MPA or an aquarium—is thus vital if MPAs are to receive the support needed for them to achieve their stated objectives. As trusted sources of information about marine conservation, aquariums are well positioned to provide information to visitors, thereby giving society a voice for MPAs (The Ocean Project, 2009). This voice is critical to ensure that governments are held accountable for decisions about MPAs (Earll, 2018).

Theoretical Foundation for Interpretation in Ecotourism

Conservation education in zoos and aquariums plays an important role in supporting the worldwide movement to build a society that supports the natural world (Thomas, 2020). Critical to achievement of this role is effective interpretation. According to Carter (2001, p. 3), interpretation is "helping people appreciate something that you feel is special," while other definitions of interpretation include the ability to "excite, delight, and awaken the senses" (Moscardo et al., 2007). In wildlife-associated educational leisure settings, such as zoos and aquariums, interpretation can be used to raise awareness of the special nature and fragility of a site, exhibit or ecosystem. It can also be used to build an understanding of the connections between components of the ecosystem or exhibit and enhance a realization of the interrelationships between humans and the animal, site or ecosystem (Ballantyne et al., 2009). Interpretation should provide the link between what is seen and felt, and what is understood by the visitor. Good environmental interpretation, can be considered to be "mission-based" as it can transforms the visitor's experience from simple entertainment to one of meaning and longer term value that has the potential to build intellectual, emotional, and physical connections between visitors and the environment (Ballantyne et al., 2007; Hughes & Ballantyne, 2013; Mellish et al., 2016). The mission-based nature of interpretation is ideally positioned to build support for MPAs through forging emotional and intellectual connections between the interests of the visitors and the meanings of the protected area (Martin et al., 2017; Moscardo et al., 2007; National Association for Interpretation (NAI), 2018). However, effective interpretation requires an understanding of the audience (Hughes & Ballantyne, 2013; Mellish et al., 2016), who have varying motives, interests, perceptions, and knowledge. An understanding of perceptions is seen to be increasingly important in conservation decision-making (Bennett, 2016). While much social science research in MPAs has focused on specific stakeholders such as fishers or other resource users, it has been noted that the perceptions of the public about MPAs are increasingly important, especially as public thoughts and actions can impact MPA success, particularly through their influence on democratic processes and political decisions (Gollan & Barclay, 2020; Jefferson et al., 2021).

Methods

Research Site

uShaka Sea World is the largest saltwater aquarium in Africa and is situated in Durban, KwaZulu-Natal (KZN) on the east coast of South Africa. The aquarium, consisting of six exhibit galleries and a large temporary exhibit hall, is home to over 1,000 marine species, housed in specially designed exhibits. uShaka Sea World is operated by the South African Association for Marine Biological Research (SAAMBR), a non-profit, non-government organization committed to marine conservation. Over 10 million people have visited the site since opening in 2004. Most (95%) visitors are South Africans, and of these (64%) are tourists from outside of KZN (Mann, 2016). The high percentage of local visitors made the site ideal for this case study, which was focussed on South Africans.

Phase 1

What Do Visitors to uShaka Sea World Know About MPAs? An English language questionnaire was designed to determine visitors' knowledge of MPAs and to collect basic demographic data. The three knowledge questions were:

1. Briefly describe a Marine Protected Area (MPA) in your own words.
2. Name three MPAs in South Africa.
3. Why do you think we have MPAs in South Africa?

A pilot test conducted with 58 SAAMBR staff members ensured that the questions could be easily understood by respondents whose home language was not English. Data were collected in the uShaka Sea World aquarium from 224 South Africans between August and September 2018. The questionnaires were administered by two trained survey clerks to visitors 18 years and older. Visitors were informed about the survey through a signboard and were approached using a "next to pass" convenience sampling method. A visitor was approached, if they agreed to participate, they completed the questionnaire and then the next person to pass a selected point was approached. If they refused, the next person to pass the selected point was approached. Visitors were free to decline to participate in the survey and a refusal log was kept. Those who accepted were informed that they could stop at any time. Approval for the project was received (2018/08/21) in accordance with the SAAMBR Ethics Policy. No personal information was entered into the database and all paper-based surveys were destroyed after the relevant data had been captured electronically.

The quantitative data were analyzed in the SPSS statistical software package Version 22. The qualitative data were coded by two independent researchers. Coding was undertaken in an iterative manner to ensure that responses were correctly coded. Patterns emerging from the coding were detected and analyzed (McLellan et al., 2003). To determine if a response to questions 1 and 3, was "broadly correct" the answers needed to include key words (or synonyms) described below.

1. Describe a MPA—key words included those related to protection, avoid damage, look after, regulations, monitoring, preserve, or conserve and words with a similar meaning, or those that related to activity restrictions with respect to access, fishing, boating, diving or those that related to benefits to people such as tourism, food, employment, recreation, pleasure, enjoyment.
2. Why do we have MPAs—key words included protect, save, care for, preserve, look after, ensure survival, prevent extinction, for future generations, for research or education, recreation, pleasure or fun.

The answer to question 2 was scored as 0, 1, 2, or 3, depending on the number of MPAs correctly named.

Exhibit Design. The information on visitor's knowledge of MPAs gathered in Phase 1 was used to inform the content and design of the exhibit, which was launched at the end of September 2018.

Phase 2

How did visitors engage with the MPA exhibit elements?
What were visitors' perceptions of MPAs after visiting the exhibit?

Visitor engagement in the exhibit was assessed through unobtrusive paper and pencil timing and tracking of visitors. This method provides quantitative data on the time visitors spent in the exhibit (dwell time) (Francis et al., 2007; Smart et al., 2021) and the number of visitors who stopped and engaged with different elements (an image, video, or interpretive sign) in the exhibit, also known as Stopping Behavior (Cole et al., 1997; Settina et al., 2020; Yalowitz & Bronnenkant, 2009). It also provided an opportunity to record interactions within visitor groups in the exhibit and between visitors and staff. Engagement was recorded when a visitor stopped and spent more than 10 s reading or viewing an element. Two trained observers, who were not wearing staff uniform, recorded data on 7 days in April and May 2019 and each observer spent between 3 and 4 hr in the exhibit each day. The first visitor to be observed was selected at random as they entered the exhibit, when that visitor or group had exited the exhibit the next visitor to enter was observed. Only visitors who appeared 18 years and older were observed, although some groups included children. A total of 187 visitors were observed.

The initial plan was to collect signatures on postcards to create a petition to send to relevant government officials to encourage them to proclaim the new MPAs. However, on the 25 October 2018, just a month after opening the exhibit, the South African Government announced the Cabinet Decision to proclaim the new MPAs. This necessitated a change in approach and the postcard was redesigned to allow visitors to express their perceptions of and support for MPAs. Postcards were placed at the exit of the exhibit and could be completed and posted into a penguin themed post box (Figure 1). A total of 526 visitors answered the question "*I support Marine Protected Areas because . . .*" on a postcard. The answer to this question enabled us to gain an

Figure 1. The penguin model post box and orange postcards at the exit to the MPA exhibit at uShaka Sea World, Durban, South Africa.

insight into visitors' perception of MPAs. These open-ended responses were analyzed by first identifying themes of meaning across the data. Thematic analysis enables analysis of more complex data such as interviews (Braun & Clarke, 2006) however, it is flexible and worked for these shorter responses. Similar words or phrases were grouped, and the percentage frequency of similar words written down by participants was calculated. This provided insight into the most mentioned words and themes.

Results

Phase 1—What Do Visitors to uShaka Sea World Know About MPAs?

Demographics. Consistent with other research undertaken at uShaka Sea World (Mann, 2016), more females (61.2%) than males responded to the questionnaire and 67% of the respondents were tourists from outside of KZN. Just under half (43.8%) of the

Table 1. Some Examples of Responses to the Question "*Briefly Describe a Marine Protected Area in Your Own Words"* Divided into Those That Focused on the "Conservation" Aspect of an MPA and Those That Focused on Prohibition of Human Activities.

Protect, save, conserve (72 responses)	Prohibition of human activities (54 responses)
A game reserve for fish	Area where controlled fishing or no fishing allowed. Areas that are patrolled and monitored
Marine protected area is an area which is protected for the sea fish and small animals which live in the sea	An area where you may not access publicly to use for swimming or fishing
To stop the extinction of marine life and learn how to protect them	Areas where all marine life are *protected* by law, so example no fishing allowed
An area of the ocean that is *protected* by an official organization	Areas where certain activities are restricted for example fishing
Area of water that is *protected* not an area for people	Area in the sea where no one can go fishing, hunting, no one can damage the coral etc.
A section of ocean seashore and coastal forest where flora and fauna are protected	It's an area that is excluded from fishing and is looked after by marine workers

visitors were from coastal provinces. Almost three quarters (70.5%) of the visitors who completed the survey were under 40 years of age. Only 14% of the respondents noted that they did no ocean related activities when visiting the coast, with most of the remainder noting that they either walked on the beach (30.6%) or swam (33.7%) in the sea. A total of 44.2% noted that they participated in an ocean-related activity, with 60% of these doing one of the following activities [recreational fishing (9.2%), diving (10.6%), surfing (5.8%), boating (10.1%)].

Knowledge. Just under half (48.7%) of the respondents said that they did not know what an MPA is. A total of 115 (51.3%) of the respondents said that they knew what an MPA is, and of these 89 (39.7% of all respondents) described a MPA in broadly correct terms. These participants stated that MPAs are areas that protect, preserve, or conserve the marine environment as well as restrict human activities and exploitation of resources, particularly fishing. Of the visitors who could broadly describe an MPA, most associated it with some form of restriction, an area were certain activities are prohibited (Table 1). The words "no," "not allowed," and "prohibited" featured in 36% of the descriptions. A few participants had a slightly deeper understanding and described MPAs as areas where fish can breed, where pollution was not allowed, endangered species are protected, or an area that will help prevent extinction of marine animals. Protection from mineral extraction and offshore MPAs were noted by none and one respondent, respectively.

Despite the apparent knowledge of what a MPA is, 78.6% of respondents could not name one South African MPA (Figure 2). Only 6.7% of the respondents could name three MPAs in South Africa. The most named MPAs were those in the

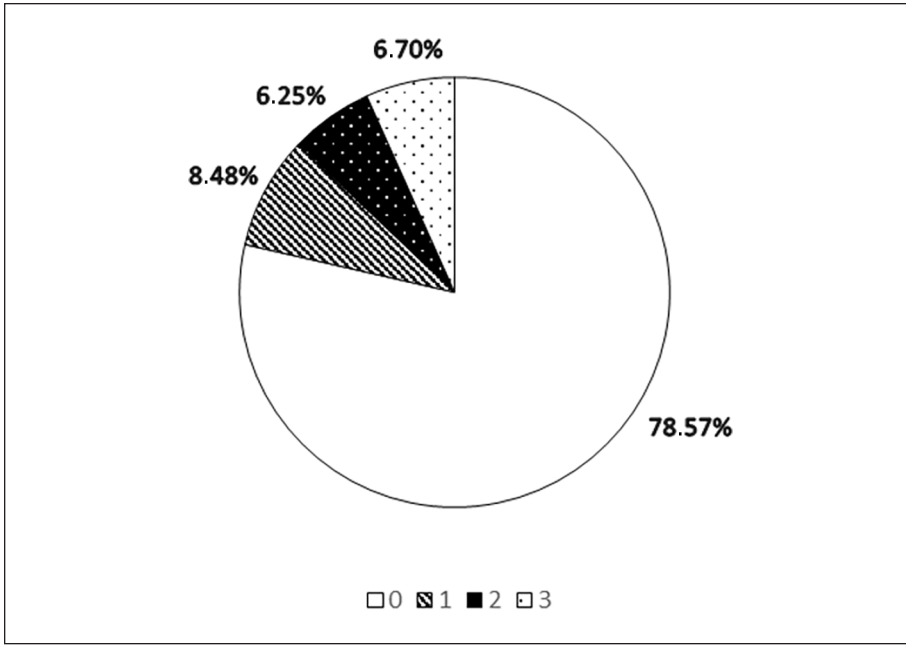

Figure 2. Percentage of visitors who could not name any MPAs (78.57%) or could correctly name 1 (8.48%), 2 (6.25%) or 3 (6.70%) MPAs in South Africa.

iSimangaliso Wetland Park (IWP) in northern KZN (mentioned 44 times). The Aliwal Shoal MPA on the KZN South Coast was mentioned 10 times and the Pondoland MPA in the Eastern Cape was mentioned eight times. South Africa's oldest MPA, the Tsitsikamma National Park, was only mentioned six times. Interestingly, aquariums were mentioned by 20 respondents as examples of MPAs, suggesting that visitors perceive such facilities to be "safe places for animals" and that an aquarium is related to the idea of "protecting marine life," thus confusing them with MPAs. For example:

- *"Area where certain species of marine life are kept protected to prevent extinction" (e.g., Two Oceans Aquarium, uShaka, East London Aquarium).*
- *"Where different species are kept to keep them safe" (e.g., uShaka, Two Oceans Aquarium).*
- *"An area where people can't harm animals from the sea" (e.g., uShaka, Two Oceans Aquarium).*

In response to the question about why South Africa has MPAs, 43% could broadly explain the rationale for a MPA. Of the participants who could broadly describe why South Africa has MPAs, most (95%) said that they were needed to protect, conserve, or preserve the marine environment (Table 2). Answers that specifically mentioned

Table 2. Examples of Responses to the Question "*Why Do You Think We Have MPAs in South Africa?*" Divided into Responses That Focused on Protection for Marine Life and Benefits to Humans.

For marine life (95%)	For human benefit (20.6%)
To *conserve* our sea life and ensure that they are not affected by human negligence	To prevent extinction, conservation, for future *generations*
To *protect* species from extinction	To protect our marine life for *generations* to come
To *protect* our sea life	To protect our fishes particularly *sea food*
To *ensure* a healthy ecosystem within sea life	To keep protected, to *educate* others about the sea life
To *protect* fish marine life from going extinct or becoming endangered	To conserve the marine life for future *generations* and our survival as humans since we are all connected to the web of life
Protect wildlife, oceans, fish stocks	It is important to have MPAs so that our *future* can see what we have seen
To *protect* our ocean life from overfishing and provide safe breeding grounds for marine life	To avoid animals from getting harmed and extinct. For next the *generations* to enjoy sea life

that MPAs are needed to prevent extinction, or to protect endangered animals and/or to provide protection for breeding stocks for fish, were included in a third (34%) of responses. The role of MPAs in conservation of marine life for future generations and being tools for education constituted 21% of the responses (Table 2). These answers show that some respondents are aware of the role of MPAs in marine conservation, but few see the benefits of MPAs to humans.

Variables. Using a significance level of $p = .05$, there were no significant differences between genders with respect to knowledge of MPAs. A one-way ANOVA confirmed that visitors older than 50 knew significantly more about MPAs than younger visitors [Describe: $F(1,222) = 17.125$, $p < .001$; Why: $F(1,222) = 7.114$, $p = .008$; Number named: $F(1,222) = 10.373$, $p < .001$]. Using a chi-square test, visitors from coastal provinces knew significantly more about MPAs than those from inland provinces [Describe: χ^2 (1, $N = 224$) $= 7.671$, $p = .006$; Why: χ^2 (1, $N = 224$) $= 13.591$, $p < .001$); Number named: χ^2 (3, $N = 224$) $= 10.230$, $p = .017$].

Exhibit Design

The results of Phase 1 revealed visitors' limited knowledge about MPAs, therefore the exhibit needed to introduce the concept of a MPA and enable visitors to personally connect with the concept. The exhibit led visitors from the familiar to the unfamiliar, building a bridge from visitors' knowledge about terrestrial protected areas (game reserves as they are called in South Africa) to marine protected areas. The Kruger National Park is the best known terrestrial protected area in South Africa; hence the

term "*Kruger National Parks of the Ocean*," to help visitors link a familiar concept—a game reserve, with an unfamiliar concept—a marine protected area.

To clarify this terrestrial–marine link, an interpretive graphic (Figure 3) was designed that included: a map of South Africa's terrestrial conservation areas and the ecosystems they protect, a map of the South African coastline showing current MPAs in relation to coastal towns, and a map of the South African EEZ with the proposed new MPAs and the ecosystems these MPAs would conserve, as well as photos showing a special feature of each MPA. The map helped to address visitors lack of knowledge of different MPAs along the coast. The headlines focused on pride (South African heritage) and a familiar African design was used as a border around the interpretive panels.

As benefits of MPAs to people were largely unknown by visitors surveyed in Phase 1, a smaller interpretive panel listed social and economic benefits of MPAs and provided a more detailed explanation of what a MPA is, again drawing on the analogy to terrestrial protected areas (Figure 4). MPAs were framed as solutions using words such as "insurance," "investment," "benefit," and "safe haven." To address the largely negative associations with MPAs expressed in Phase One, words such as "decline," "depleted," and "threatened" were avoided, as were words associated with activity controls such as "restricted," "closed," or "prohibit."

To enhance visitor's opportunities to learn about the new MPAs, black walls provided a backdrop for a series of 22 large framed and backlit photos (Figure 5), each highlighting a single feature of each of the proposed new MPAs. Other exhibit elements included: a children's corner for coloring in and an interactive magnetic board; a display case with dried marine specimens (artifacts) and a large screen for a specially created video MzanSea https://www.youtube.com/watch?v=LI7Xx21ESoY.

Phase 2

How did visitors engage with the MPA exhibit elements?
What were visitors' perceptions of MPAs after visiting the exhibit?

Visitor engagement. Of the 187 visitors who entered the exhibit during the observation period, 115 spent less than 30 s in the exhibit. Only 38.5% (72) visitors spent more than 30 s in the exhibit. Of these, 82% spent up to 5 min in the exhibit, 12.5% spent between 6 and 10 min and 5.5% spent more than 10 min engaging with staff and elements in the exhibit. Visitors engaged with, in decreasing importance, the central graphic panel, the video screen, the display case, the child activity, the secondary graphic panel, and the penguin model.

The central graphic with the map drew the most attention as visitors took time to understand the map and find places that they knew. Visitors tried to position the location of an MPA in relation to a familiar town, often noting that they did not know that an area they had previously visited was a MPA. The position of the central panel was important as it could be seen directly from the entrance. The headline was large and visitors could read it as they entered. Adults with children used the graphic panels to

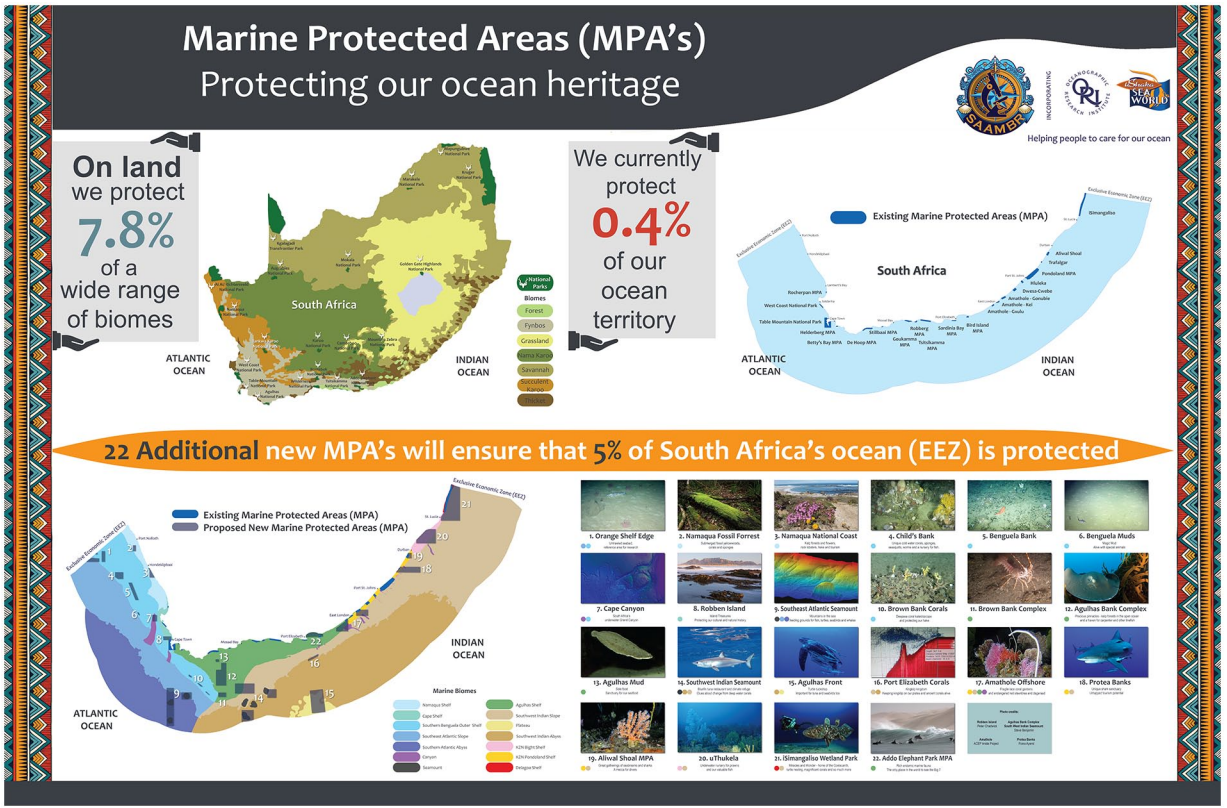

Figure 3. Central interpretive graphic panel to introduce marine protected areas in the temporary exhibit hall at uShaka Sea World, Durban.

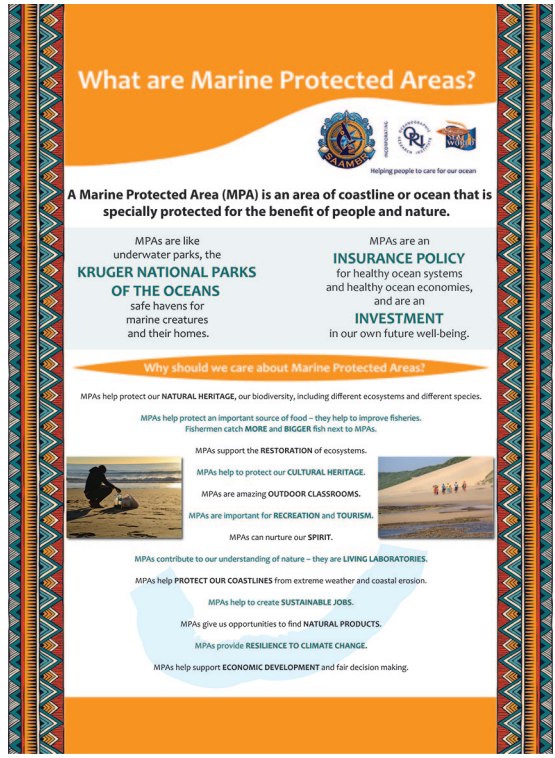

Figure 4. Secondary MPA graphic panel. "What are Marine Protected Areas?" in the temporary exhibit at uShaka Sea World in Durban, South Africa.

explain to the child about MPAs. The map also gave staff an "opener" to a discussion with the question "Where do you live?"

Of the framed images, those with animals attracted the most attention. These animals were not necessarily large or familiar. In fact, a popular image was of a sandy seabed with a few brittle stars and a colorful red fish. Surprisingly, images that were difficult to understand often drew visitors' attention as they tried to understand the image, leading to insightful discussions with staff. Many visitors took photos of graphic panels and the framed images. The video attracted attention as it was colorful and featured a well-known music celebrity.

Perceptions of Marine Protected Areas. The following themes emerged from the coding process undertaken on the responses to the question "I support Marine Protected Areas because . . .": Protection, Love, Legacy, Current Use, Animal Focus, Personal Action, or Spiritual. The analysis of the postcards are presented in Table 3.

Figure 5. One display wall in the uShaka Sea World aquarium MPA exhibit hall showing the large screen and smaller back-lit framed.

Words associated with protection and conservation were the most frequently mentioned on the postcards (35.6%). This was closely followed by responses that suggest a personal connection to marine life with the use of words associated with love or care (30.4%). Over 18% of visitors mentioned the future, future generations, or their children, with many responses noting that MPAs would ensure that resources or marine "heritages" would be safe for years to come. Postcards with comments associated with human use value were noted in 9.9% of the responses. A smaller percentage (6.5%) of responses noted the idea of ensuring that animals have a future for the sake of the animals. A few respondents noted a personal action related to ocean protection (3.2%) or a religious perspective (2.3%). In combination, over half (63.6%) of the postcard responses (protection, legacy, human use) demonstrated that the visitor had thought about a MPA and what it meant to them.

Discussion

Visitor Knowledge of Marine Protected Areas

Marine protected areas are a critical tool in the marine conservation toolkit, however, communicating about MPAs is difficult as much of what is being protected is seldom seen. The challenges of communicating the value of protecting the ocean are compounded

Table 3. Frequency of Each Response Category to the Open-ended Postcard Question "*I support Marine Protected Areas because. . .*," with Associated Examples. Visitors' Postcards were Completed after Viewing the MPA Exhibit at uShaka Sea World.

Category	Percentage of responses (%)	Examples of responses "*I support Marine Protected Areas because. . .*"
Protection	35.6	They will protect our ocean's resources from being over utilized and help the oceans recover from decades of abuse
		It helps in monitoring of marine biodiversity and it is where marine living organisms can thrive well since there is less human interference
		They provide undisturbed habitats for indigenous plants and animals that are rare to be protected, and increase biodiversity
		We need to look after our sea animals as much as we need to look after land animals
		We are all linked and dependent on one another directly/indirectly. We need to help and defend those who cannot do it themselves
Love	30.4	I love sea animals
		I want to help save sea animals. I love sea animals
		I love animals they deserve to live too
		They keep the animals. I love alive
		I care about the ocean and the many species
Legacy	18.6	It's fundamental for future generations to protect the oceans to enjoy and use as an educational resource
		They are investment into the future populations. A great way to protect our marine heritage
		It forms part of our beautiful country and we need to share the beauty of our oceans for generations to come
		I would love for my children to also get to see marine animals, instead of just reading about them
		We need to protect our oceans creatures for future generations to enjoy. Also to keep our ecosystem working. Wish we had a lot more.

(continued)

Table 3. (continued)

Category	Percentage of responses (%)	Examples of responses "*I support Marine Protected Areas because. . .*"
Current use	9.9	They contribute to our economy, health and education by providing clean oxygen to us and also help us to learn and care for animals that we don't often see
		They secure marine habitats so that people and nature can benefit. Animals that live there can reproduce and grow better
		They conserve marine life. Great for tourism. It makes me proud to know what's in the sea. Also provide job opportunities
		If the ocean ecosystems are not maintained life all over earth is affected
		They are vital to the survival of many species (nurseries for young) (some endangered species live there) and they increase ecotourism
Animal focus	6.5	Sea animals are important
		All animals deserve to live
		The animals have just as much right to live as humans
		Our oceans contain beautiful marine life
Personal action	3.2	I am currently studying environmental management. I would like to know more about marine threatened species
		I'm not going to litter in the ocean and protect sea life
Spiritual	2.3	Ocean and the world is our mother and the creation by the one who has given us life
		God created them for us to protect

when people have limited ocean experience or know little about the ocean or the value of the ocean in sustaining life on earth. However, for MPAs to be accepted politically and socially it is essential that people understand their benefit to humans. International calls for more MPAs, including the 2022 Kunming-Montreal Global Biodiversity Framework (Convention on Biological Diversity (CBD), 2022) are progressively more reliant on generating public interest in MPAs, to support the achievement of these goals.

While very few respondents had a good understanding of what a MPA is, there appeared to be some understanding of the concept. The three words *Marine—Protected—Area* may have primed respondents (Chalmin-Pui & Perkins, 2017), leading to recording a higher than actual understanding of the concept. This is confirmed by the number of respondents who thought that an aquarium is a MPA or who could not name a single MPA. This suggests that visitors' understanding was very superficial and that the question primed responses. Although Cele et al. (2017) found some awareness of MPAs amongst stakeholders on the KZN South Coast, the results of this study highlight that, for most South Africans (especially those from inland provinces), MPAs have little meaning. This is similar to findings elsewhere (MPA News, 2000; Tydlaska & Edwards, 2022) and supports the international call for improved communication about MPAs (Davis et al., 2014; Day et al., 2014). The Marine Protected Areas Day, launched in South Africa 2021, may contribute to building greater awareness of MPAs amongst a wider audience https://mpaday.org/. The finding that younger people knew significantly less about MPAs than older visitors highlights the need for greater communication efforts to be directed at the youth. The new Youth4MPAs initiative in South Africa may contribute to raising awareness of MPAs amongst the youth of South Africa https://youth4mpas.com/.

The visitors that had some understanding of MPAs, viewed them as places where human activities are restricted or prohibited, evidenced by the frequency with which the word "no" featured in descriptions. Regulatory signage is commonly used to communicate about MPAs *in situ*. Unfortunately, this signage reinforces the impression of MPAs being for nature and not for people (Figure 6). This negative association may account for some of the opposition to MPAs (Voyer et al., 2014). In addition, most respondents thought that MPAs only protect nature from human impact and very few respondents mentioned the benefits of MPAs for people. These results suggest two focus areas for communication—human benefits and the multiple uses of MPAs. This has implications for communication about MPAs in general, and particularly amongst stakeholders such as tourists. Visitors to protected areas in South Africa consider learning to be an important motivation and it has been suggested that such protected areas should educate tourists through information boards, talks, videos, and displays (Kruger & Saayman, 2010; Van der Merwe et al., 2020). As management plans for MPAs are developed and implemented, it is recommended that these include a focus on effective communication. Communication that focuses only on restrictions are unlikely to generate support and without the support of people, including tourists, coastal MPAs are unlikely to succeed (Bennett & Dearden, 2014). As noted by Tuohy et al. (2022) and Tydlaska and Edwards (2022), informative and positively worded informational signage may be effective at generating support for marine protection in

Figure 6. Regulatory signage for the Trafalgar Marine Reserve in South Africa showing the emphasis on negative messages (Photo by Peter Chadwick).

situ, while simultaneously meeting tourists' need to learn. Ballantyne et al. (2009) suggest that wildlife tourism management practices should enlist tourists as conservation partners and communicate the reasons behind restrictions.

Although behavior change was not a goal of this exhibit, interpretive signage in a MPA should encourage and support pro-environmental behavior while visiting the MPA, and after the visit, and thereby contribute to ocean literacy and broader ocean friendly behavior (Stoll-Kleemann, 2019). Bearing in mind the social and psychological drivers of behavior described by Martin et al. (2017), interpretive signage in MPAs should emphasize the pro-environmental behaviors that tourists can undertake while visiting the MPA, and explain the rational for the regulations, to encourage support. Interestingly, visitors in this study often expressed surprise that a coastal area that they had visited was a MPA. There is currently limited interpretation, or facilitated experiences, to support tourists' learning in most South African protected areas (Van der Merwe et al., 2020) and recent research in the Aliwal Shoal MPA in South Africa highlighted an urgent need for interpretive signage to communicate with people visiting the MPA (Francolini et al., 2023). This signage should, at the very minimum, highlight the fact that the area is a MPA. The results of this study can contribute toward the design of more effective interpretation of MPAs in South Africa and thereby address the critical need for better interpretative signage in the country's coastal MPAs.

Visitor Engagement

As the MPA temporary exhibit competed with exceptional live animal exhibits, the short dwell time of most visitors was expected, however, the relatively high level of engagement and dwell time of some visitors was surprising. Dwell time compared favorably to other studies (Francis et al., 2007; Mortan & Yalowitz, 2003; Yalowitz & Bronnenkant, 2009). Although relatively few visitors spent a long time in the exhibit, more meaningful engagement with fewer visitors was considered preferable to superficial engagement with most visitors. Moss et al. (2010) noted that a longer dwell time is not necessarily indicative of greater engagement, however, in this case study, visitors who spent a longer time in the exhibit did appear to be actively seeking information—either from the signage or staff. The beautiful images, clear interpretive graphics and the video all held visitors' attention, confirming the finding of Smart et al. (2021) and Huang et al. (2022) who recommended using a mix of traditional and digital media to support interpretation in free-choice learning environments. Interestingly, the more unusual images stimulated curiosity and sparked discussions which may have contributed to meaningful learning as suggested by Ballantyne and Packer (2005). As was noted by Moss et al. (2010), the bright colors of the signage, noticeable in this case study in the African themed print, attracted visitors' attention.

Visitors' use of the maps was interesting. The maps stimulated engagement between visitors within groups as they interacted with the map and with each other; the maps also helped visitors to link prior knowledge (of towns that they knew) to new knowledge (location of the MPAs). Through this they were able to discover the location of some MPAs. While it is known that maps can build an understanding of and support for marine spatial planning (Ban et al., 2009; Lombard et al., 2019), this study provides novel evidence of the value of maps to communicate spatially complex information in a relatable manner about MPAs.

Perceptions of Marine Protected Areas

It appears that, for over half of the respondents, the exhibit influenced perceptions, evidenced by their detailed responses, which included concepts from the exhibit. The postcard responses suggest an understanding of the concept of a MPA and knowledge of the benefits (human use values) of MPAs to people. This contrasted with the results of Phase One, in which respondents were largely unaware of even the existence of MPAs. Although the two samples are not directly comparable (the data were collected using different methodologies), it does suggest that the exhibit enhanced respondents' knowledge of MPAs. Maze et al. (2016) recommended that framing biodiversity as a "national asset" was relevant to a South African audience. Interpretation emphasized the role of MPAs in conserving South Africa's unique biodiversity for human benefit and responses suggest that this framing was effective.

Emotion, as evidenced by frequent use of emotive words, featured in a third of the postcard responses, suggesting that an emotional attachment to the ocean, marine animals or a specific animal was a primary motivator for a positive response. The role of

affective engagement in generating support for conservation in zoos and aquariums is documented (Ballantyne et al., 2011; Clayton et al., 2009; Skibins & Powell, 2013), however, its potential in building ocean literacy and communicating positively about MPAs has only recently been realized (McKinley & Burdon, 2020). Personal connections to the ocean and specific marine animals were evident in the postcard responses. It is unlikely that the exhibit inspired these personal connections, suggesting that visitors who felt connected to the ocean were more likely to complete a postcard. Further research is needed to determine how to reach less interested visitors, rather than simply encouraging the predispositions of already engaged visitors (i.e., preaching to the choir) (Luebke, 2018).

It was interesting to note that one of the most common motivations to support MPAs was to protect marine life for future generations. This aligns well with previous research in South Africa which noted that a responsibility to future generations motivated pro-environmental behavior (Mann et al., 2018) and the findings of Maze et al. (2016) that framing biodiversity as "our children's legacy" can be effective.

Limitations and Future Research

This project was undertaken with limited funding (less than USD 2,800) and a within narrow time frame and as such several limitations should be noted:

- The post card data was only able to capture the perceptions of those who had the time and desire to respond. It was noted that when visitors were in a hurry, when the area was busy or when visitors were accompanied by noisy children, they often ignored the post-box. Visitors with negative perceptions of MPAs were unlikely to complete a postcard, and no negative responses were recorded. The results are therefore biased to those with more positive views on MPAs.
- The post-visit data were not directly comparable with the pre-exhibit data. This means that assessment of changes in visitor knowledge of MPAs could not be directly measured.
- The timing and tracking of visitors should have been undertaken over a longer period to better understand visitor behavior in the exhibit.

Addressing the above limitations can guide future research. Specific suggestions include the development of techniques to capture negative perceptions and research that enables direct comparison between pre- and post-visit knowledge and perceptions. In addition, research on how to improve interpretation within MPAs is needed to ensure that every opportunity to reach visitors is optimized.

Implications for Practice

This project has provided valuable insights for the design of future interpretation on MPAs for multiple stakeholders, including tourists, and is relevant for both *in situ and ex situ* environments:

- Understand the target audience through appropriate social research.
- Help connect the audience to the topic by building from the familiar to the unfamiliar.
- Capitalize on emotional connections to marine animals to generate support.
- Where appropriate, use maps with familiar landmarks to engage and inform.
- Share the benefits of MPAs to people.
- Include protecting nature for future generations and pride in a national asset in the framing.
- Emphasize the positive and use supportive language. Positive words that generate support for MPAs rather than negative words should be used. Information on pro-environmental behavior acceptable in the MPA should be stressed, rather than emphasizing what cannot be done.
- Develop communication specifically for the youth.

Conclusion

This paper has provided the second assessment of public knowledge and perceptions of MPAs in Africa and thereby starts to address the geographic gap in marine perception research noted by Jefferson et al. (2021), as well as addressing the importance of increasing our understanding of the conservation effect of interpretive programs among non-Western audiences noted by Mellish et al. (2019). Some of the methodological gaps noted by Jefferson et al. (2021) were addressed through the unique nature of the study. The case study provides insights to guide future interpretation about MPAs both in aquariums and in situ. For MPAs to be effective they need the active support of a range of stakeholders, including visitors. Therefore, better engagement with this sector is vital. Firstly, appropriate signage is needed to inform visitors that they are, in fact, visiting a MPA. Thereafter, the unique aspects of the area can be interpreted to inspire and inform, through building personal connections between tourists and the animals or ecosystems prominent in the area—many of which will be underwater. Information should be relevant to multiple visitors and site specific. In situ communication efforts should also include information about environmentally positive behaviors that visitors can undertake while in the MPA, including information on the rationale for the behaviors. It is hoped that these recommendations will help visitors to better support MPAs—both during their visit and thereafter.

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