



REPORT
GREEN BUBBLES LAUNCH
PONTA DO OURO PARTIAL MARINE RESERVE (PPMR)
5/6/2015-25/6/2015



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GREEN BUBBLES RISE

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INTRODUCTION

The bulk of the work constituting Work Package 1 (WP1) includes a baseline assessment of the diving 'system'. Such a baseline assessment involves the collection of relevant information from all key stakeholders in the 'system'. Diving charters owners and managers constitute one of the most important interfaces between diving tourists, diving operators, researchers, citizen scientists, the relevant authorities, local communities (e.g. local businesses, inhabitants and municipalities), various markets (e.g. technology), and the environment. Therefore, the first step of the baseline assessment was the analysis of diving operators' perceptions of the diving 'system'. For this analysis, the focus was primarily on the two main case studies selected for Green Bubbles (GB), namely the Portofino MPA (Italy) and Ponta do Ouro, located in the the Ponta do Ouro Partial Marine Reserve or PPMR (Mozambique) (Figure 1).

The following report summarizes the outcomes of a questionnaire survey and semi-structured interviews which were held in Ponta do Ouro (Mozambique), between the 8/6/2015 and the 25/6/2015, following the official launch of the GB project on World Oceans Day (8/6/2015). The report also briefly summarizes the outcomes of the first two questionnaire surveys with scuba diving tourists in Ponta do Ouro, which constitute part of the strategy of WP1.

The launch of GB in Ponta do Ouro was intended as a way to meet with the representatives from the diving and swim-with-dolphins charters of the area, and to officially introduce the GB project to the diving industry in Ponta do Ouro. The event was attended by a total of 14 people, including staff from GAIA, UBICA, TREES (NWU), diving charters (six people), swim-with-dolphins charters (two people), and the PPMR (the manager). The questionnaire survey was carried out on the same day as the launch, with a total of six representatives from three diving charters and the only two swim-with-dolphins charters in Ponta do Ouro participating. The semi-structured interviews were carried out separately from the questionnaire surveys during the month of June 2015, and involved seven representatives (four diving charters, two swim-with-dolphins charters, and the PPMR). Regardless of whether they had participated in the launch, the questionnaire survey, or the semi-structured interviews, most diving charters were invited to enterprise collaboration with the GB project by means of signing a Memorandum of Understanding (MOU), which they could exit at any point during the course of the project. So far two diving charters have officially joined GB.

The aim of the questionnaire survey and semi-structured interviews with the charters was to take a 'first dive' into the exploration of the diving industry and the diving 'system', primarily from the perspective of business owners and managers in the industry itself. The data collected represented opinions and views concerning themes underlying the three main pillars of sustainability, namely social, environmental, and economic. The results of

this first analysis provide information which will be useful in the formulation of new assessments throughout the course of GB.

During the month of June, the first two questionnaire surveys with the diving tourists were also carried out in Ponta do Ouro. The main aim of the first survey was to understand divers' attitudes towards Citizen Science. The purpose of the second survey was to evaluate divers' experience in Ponta do Ouro, perceptions on the negative impacts of diving, and self-reported diving behavior. The data from this last survey will be compared with data collected during underwater observations of diver behavior. During the surveys, two diving schools (one from Johannesburg and one from Pretoria, South Africa), expressed their interest in GB. This interest resulted in them officially joining the project by signing the MoU.



Figure 1. Map showing the Ponta do Ouro Partial Marine Reserve (PPMR) in Mozambique. Credits: Peace Parks Foundation <http://www.peaceparks.org>.

MATERIALS AND METHODS

QUESTIONNAIRE SURVEY—CHARTERS

Questionnaire structure

A structured questionnaire was developed during January and February 2015 by members of TREES (NWU), GAIA, and UNIVPM. The questionnaire was characterized by four main sections.

The first section (section A) included seven questions covering demographic details such as gender, age, and education. The second section (section B) included ten questions covering

details on the diving charters (later also referred to as diving businesses), although also the only two swim-with-dolphins charters in Ponta do Ouro participated in the survey. These questions covered aspects such as location, size (number of vessels, number of staff during the diving season), productivity (logged dives) over the last five years, and business seasonality. The third section (section C) included six questions covering details on diving experience, for example number of dives logged, years of diving, diving frequency (per year), and a list of all obtained certifications and relevant certifying agencies.

The fourth and last section (section D) included a total of 81 items in one question. The question invited the participants to indicate their level of agreement (using a 5-point Likert scale) with a list of statements concerning the scuba diving industry. These statements covered nine broad themes, including personal (e.g. quality of life), social (e.g. support to and by the local community), economic (e.g. revenue generated by the industry) environment (e.g. impacts, conservation), governance (PPMR), communication (e.g. between the industry and the community, the PPMR, and scientists), science (e.g. interest and support), cooperation and promotion (e.g. using social networks to promote the business), and tourism (e.g. behavior, safety).

Questionnaire administration

In May and June 2015, the diving charters operating in Ponta do Ouro (eight in total), one diving charter operating in Ponta Molongane (within the boundaries of the PPMR and located north of Ponta do Ouro), and the two swim-with-dolphins charters in Ponta do Ouro were invited, either through email or in person by members of GAIA, UBICA, and TREES (NWU), to participate in the launch of GB. Eight charter representatives (all from Ponta do Ouro) participated in the launch, six of which also participated in the questionnaire survey. These people filled in the questionnaire during the launch, following the introduction of the project, which lasted approximately one hour (Figure 2). The questionnaire took 20 minutes to complete (Figure 3). Before and after completing the questionnaire survey, the representatives were able to ask questions to the GB staff. Diving charters that did not participate in the launch were given an opportunity to be introduced to the project via subsequent personalized meetings and invited to participate. Three of these charters were visited at different times in June.



Figure 2. GB introduction to diving and swim-with-dolphins business representatives in Ponta do Ouro. Photo credits: S. Lucrezi.



Figure 3. Questionnaire session with diving and swim-with-dolphins business representatives in Ponta do Ouro. Photo credits: S. Lucrezi.

SEMI-STRUCTURED INTERVIEWS—CHARTERS AND THE PPMR

After the launch of GB, the charter representatives were invited to participate in a semi-structured interview session, aimed to give them an opportunity to elaborate the themes covered in the questionnaire survey. In total, six representatives (four diving charters and the two swim-with-dolphins charters) agreed to participate in the semi-structured interview session in their own time, at their charter base. The representative of the PPMR also agreed to be interviewed.

The interview generally had one interviewer, the interviewee, one person taking notes, and one witness. To facilitate the discussion of relevant themes, the interview was structured in six generic questions:

Question 1: Society. How would you describe the relationship between your activity/operation and society (local community and the general public), and what would you change?

Question 2: Governance (PPMR). How would you describe the relationship between your activity/operation and the PPMR, and what would you change?

Question 3: Economy. How would you describe the economic state of your activity/operation, its financial contribution to society and conservation, and what would you change?

Question 4: Non-monetary value. What are the non-monetary aspects that add value to your activity/operation, and what would you change?

Question 5: Environment. How would you describe the relationship between your activity/operation and the environment/conservation (mostly marine but also terrestrial), and what would you change?

Question 6: Science. How would you describe the relationship between your activity/operation and the sciences (from environmental to social and economic) and what would you change?

QUESTIONNAIRE SURVEY—DIVERS

Questionnaire structure

Two structured questionnaires were developed during April and May 2015 by members of TREES (NWU) and GAIA. Both questionnaires included a standard demographic section (e.g. gender, age, education) and a standard section on diving experience (e.g. certifications obtained, dives logged). The Citizen Science questionnaire included a section to be compiled by people who had participated in Citizen Science. This section asked details on the latest Citizen Science project which respondents had participated in, and questions on satisfaction with the experience of Citizen Science. Those respondents who had never participated in Citizen Science were asked questions on their attitudes towards Citizen Science. The second questionnaire contained a section on the general diving experience in Ponta do Ouro, a section on environmental perceptions, a section on self-reported underwater behavior, and some questions on perceived diving norms.

Questionnaire administration

Between the 9 and the 22 June 2015, staff from TREES (NWU), GAIA, and UBICA invited diving tourists from various charters to participate in the questionnaire surveys. The bulk of the sampling, however, was done during the long weekend from the 13 to the 15 June. Given that sampling was done during winter and low season, the diving population at that time was small. Assuming that the total number of dives for that month was similar to that

of the same month in 2014, and that each diver logged four dives on average, the total population of divers visiting Ponta do Ouro would have been approximately 380 people. However, diving figures from the previous months in 2015 were lower compared with the same months in 2014. Therefore, it is likely that the number of divers visiting Ponta do Ouro in June 2015 was lower than 380. In total, 80 participated in the Citizen Science survey and 87 in the other survey. People who accepted to participate in the surveys were briefly introduced to GB and explained the aims of the surveys. Most of them agreed to be also filmed while diving (one dive) so that information provided in the questionnaires can be compared with observed underwater behavior. Video analysis is in progress and not included in the present document. Each survey took approximately 15 minutes to complete.

DATA ANALYSIS

Data from all questionnaire surveys were captured in Microsoft Excel (2010) and analyzed using descriptive statistics in Statsoft Statistica (version 12, 2014). The results from the semi-structured interview sessions were transcribed in Microsoft Word (2010). All graphs were created using the software GraphPad Prism (version 5.03, 2010).

RESULTS

QUESTIONNAIRE SURVEY—CHARTERS

Section A: Demographic details

Four of the participants in the questionnaire survey were female, and two male. The age of the participants ranged from 26 to 45, with an average of 34 years of age. The highest level of education for four of the respondents was a high school diploma or equivalent; two of the respondents had a university degree or equivalent. All except one (originally from Sweden) of the respondents were originally from South Africa. The marital status of the respondents was either married (four people), or single (two people). Two people claimed to have grown up by the sea, while the others inland.

Section B: Details on the diving charter

Three respondents owned the diving charter they were representing. Of these, two were also managers, administrators, instructors and guides. The other three respondents were managing the charters they were representing, with one being also a guide.

The charters had been in Ponta for a period between five and 21 years. However, at the beginning of July one of the charters suddenly ceased operations. Half of the charters were less than ten years old, while the other half were 15 years or older. In half of the cases, the respondents had been in possession of or working for a charter since its establishment. The longest someone had been involved in a charter was 18 years (second oldest charter). The representative of the oldest charter, however, had been employed for only two months. The respondents claimed to have had two to 18 years of experience as professionals in the

diving business, with half having six or less years of experience, and the other half 14 or more.

The diving charters represented in the survey were all based in Ponta do Ouro (although there are other charters located in other areas of the PPMR). The number of employed (either permanently or temporarily) staff during the diving seasons ranged from five to 17, with five or six staff reported in the case of three charters. Some charters were involved in other activities outside of diving operations, including repairs (two) research (two), and volunteering (two). The charters did not own more than two vessels (rubber ducks) for diving activities.

In answer to the question of charters productivity (in terms of both dives and courses) from 2010 to 2014 inclusive, only one charters reported to have registered 1600 dives in 2014. However, data on overall productivity of the diving industry (dives only) in Ponta do Ouro was obtained from the PPMR and is displayed in Figure 4. Productivity increased sharply from 2011 to 2012-2013, then decreased again in 2014. It must be pointed out that 2011 may have been an exceptional year, due to a severe fire in 2010 which affected the diving charters in the area. The year of 2014 was also characterized by the introduction of stricter immigration regulations by the South African government. These regulations may have indirectly affected the flow of tourists across the border into and out of Mozambique. In answer to the question of general monthly productivity (seasonality), the participants in the survey reported moderate productivity throughout the year, with the exception of May-June (winter) which were the quietest months, and December, January, March and April which were the busiest months due to summer and school holidays (Figure 5).

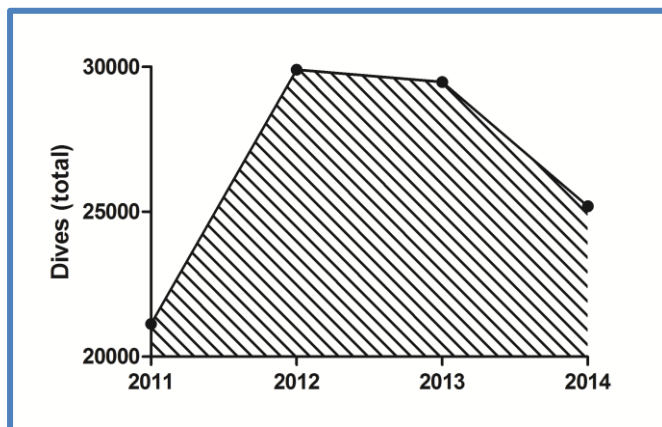


Figure 4. Reported productivity in Ponta do Ouro from 2011 to 2014. Source: PPMR (Miguel Congalves).

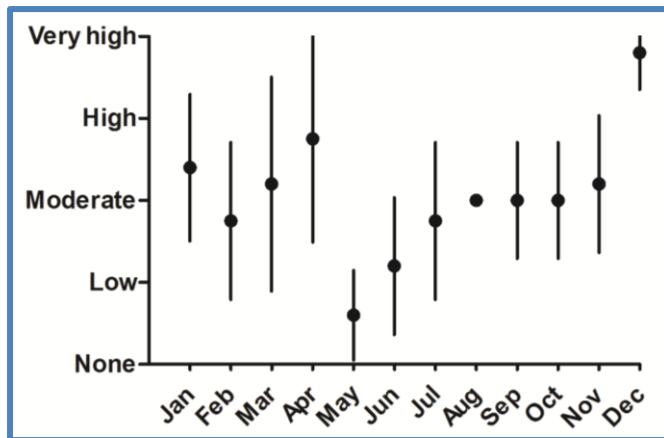


Figure 5. Reported seasonality of diving charters in Ponta do Ouro (based on statements from six charters).

Section C: Diving experience

The list of owned certifications/levels (25 in total) and respective certifying agencies (four in total), as reported by the respondents, is provided in Table 1. Certifications/levels were principally basic (Open, Advanced; 11 in total), with some participants having professional, specialty, and dry certifications as well. Most certifications were obtained through PADI. The respondents had logged 1402 dives on average, ranging from 31 to 4500. They had been diving for 12 years on average, although years of diving ranged from two to 21. The reported number of logged dives per year ranged from only two to 500.

Table 1. Total number of certifications/levels reported by the participants.

Course/Level	Certifying Agency	Group 1: Open, Advanced	Group 2: Professionals	Group 3: Specialities	Group 4: Technical	Group 5: Out of water (dry)
Advanced	PADI+NAUI	5				
Cave	PADI			1		
Deep	PADI			1		
Divemaster	PADI		1			
EFR	PADI					3
Instructor	PADI		1			
Navigation	PADI			1		
Night diving	PADI			1		
Oxygen provider	PADI					1
Open water	PADI+NAUI+SSI	6				
Rescue	PADI	1				
Search/recovery	PADI			1		
Skipper	SAWSA					1
Wreck	PADI			1		

Section D: Perceptions on the diving 'system'

A summary of the responses given to the last section in the questionnaire is provided in Table 2. On a personal level, the respondents felt that scuba diving influences and has a positive impact on their lifestyle. Generally, the respondents supported the growth of the scuba diving industry.

Moving on to the social realm, the respondents agreed that scuba diving is critical for Ponta do Ouro, making the area attractive and popular. The respondents also agreed that the potential of the diving industry in the area is generally underestimated. However, there were mixed views concerning the support that the industry gives to the community, and the interest, involvement and support that the community gives to the industry. Concerning economic aspects, the respondents believed that the scuba diving industry generates employment and opportunities for local businesses to make money. However, there were mixed opinions concerning if and how the money generated by the industry is reinvested in the PPMR.

The respondents agreed that scuba diving promotes conservation and environmental education, and that it does not cause negative environmental impacts. On the other hand, they believed that industries other than scuba diving may be causing negative environmental impacts in the PPMR.

The respondents tended to have mixed views about the way the PPMR is managing the diving industry. They agreed that the PPMR does address the concerns of the people from the industry, and that it is active in the sustainable development of local businesses dependent on the PPMR. However, these businesses do not necessarily include diving businesses. Respondents also felt that the industry is under pressure from the PPMR, and that the taxes paid to the PPMR are not necessarily reinvested in the industry. The respondents agreed that the diving industry has several concerns and that it is open to exchange and communication. However, they were unsure about the effectiveness of communications between the diving industry, the PPMR, and scientists. They also agreed that bureaucracy currently hampers the proper functioning of the industry.

Moving to opinions on science, the respondents agreed that scientific research benefits the scuba diving industry, and that the diving industry is actively involved in research, but concerns by the industry may not necessarily be addressed by scientists. There was uncertainty regarding the representativeness of the industry in scientific research, and respondents felt that the exchange of information between the industry and scientists is not effective. The respondents were positive that multi-disciplinary consortia can be a good approach at analyzing the diving system, and agreed that the industry could use assistance of a variety of scientific disciplines, such as Information Technology.

The respondents were generally positive about the ability of diving operations in the area to cooperate and promote their business. However, they also agreed that some businesses

may not respect each other, and that competition may exist between the diving industry and other industries in the PPMR.

With regard to diving tourism, the respondents agreed that diving tourists care about the marine environment, although it is not always guaranteed that they follow proper diving etiquette or that they are fully aware about safety procedures. They agreed that the dive sites tend to become overcrowded during the diving seasons, and that the clientele puts them under pressure.

Table 2. Summary of respondents' perceptions on the diving 'system'.

Fully agree						
Somewhat agree						
Neutral						
Somewhat disagree						
Fully disagree						
	n	n	n	n	n	
PERSONAL						
1. Scuba diving is the reason why I live here			2	2	2	+
2. Scuba diving defines who I am	1		1	1	3	+
3. My business positively affects me and my personal quality of life	1		1	1	3	+
4. I support the growth of the scuba diving industry					5	+
SOCIAL						
5. The scuba diving industry benefits overall management of towns/municipalities of the area	1	1	1		2	mix
6. Scuba diving has more positive than negative impacts in the area			3		3	+
7. The potential of the scuba diving industry is generally underestimated		1		2	3	+
8. The scuba diving industry supports the local community		1	2		3	mix
9. Revenues generated by the scuba diving industry are used to the benefit of the local community	1	2	3			--
10. The scuba diving industry acts in total respect of the local community		1	3	2		--
11. The scuba diving industry is supported by the local community	2		2	1	1	mix
12. The local community recognises benefits in the scuba diving industry	2		2	2		--
13. The local community takes common initiatives to support the local economy	2		1	1	2	mix
14. The local community is involved in marketing to promote scuba diving	3	2				--
15. The local community takes common action to promote touristic packages including local businesses	3	2	1			--
16. The local community cares about the state of marine environments in the area	1	3	2			--
17. Scuba diving creates leisure opportunities for people			2	1	3	+
18. Scuba diving forms part of the "heartbeat" of this area				2	4	+
19. Scuba diving makes this area popular					6	+
20. This area is a world class destination for scuba diving				1	5	+
ECONOMIC						

21. The scuba diving industry creates employment				1	5	+
22. Scuba diving creates more opportunities for local businesses	1				5	+
23. The scuba diving industry ensures the maintenance of infrastructure and services in towns/municipalities of the area	2	1	1	1	1	mix
24. The scuba diving industry competes with cultural traditions of the area	1	1	4			--
25. The scuba diving industry increases property and accommodation value in the area			1	3	2	+
26. The scuba diving industry increases the total cost of living in the area			3	1	2	+
27. The scuba diving industry generates more income for this area				1	5	+
28. The scuba diving industry generates revenue for conservation/environmental management	1		2	2	1	+
29. Revenues generated by the scuba diving industry benefit environmental protection	1	1	1	2	1	mix

ENVIRONMENT

30. The scuba diving industry improves waste management (discharge, collection) in the area, both directly and indirectly	3		3			--
31. The scuba diving industry promotes conservation in the area			1	3	2	+
32. The scuba diving industry promotes environmental education in the area		1	2	3		+
33. The scuba diving industry is actively engaged in litter picking	1		1	2	2	+
34. Scuba diving has caused reductions in wildlife abundance and diversity in this area	3		1	1	1	--
35. Scuba diving has clear negative impacts on the environment in this area	3		3			--
36. Scuba diving increases pollution in this area	1		5			--
37. Industries other than scuba diving have clear negative impacts on the environment in this area			4	2		+

GOVERNANCE (PPMR)

38. The scuba diving industry benefits the PPMR	1	1		1	3	mix
39. The scuba diving industry benefits good management of the PPMR	2	1	1	1	1	mix
40. The scuba diving industry is well managed by all interested parties	2		3	1		mix
41. The scuba diving industry pays the same fees to the PPMR as any other PPMR user	3	1	1	1		--
42. The fee that the scuba diving industry pays to the PPMR is worth the support received from the PPMR	2	1	3			--
43. The PPMR works to improve the quality of diving	1	1	2		2	mix
44. The PPMR takes action to promote the sustainable development of local businesses directly dependent on it	1		3	2		+
45. The PPMR takes action to promote sustainable tourism in the area	2		3	1		mix
46. The PPMR firmly enforces diving safety rules	1	1	2	2		mix
47. The PPMR firmly enforces proper diving etiquette	1	1	2	2		mix
48. The PPMR takes a holistic approach at managing the scuba diving industry	1		4	1		+

49. The scuba diving industry is under pressures from the PPMR	1	1	1	3	+	
50. The PPMR favours other industries (e.g. fishing) before scuba diving	1	1	2	1	1	mix
51. Requests and concerns of the scuba diving industry are addressed by the PPMR	1			4	1	+
52. The scuba diving industry is actively involved in management of and planning for dive sites	1	2	3			--
53. Revenues generated by the scuba diving industry for the PPMR are re-invested in the industry by the PPMR	3	1	1	1		--

COMMUNICATION

54. The system currently in use to report details about the scuba diving industry to the PPMR is effective	4			2		mix	
55. Communication between the scuba diving industry and the public is effective	1			2	3	+	
56. Communication between the scuba diving industry, authorities (including the PPMR), and scientists is effective	3	1	2			--	
57. The scuba diving industry is open to communications aimed to solve different issues in the system				1	3	2	+
58. The scuba diving industry has many concerns				1	2	3	+
59. Bureaucracy hampers the functioning of the scuba diving industry				2		4	+

SCIENCE

60. Scientific research is beneficial to the scuba diving industry				2	4		+
61. Requests and concerns of the scuba diving industry are addressed by scientists				6			mix
62. The scuba diving industry is actively involved in research	1		2	2	1		+
63. Scientists take a holistic approach when analysing the diving system	1		4		1		mix
64. The scuba diving industry is well-represented by scientists	1	1	2	1	1		mix
65. There are enough knowledge and exchange events between scientists and the scuba diving industry	2	2	1		1		--
66. Scientists promote marine environmental education in the area		1	3	1	1		+
67. The scuba diving industry is misunderstood by scientists		1	4	1			mix
68. The scuba diving industry is under pressures from scientists		2	2	1	1		mix
69. There are disciplines (e.g. Information Technology) that the scuba diving industry would like the assistance of			2	1	3		+
70. Multidisciplinary consortia can represent a good approach at analysing the diving system			5		1		+

COOPERATION / PROMOTION

71. Operations/businesses in the industry are cooperative	1		1	4			+
72. Operations/businesses in the industry act in full respect of one another	1	1	2	2			--
73. The scuba diving industry makes use of marketing to promote itself			2	1	3		+
74. The scuba diving industry makes use of social media				1	5		+
75. The scuba diving industry is in competition with other industries	1	1	1	1	3		+

TOURISM

76. Diving tourists care about the marine environments in this area	1	1	3	1	+
77. Scuba diving attracts too many visitors to the area	3		1	2	mix
78. Dive sites in the area are overcrowded during the diving seasons	1	1	1	3	+
79. Diving tourists follow proper diving etiquette		2	3	1	mix
80. Diving tourists are fully conscious about safety procedures during diving operations		3	2	1	mix
81. The scuba diving industry is under pressures from customers	1		2	3	+

SEMI-STRUCTURED INTERVIEW SESSION

Some of the people who participated in the questionnaire survey also took part in the semi-structured interview session. In addition, other representatives participated in the semi-structured interview, plus a representative of the PPMR. A summary of the outcomes of the session (extracted from notes) is provided below.

Society. Question 1: How would you describe the relationship between your activity/operation and society (local community and the general public), and what would you change?

Generally, charter representatives saw their business creating employment for many people, including members of the community. Some representatives saw a big change following a fire in 2010. The fire affected the diving businesses located in the campsite near the boat launching site on the beach. The fire destroyed much of the infrastructure and accommodation available to tourists. After the fire, some of the charters had to be relocated, with a consequent redundancy of staff and reduction in employment. Nonetheless, the remaining employees (from local communities) were still treated as family, and the representatives felt that this had indirect positive effects on the community. Charters also felt that the diving industry is responsible for much of the employment and money-making in the area, attracting the majority of tourists, providing the majority of jobs, and reflecting positively on accommodation and restoration businesses as well.

Some representatives elaborated their discussion of the relationship that locals have with the diving industry. While the industry is able to create employment, some locals may not wish to be directly involved in diving or water-based jobs. This may be a consequence of cultural differences, given that local communities tend to be more connected to the land and have fear of the water. With time, many from the local communities have learned that the sea offers ways of subsistence through fishing, but many fishers still do not swim. Nonetheless, if motivated and trained, local people do learn how to swim and dive, as demonstrated by some of the staff working for the charters. The representatives still expressed their concern regarding the skippers' (also called *marineros*) inability to swim, which can put their life in jeopardy, also adding more responsibility to the employing charter.

Generally the charters felt that they had a good relationship with the clientele. However, the clientele may differ greatly from charter to charter. Some diving charters explained to rely primarily on the walk-in trade, that is, people coming to the dive shop and booking a dive on the spot. Other charters are away from the reach of this trade and prefer to focus on a more organized, contained, and international clientele. Some charters market themselves locally via advertising boards, while others rely on word of mouth. Some charters cater for large groups and diving schools (mostly coming from Johannesburg in South Africa), while others prefer to attend to the needs of small groups and families. Some

charters attract a more generalist type of market (e.g. shallow diving), while others tend to attract specialized divers (e.g. deep diving, diving with sharks). Some charters operate through hired and seasonal staff, while others are family-based businesses. As a consequence of these differences, the seasonality of the charters varies, with some being busy primarily during holiday periods, and others all-year-round. Another consequence is that while some charters end up relying on more ephemeral clientele, others build a loyal clientele.

Representatives from swim-with-dolphins charters explained that they mostly deal with people who wish to be introduced to the ocean and experience it for the first time, therefore do not dive, but are potential divers. This clientele generally comes from South Africa, Maputo (Mozambique), but also from overseas, and is characterized by people of all ages, including also people with disabilities. Representatives felt that dolphin encounters are capable of positively affecting the quality of life of clients, especially people who have many fears. The experience of coming to Ponta through the dunes, getting on the boat, into the ocean, and swimming with the dolphins is all part of a healing process for them. However, taking the boat out in rough sea conditions is not a good thing to do, as it puts fear into the clients, and the chance of seeing dolphins is also very low. So that is generally avoided. According to the representatives, there should be a standard whereby a boat can be taken out only under certain conditions. The representatives explained that clients tend to be understanding when conditions are unfavorable to swim with dolphins. This is thanks to the briefings that clients receive before heading out on the boat, explaining to them what to expect when they are out there, and the implications of interacting with wild animals such as dolphins.

While the relation between charters and clients may be positive, that between charters and other tourists may not be the same. The representatives expressed concern over the massive flow of non-diving tourism coming to Ponta do Ouro during the school holidays. According to the representatives, most of these people would come from across the South African border and from Maputo to party and drink. These people tend to generate high levels of litter, which is then removed by the locals and the businesses once tourists have left. In order not to drive away both potential and loyal clients, some charters tend to discourage them to come to Ponta do Ouro during peak holiday periods.

Governance (PPMR). Question 2: How would you describe the relationship between your activity/operation and the PPMR, and what would you change?

The relationship described by the representatives turned out to be divided into one with the PPMR, and one with the government. Generally, the charters were aware that the PPMR has not come into full effect yet, meaning that the maritime department in the government still expects taxes to be paid to it, and is still physically present in the area. In light of this, charters feared that they would have to pay tax both to the government and to the PPMR until a fixed arrangement is made, or that they would have to pay more money to the PPMR

once the maritime tax is lifted. According to some representatives, the tax would imply an additional ZAR 100 per dive (ZAR 350 on average). Such an increase would have negative implications for diving businesses. The main tourism in Ponta do Ouro comes from South Africa, and an increase in the cost of diving would lead to a decrease in the clientele. Charging in US dollars rather than in ZAR or in the local currency would not be an option for the South African clientele. Other representatives understood that the government was initially planning to add a surcharge of Mozambican Meticas 150 per client per week together with the fees that the PPMR was going to implement; however, it seems that this plan won't take effect, leaving only one fee to be paid to the PPMR.

Most of the charters stated that they would still be happy to pay taxes to the PPMR, provided that the money is used transparently and to the benefit of the PPMR and the people living in it. However, charters were less inclined to pay tax to the government and to the maritime department. Charters felt misunderstood by the government (and in some cases also by the PPMR) thinking of them as making enough money to support greater taxation. They also expressed frustration over the intricate bureaucratic channels to be followed, especially by foreigners (i.e. South Africans) in order to start and run a diving business. Finally, they were concerned regarding the use that the maritime department makes of the money taken from the diving industry. Apparently, this money is not reinvested in the PPMR, but taken up by the government.

Charters generally looked forward to the advent of the PPMR as the main managing authority. This was because charters believed that this transition would mean better enforcement, a more sustainable diving industry, and less corruption in the area. The PPMR representatives were seen as more approachable and understanding than the officials working for the government. Finally, the PPMR warden was seen as a critical intermediary between the charters and the government. Some of the representatives stated to have been actively involved with the PPMR in activities including the establishment of rules and regulations for diving and swimming with wild animals; the control of beach access and of the launching of the boats before the PPMR came along; the monitoring of fish catch; the planning of the PPMR; and the identification of relevant wildlife in the area before and during the implementation of the PPMR in 2009.

Representatives generally felt that the establishment of the PPMR has yielded positive biological returns, thanks to new restrictions and regulations. The PPMR has created a sanctuary for marine life to grow. While the job that the PPMR is currently doing in the area was viewed positively, the representatives also expressed some concerns and made some recommendations. First, the PPMR should have more staff to its disposal. Second, the PPMR should receive additional funding (from the Peace Parks Foundation or from the government) aside from what it already receives through the diving industry and through issuing permits. Third, there should be better and more frequent sea patrol; currently the PPMR makes use of a small boat, which is launched only three or four times a month.

Fourth, restrictions and regulations should be better enforced out at sea, for instance to control trawling over the reefs and the abusive use of jet skis, which should only be allowed for the purpose of recreational fishing. Last, new restrictions may be proposed, such as the introduction of a one-boat policy (each charter allowed to own one boat only), or posing a limit to the number of boats per dive site, to reduce pressures on the reefs in the PPMR. At the moment people tend to use their common sense to ensure that diving pressures on reefs are reduced. For instance, when a reef is crowded with vessels, charters move their boats to another site.

One of the greatest concerns for most of the charter representatives was in regard to the impacts of a soon-to-come tar road, which will connect Maputo to Ponta do Ouro. According to many, the road would have significant negative impacts on the area and on the diving businesses. The road may increase accessibility and bring more business, as it would allow anyone driving a vehicle beside a four-wheel drive to access Ponta do Ouro and the beach. However, the businesses benefiting from the road are unlikely to be diving-related, as people coming from Maputo will probably seek to use the beach, and will bring their own provisions (food and alcohol). The representatives felt that the road would also bring in more crime, environmental damage and degradation, thus deterring current diving clientele. They maintained that the infrastructure (e.g. sewerage system, water pipes, electric supply) and police patrol in the area are inadequate to sustain the increasing flow of tourism resulting from the road. Further, they felt that the government should have taken care of more important matters, such as the need for schools and a municipality, before the establishment of the tar road. The representatives pointed out that while some people had been included during the decision-making process concerning the road, many others, including members of the local community, neither had been informed nor educated properly regarding the possible consequences of the road. Some people suggested that the road should connect Maputo to the South African border rather than to Ponta do Ouro, thus still requiring four-wheel drives to reach Ponta, and maintaining the secluded atmosphere of the place.

Another concern expressed by the representatives was regarding the potential construction of a harbor north of Ponta do Ouro. The government's plan to construct a 22m deep harbor north of the Techobanine reef sanctuary to transport coal from Botswana was confirmed by the PPMR. Such plan seems to be currently on hold, due to the lack of money to build the harbor, and the possibility that a port in Namibia will be used for the transport of coal instead. Further, since Ponta do Ouro is up for world heritage listing, some representatives felt that this possibility should put pressures on the Mozambican government to retract their plans for the harbor construction.

The idea of a trans-frontier marine park, joining the marine reserves across the border in South Africa (iSimangaliso Wetland Park) with the PPMR was considered good by some of the representatives. Others, however, expressed concerns in this regard. These people

feared that a trans-frontier park would result in even greater restrictions in the PPMR, suffocating diving businesses, with the risk of resulting in tourism declines.

Economy. Question 3: How would you describe the economic state of your activity/operation, its financial contribution to society and conservation, and what would you change?

Representatives of the charters affected by the fire of 2010 explained that the economic state of their business had changed dramatically since then. The fire had resulted in great infrastructure and economic losses. The economic recession was also mentioned as another cause of economic downturns for the diving industry in Ponta do Ouro. Some representatives sustained that people no longer dive due to lack of money, rather than due to an attitudinal change. Additional causes of economic losses and difficulties were attributed to the recent “xenophobia” events taking place in South Africa, which has led to the cancellation of bookings; uneven school holidays throughout SA, making it difficult to pick up business in winter; having to rely on walk-in trade because people do not book in advance anymore; and more competition with charters that were established more recently.

Some charters, especially those providing also their own accommodation, did not lament significant economic losses, although they still acknowledged that the impacts of the economic recession on the South African clientele has had an effect on them, particularly during the low season. One swim-with-dolphins charter representative felt that the swim-with-dolphins business may be financially better off compared with the diving businesses. Supposed advantages include a more heterogeneous clientele, and the fact that the activity does not require the hire of equipment. Swim-with-dolphins charter representatives also believed that their business indirectly benefits the diving industry, because it stimulates people to take interest in diving. However, they also acknowledged receiving diving clients who wish to have the swim with the dolphin experience. Diving charters that were doing well financially compared with others claimed that their success may be due various reasons, including the international, more experienced, and specialized clientele; the family-based model of their business; pre-booking rather than walk-in trade; and the assistance of travel agents.

Non-monetary value. Question 4: What are the non-monetary aspects that add value to your activity/operation, and what would you change?

The representatives listed a number of aspects adding value to their businesses. The first aspect was obviously the reef and the marine life underwater. The representatives felt that despite the proximity, the reefs of Ponta do Ouro are unique and different from those of Sodwana Bay (iSimangaliso Wetland Park), particularly because of the abundance and variety of mobile wildlife and coral. The second aspect was the beach of Ponta do Ouro, which is an asset that can be enjoyed for free. The third aspect was safety, allowing children

to grow up without worrying about crime. The fourth aspect was the weather, which is very favorable even when it is cold. The fifth aspect was the sheltered nature of the bay of Ponta, protecting the village from severe weather. The sixth aspect was the friendliness of the local community. The seventh aspect was cleanliness, at least compared with South Africa. The eighth aspect was the secluded and adventurous nature of Ponta, requiring the use of a four-wheel drive to access the dunes and the village. The ninth aspect was the opening and closing hours at the South African border gates, helping crime be more contained. The tenth aspect was the general beauty of the area. The eleventh aspect was the location of the area in Mozambique, making it a unique experience for South Africans and foreigners to cross the border and be in a new country, even though it is relatively close. The twelfth aspect was the possibility to do things that would not be allowed elsewhere, such as swimming with wild animals. All these aspects contributed to the nice lifestyle and “vibe” of Ponta do Ouro.

Environment. Question 5: How would you describe the relationship between your activity/operation and the environment/conservation (mostly marine but also terrestrial), and what would you change?

Some representatives claimed to be actively involved in environmental matters and conservation, from simply changing boat motors from two to four strokes, to beach cleanups, beach patrol, education on dolphin conservation, the creation of codes of conduct (dolphin swims), marine mammal monitoring, and reef monitoring. However, other representatives felt that there is not enough interest in environmental issues in the area, and that there should be more education. Most charters agreed that diving does not really have a damaging impact on the reefs, as long as it is done according to the rules. On the contrary, they believed that fishing (recreational fishing and trawling rather than artisanal fishing) has negative impacts on the marine environment, for example through the loss of fishing line and illegal activities.

Both the charters and the PPMR perceived the underwater environment and the behavioral patterns of wild animals to have changed over the years, possibly as a consequence of global climate change, or of other impacts such as from fishing. For example, whale sharks are not as frequent as they used to be, and the cover of hard coral has also been dropping severely.

Representatives tended to be concerned about the possible consequences of the construction of the tar road on the environment. They felt that the greatest threats would be pollution, littering, and more development in the area. Some people explained that the nature of the area has already changed dramatically since the arrival of electricity in 2002, which opened the doors to more mainstream diving tourism, to the establishment of various businesses other than diving, causing competition, and to development. Some interviewees stated that constructions on the first-line dunes are illegal, which was made possible due to corruption or pressure from people holding various type of power.

Science. Question 6: How would you describe the relationship between your activity/operation and the sciences (from environmental to social and economic) and what would you change?

Some representatives are currently not involved in any science projects, while others are actively involved in Citizen Science, especially projects involving mammal behavior, mammal and fish tagging and monitoring, and reef monitoring. These projects normally require the collection of data either alone or with other scientists, which are then shared with the people who process the data and use it for scientific and conservation research purposes (either public or private sector). Some charters are also happy to offer their services (e.g. boat, dives, guide, and equipment) for the benefit of scientific research. As a side note to this respect, all but one of the charters whose clientele has been filmed in the frame of GB research did not charge the GB staff for any diving-related cost. The PPMR is obviously involved in the collection of data for scientific and management purposes as well.

Some companies, however, feared that getting involved in Citizen Science or in research would imply more bureaucracy and additional permit applications to the PPMR (which is untrue, according to the PPMR). For this reason, they prefer not to get involved in research projects. Other companies felt that competition between charters precludes the possibility of fruitful collaborations in Citizen Science projects. Others felt that data collected for the purpose of science should be better shared with and divulged to the public, and that while many research projects have “come and gone” the feedback has been poor. Generally, the representatives agreed that it would be good to market Citizen Science as a product that the diving (and swim-with-dolphins) business can offer to the public, as a way to get people involved in science and earn money at the same time. Volunteer tourism was also seen as an option, although the representatives pointed out that this type of market is foreigner and more expensive to cater for.

QUESTIONNAIRE SURVEY—DIVERS

A total of 80 divers participated in the questionnaire survey on Citizen Science, and 87 divers participated in the survey on environmental perceptions and self-reported behavior in Ponta do Ouro. Although formal data have not been recorded in this respect, it can be assumed this corresponds to ca. 95% response rate as only a very small number of potential respondents declined the invitation to fill in the questionnaires. Males and females were equally represented. The participants were 37 years old on average, from South Africa, well educated (diploma, degree, or higher), either married or single, and employed. Most held basic certifications, including Open Water, Advanced Open water, and Rescue, although some divers also possessed pro, specialty, technical, and dry certifications, principally through PADI. They had dived for an average of six years, had logged an average of 214 dives, and were logging 33 dives per year on average. Of all the people surveyed, most did not know about Citizen Science, and only two had participated in Citizen Science before. However, divers were generally interested in hearing more about Citizen Science, and

showed interest in it. Some of the people who were interested in Citizen Science, however, were not interested in actually participating in it. The main reason given was the lack of time and means to do it.

Overall, people diving in Ponta do Ouro had dived there before. These people were excited about a variety of species, including coral, nudibranchs, dolphins, and popular fish of the area such as the potato bass, sharks, mantas, and eels. People were generally satisfied with their diving experience in Ponta, and were able to identify the damage caused by some improper diving activities, such as contact with coral. Finally, they felt that they had a good level of diving conduct.

DISCUSSION AND CONCLUSIONS

The aim of the questionnaire surveys and semi-structured interviews was to take a 'first dive' into the exploration of the diving industry and the diving 'system', primarily from the perspective of business owners and managers in the industry itself, but also from the perspective of clients and governance. In this specific case, the case study of Ponta do Ouro (PPMR) and the diving businesses operating within it were considered. The data collected represented opinions and views concerning themes underlying the three main pillars of sustainability, namely social, environmental, and economic. The results of this first analysis provide information which will be useful in the formulation of new assessments throughout the course of GB.

The collection of relevant information from key stakeholders within the diving industry constitutes a critical step in, if not the basis for, any approach aimed to assess the diving 'system'. Diving charters owners and managers tend to be a critical interface between diving tourists, diving operators, researchers, citizen scientists, the relevant authorities (in this case the MPA), various markets (e.g. technology), local communities (e.g. local businesses, inhabitants and municipalities), and the environment. Therefore, they form part of that group of key stakeholders in the diving industry that deserve particular attention.

A number of relevant themes and issues emerged from this exploratory study. The results from the questionnaire survey with the charter representatives indicate that diving business owners and managers viewed scuba diving as an industry which brings benefits to the environment, to the authorities (government and PPMR), to the local community, and to society. However, they expressed concerns regarding some of the changes lying ahead, including the tar road coming from Maputo, development plans, and plans to construct a harbor north of the bay. Views on governance were mixed, with uncertainty specifically regarding management and plans by the government. Cultural differences between the business owners (mostly South African) the local communities were also acknowledged. While some of the charters are actively involved in Citizen Science, proper feedback seems to be an issue. Despite their proximity, the charters seem to follow quite different business

and marketing models, leading to various degrees of competition and different business outputs, which may work for or against each business.

The results reported here can constitute a solid ground from which new assessments and investigations can be based. The issues emerged in this instance point to the need to further explore a number of aspects in the diving 'system' including, among others: 1) Social impacts; 2) Involvement with local communities; 3) Governance (government and PPMR); 4) Economic impacts; 5) Citizen Science; 6) Scientific support; 7) Environmental and ecological impacts; 8) Marketing approaches; 9) Business models; 10) Communications; 11) Travel behavior; 12) Operation risks and safety; 13) Quality of life; and 14) Human dimensions.

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