



Scuba diving tourism systems and sustainability: Perceptions by the scuba diving industry in two Marine Protected Areas



Serena Lucrezi ^{a,*}, Martina Milanese ^b, Vasiliki Markantonatou ^c, Carlo Cerrano ^c, Antonio Sarà ^b, Marco Palma ^d, Melville Saayman ^a

^a TREES – Tourism Research in Economic Environs and Society, North-West University, 11 Hoffman Street, Potchefstroom 2520, South Africa

^b Studio Associato GAIA s.n.c., Via Brigata Liguria 1/9 Scala A, 16121, Genova, Italy

^c Department of Life Environment Sciences (DiSVA), Polytechnic University of Marche, Via Brecce Bianche, 60131, Ancona, Italy

^d UBICA s.r.l., Via S. Siro 6/1, 16124, Genova, Italy

HIGHLIGHTS

- The scuba diving tourism industry's sustainability is affected by various problems.
- These problems were investigated by engaging scuba diving operators in two MPAs.
- Relations with other elements in the Scuba Diving Tourism System were assessed.
- Operators felt the potential of the scuba diving industry, yet limited support.
- General and *ad hoc* measures to enhance the industry's sustainability were advanced.

ARTICLE INFO

Article history:

Received 19 April 2016

Received in revised form

2 September 2016

Accepted 3 September 2016

Keywords:

Industry

MPA

Operators

Ponta do Ouro

Portofino

Scuba diving

Stakeholders

Tourism

ABSTRACT

Scuba diving tourism encourages conservation, generates revenue, and supports local communities. Understanding its interactions with environmental, social, and economic factors is important in the context of Marine Protected Areas (MPAs), where dynamics between role players are complex. This study provides insights into the problems affecting the sustainability of the scuba diving tourism industry in two MPAs in Italy and Mozambique. The interactions between the industry and environment, economy, non-monetary aspects, society, governance, and scientific community were investigated via questionnaire surveys and interviews with 20 scuba diving operators. Operators felt the importance of scuba diving to themselves, MPAs, and resident communities, although they lamented limited support to the industry by other stakeholders. Recommendations to enhance sustainability include actions ranging from engagement in planning and management to education and social responsibility. However, the heterogeneity of issues perceived by the industry, reflected in differences between the case studies, calls for *ad hoc* measures.

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

Scuba diving tourism has grown to become a multi-billion dollar industry, drawing millions of people to explore the underwater world (De Groot & Bush, 2010; Wongthong & Harvey, 2014). The boom in scuba diving has led to significant investments in various products, from retail to education and dives, encouraging the

emergence and growth in the number of scuba diving schools, scuba diving equipment shops, and scuba diving charter businesses (Dimmock, Cummins, & Musa, 2013). Like all tourism industries, scuba diving calls for scrutiny in whether and how it rests on the three pillars of sustainability, environmental, social, and economic (Haddock-Fraser & Hampton, 2012; Townsend, 2008; Wongthong & Harvey, 2014). This is in the light of the enormous potential held by the scuba diving tourism industry to carry out and encourage conservation, attract tourism, generate revenue, improve peoples' quality of life, and promote community pride (De Groot & Bush, 2010; Mota & Frausto, 2014; Wongthong & Harvey,

* Corresponding author. TREES, North-West University, Private Bag X6001, Potchefstroom, 2531, North-West, South Africa.

E-mail address: 23952997@nwu.ac.za (S. Lucrezi).

2014).

Most of the research focusing on scuba diving tourism has given attention primarily to two aspects. One is environmental, including the interaction of scuba divers and the underwater environment, and potential ecological impacts (Dimmock & Musa, 2015; Haddock-Fraser & Hampton, 2012; Hillmer-Pegram, 2014). The other, a spinoff of the first, is the sustainable management of diving tourism, with attention to the environmental perceptions of divers, and their willingness to contribute to marine conservation (Hillmer-Pegram, 2014). However, these aspects alone fail to portray scuba diving tourism holistically and assess its sustainability (Hillmer-Pegram, 2014), so that mixed methods of research investigating scuba diving tourism from various angles, engaging multiple stakeholders, and assessing a large number of case studies are required.

The central elements of the scuba diving tourism system (SDTS), as first conceptualised by Hillmer-Pegram (2014) and later refined and re-proposed by Dimmock and Musa (2015), include the marine environment where the activity takes place and a variety of stakeholders, grouped into the broad categories of scuba divers, the scuba diving industry, and host communities. In the conceptual model provided by Dimmock and Musa (2015), the scuba divers group is characterised by those divers creating demand, such as tourists. The host communities include the residents of the area where scuba diving takes place, but also local governments and authorities, managers and policy makers. The scuba diving industry encompasses scuba diving businesses, from diving charter businesses to schools, but also all other peripheral suppliers to scuba diving tourism, such as the hospitality sector, transport, and retail. All these stakeholders interact; any emerging clashes and juxtaposing functions need to be addressed through communication, collaboration, and adjustments. A sustainable SDTS would be expected to maximise the experience of scuba divers, while allowing the industry to make these experiences possible and being economically viable, preserving the marine environment and respecting the needs of the host communities (Wongthong & Harvey, 2014). Given the interdependence of these elements, systems approaches or approaches drawing on the perspectives of all stakeholder groups are favoured over linear and narrow approaches as a means to propose sustainable goals (Dimmock & Musa, 2015). The sustainability of scuba diving tourism following the concept of Integrated Coastal Management (ICM) can be achieved by integrating the various elements related to the use of coastal resources. Therefore, it requires proper communication amongst all relevant stakeholders and their participation in management and decision-making (Fabinyi, 2008; Wongthong & Harvey, 2014).

According to Dimmock and Musa (2015), the scuba diving industry can be seriously neglected in policy and planning when systems or integrated approaches are not used to analyse the SDTS. Little research has engaged the scuba diving industry in direct communications and exchanges aimed to uncover the roots of various problems affecting it today (Hillmer-Pegram, 2014). Sustainability goals, from conservation to quality service delivery to customers, remain difficult to propose until the interactions between environmental, social, and economic systems affecting the scuba diving industry are understood. Some of these interactions have been investigated; challenges to the contemporary scuba diving industry include aspects such as increased environmental pressure from tourism, market diversification, rapidly changing technology, greater competitiveness within the industry, competition with other industries, poor legislation, governance issues, and low community-level support (Dimmock et al., 2013; Haddock-Fraser & Hampton, 2012; Jentoft, Pascual-Fernandez, De la Cruz Modino, Gonzalez-Ramallal, & Chuenpagdee, 2012). Challenges

may either increase or be exacerbated when dynamics between role players within the SDTS become more complex, and when some groups exert more authoritative roles than others, as in the case of Marine Protected Areas (MPAs).

MPAs are generally intended to establish and achieve conservation goals by either excluding or controlling consumptive uses of marine resources, such as fishing, and supporting non-consumptive uses, for example scuba diving tourism (Fabinyi, 2008). The latter uses are also generally regulated in MPAs, given their potential negative impact on marine ecosystems. Previous studies have reported on the issues arising following the establishment of MPAs where scuba diving tourism takes place (Badalamenti et al., 2000; Bottema & Bush, 2012; Brown et al., 2001; De Groot & Bush, 2010; Fabinyi, 2008; Jentoft et al., 2012; Mangi & Austen, 2008; Rees et al., 2015; Rodríguez-Rodríguez et al., 2015; Salmona & Verardi, 2001). These may involve tensions and conflicts among stakeholder groups, such as fishers and divers; the implementation of restrictions and regulations; lack of effective management by the appointed authorities; limited or different understanding of the motivations and long-term goals of MPAs; and lack of or late participation by stakeholders in the planning of MPAs. These studies have highlighted the increasing complexity of the SDTS as a result of role shifts and significant changes, and the importance of paying attention to the causes of tensions to come up with solutions that accommodate all. If appropriately managed (and supported by stakeholders), MPAs are able to bring a variety of benefits to local communities, including flourishing ecosystems that deliver services and goods, and balance between claims by different users. Yet, it is acknowledged that MPAs also result in compromises and sacrifices for all stakeholders concerned, an unavoidable trade-off that is exacerbated when communications among the parties are not effective (Fabinyi, 2008). In light of the particular benefits, from financial to educational and governance, which MPAs can gain from supporting a balanced form of scuba diving tourism, the space given to the “say” of the scuba diving industry in the SDTS revolving around MPAs may still be limited.

The aim of this study was to provide insights into possible issues affecting the sustainability of the SDTS in two MPAs, by investigating how the scuba diving industry perceives itself and its relationship with other elements in the system. The study was based on direct interactions with representatives of the scuba diving industry, namely scuba diving operators, via questionnaire surveys, focus group discussions, and semi-structured interviews, which are able to generate relevant information easily and at a low cost, compared with more expensive and impersonal methods of data collection (Fabinyi, 2008; Haddock-Fraser & Hampton, 2012; Hillmer-Pegram, 2014; Wongthong & Harvey, 2014). The information collected was used to describe the profile of the diving sector, to identify critical obstacles in the scuba diving industry's journey towards sustainability, and to propose realistic plans to overcome them. Results added to previous knowledge about the key elements that define the scuba diving industry, and may holistically inform management decisions regarding costs and benefits from conservation actions that secure win-win outcomes for local business.

The study drew from the conceptual models of SDTS described above in two ways. First, by focusing on a neglected stakeholder group in the system, namely the scuba diving industry itself. Second, by investigating the interactions between this group and various elements within the system, including the environment, economy, non-monetary aspects, and other stakeholders. The model was modified for the purpose of this assessment, in that the scuba diving industry here was exclusively represented by the local diving charter businesses/schools. Remaining stakeholders were grouped into society (local residents, local governments, clients, and the general public), governance (those in charge of the

management of the MPAs under investigation), and the scientific community.

2. Study area

The research was conducted in two different case studies (Table 1). Portofino MPA in Liguria, Italy; and Ponta do Ouro, in the Ponta do Ouro Partial Marine Reserve (PPMR), southern Mozambique (Fig. 1). Acknowledging that there are a variety of protection and management schemes that may apply (also) to the marine territory, yet for the sake of simplicity, both the Portofino MPA and the PPMR are here collectively referred to as MPAs.

2.1. Portofino MPA

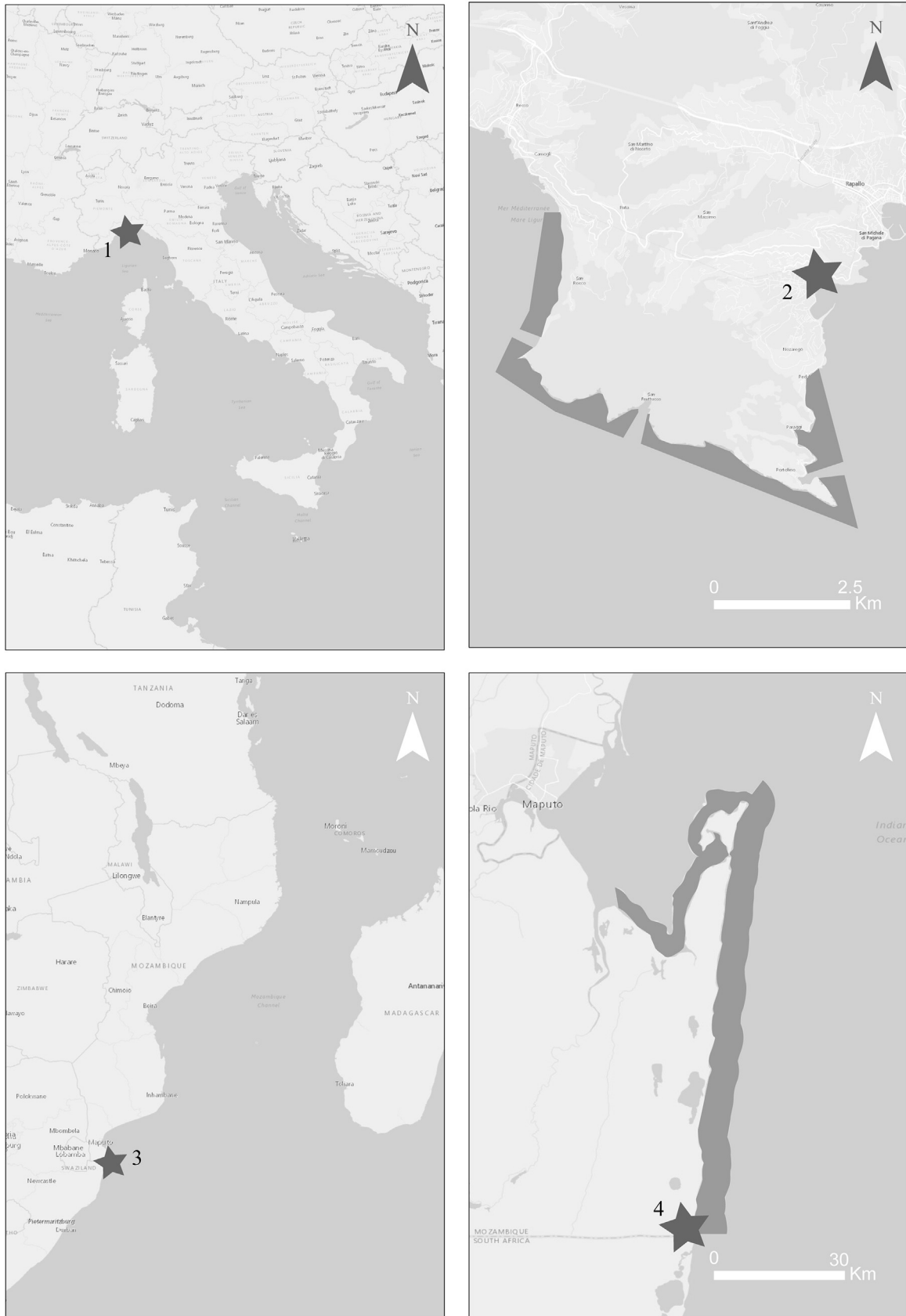
The Portofino MPA is located in the Ligurian Sea, Italy, in the north-western Mediterranean Sea (Fig. 1). Established in 1999 and

covering a total of 3.74 km², the MPA surrounds the promontory of Portofino, which has 13 km of coastline and is also a terrestrial park (Portofino Regional Park, managed by a different management authority). The MPA, ranking as a National Park, is managed by a consortium comprising the municipal councils of Santa Margherita Ligure, Portofino, and Camogli, the University of Genoa, and the Metropolitan City of Genoa. The MPA falls under a three-zoning plan for different accessibility and use, where human activities including scuba diving are being regulated and monitored through the issuing of authorisations.

The scuba diving industry has existed in the area for at least half a century, as testified by the presence of many long-established equipment manufacturers in the area (e.g. Cressi Sub, Mares, Scubapro, Technisub), all of which were born of the growing importance of the local diving-related business. To date, the scuba diving sector operating in the Portofino MPA numbers as many as 20 commercial charter businesses ([Area Marina Protetta Portofino](#),

Table 1
Key characteristics of the case study locations.

	Portofino MPA	Ponta do Ouro, PPMR
Location and climate	Northern hemisphere, Meso-Mediterranean climate	Southern hemisphere, sub-tropical climate
Area	3.74 km ²	678 km ² (whole reserve)
Waters	Northern Mediterranean Basin	Indian Ocean
Disease risk	No risk of infectious disease	Some risk of infectious disease, malaria area
Underwater landscape	Rocky vertical wall, boulders, caves and canyons composed of puddingstone	Low-profile patch subtidal rocky reefs and rock ridges (barren rocky reefs, shallow ledges, and deep ledges) composed of sandstone
Biocenosis	Photophilous algae, coralligenous biocenosis (with red coral, sponges, sea fans), <i>Posidonia oceanica</i>	Coral reefs (soft and hard coral, sea fans, sponges)
Popular mobile wildlife	Grouper, barracuda, moray eel, dentex, nudibranch	Pelagic game fish, grouper, moray eel, dolphin, shark, nudibranch
Fishing	Traditional (“tonnarella”, “rossetto”, “mugginara”), commercial (artisanal, nets, lines), recreational (hook and line)	Subsistence harvesting from shore (where allowed), recreational shore angling, sport fishing of pelagic species, spearfishing
Tourism history	Coastal tourism (aside from scuba diving) since the 1950s	Coastal tourism since the end of the civil war in 1992
Tourism and recreation types (aside from scuba diving)	Boating, sailing, yachting, ferry rides to coastal towns, kayaking, snorkelling, bathing, swimming, recreational fishing, sunbathing, shopping, hiking, ecotourism, culinary tourism	Ocean safaris, dolphin and whale watching, swimming with dolphins, snorkelling, bathing, swimming, surfing, sunbathing, sport and recreational fishing (pelagic), shore angling, jet skiing, quad biking, off-road vehicle driving, inland safaris, camping, turtle nests watching, party tourism
Development	Population growth from the 1950s, growth of coastal towns and ports, development of holiday resorts	Population growth since the end of the civil war in 1992, proposed development of deep-water port in reserve
Past and present environmental and ecological issues	Seawater quality degradation in ports, coastal erosion due to development, erosion and landslides, land-based and water-based source pollution, fires, dumping and building, anchoring, trawling, fishing nets, fishing line, sport fishing, direct and indirect damage from scuba diving, non-indigenous species (including algal blooms), mass deaths of marine organisms (most likely linked to climate change)	Poaching of marine life, overfishing, overharvesting, illegal trawling, proposed deep-water port construction, crowding of dive sites, light, sound, oil, plastic pollution, disturbance of marine life, jet skis, abusive development on primary coastal dunes
MPA structure	Integral reserve, general reserve, partial reserve	Sanctuary zones (three), restricted zone (one), multiple use zones (two). Ponta do Ouro is a multiple use area
Past and present governance issues	Challenging establishment with opposing (yachting associations, nautical operators, municipalities, tourism operators) and supporting (environmental associations, scientists, terrestrial park, ferrymen, tradesmen, diving charter businesses) parties	Threats imposed by the proposed construction of deep-water port near sanctuary zone, poaching, limited awareness of PPMR by visiting tourists and scuba divers
Number of scuba diving charter businesses operating in MPA	Approximately 20	Approximately 19 (six in Ponta do Ouro as of February 2016), no more than 19 allowed in the reserve
Number of logged dives per year	Not known (the MPA makes reference to 20000 to 60000 divers per year)	Not known for entire PPMR (21000–30000 dives logged from Ponta do Ouro launching site)
Specific regulations/restrictions for scuba diving charter businesses (excluding individual diving)	No use of underwater propulsion vehicles in the general reserve, no anchoring in the general reserve, no underwater fishing, no scuba diving lessons in the general reserve, no more than 24 divers at a time at a given site in the general reserve, no more than two boats per dive site at a time, limited number of allowed sites for night diving, briefing regarding MPA regulations on diving behaviour compulsory	No use of underwater propulsion vehicles, no anchoring, no more than an appointed number of commercial operations per area, groups must tow visible surface buoy, trainees' first dives must be over sand, wearing gloves is discouraged
Established dive sites	21 marked by buoys	20 from Ponta do Ouro to Ponta Mamoli, no buoys
Key scientific projects involving the scuba diving industry	Reefcheck Italia Onlus, Green Bubbles RISE, Mesomed	Turtle monitoring, whale and dolphin research, economic valuation of reefs, coral reef monitoring, Green Bubbles RISE
Key stakeholder groups currently interacting with the scuba diving industry	Portofino MPA consortium, University of Genova, Polytechnic University of Marche, Ziguele, Fishing League, Liguria Region, scuba equipment producers and retailers, Green Bubbles RISE consortium (since 2015)	PPMR resource manager and management board, Peace Parks Foundation, Oceanographic Research Institute, National Agency for Conservation Areas, Centro Terra Viva, Green Bubbles RISE consortium (since 2015)



Basemap: OpenStreetMap contributors and the GIS user community

Fig. 1. Study areas, namely the Portofino MPA, Italy (1,2), and Ponta do Ouro, PPMR, Mozambique (3,4).

2016). Most have come together to form Assodiving Portofino, an association representing scuba diving operators around Portofino. Scuba diving in the MPA is allowed at 21 sites in the general reserve, marked by buoys, and anywhere in the partial reserve. Permits are not limited to the commercial operations, and private citizens can dive independently in the MPA under authorisation. As defined by articles 13 and 14 of the management plan, at each site no more than 24 divers can dive simultaneously, while it is compulsory to provide information about the MPA regulations on diving behaviour before the dive. Divers (individuals or charter businesses) are obliged to register the details of the vessel, the names of the guides and/or instructors, the participants and their diving certificates, the date, the time and the diving site. Monitoring statistics of the Portofino MPA have reported up to about 60000 dives in 2001 (Cappanera, Venturini, Campodonico, Blini, & Ortenzi, 2012). However, a reduction in demand within the sector has been observed over the last years, so that the latest statistics report that in 2014 approximately 28000 dives took place within the MPA (V. Cappanera pers. comm.).

Diving associations initially supported the establishment of the MPA in the nineties, favouring environmental protection and envisaging economic benefits (Salmona & Verardi, 2001). Nevertheless, the process of establishing the MPA was difficult and lengthy, hampered by poor consensus and limited participation among key stakeholders (Salmona & Verardi, 2001). This may have resulted in a series of unvoiced concerns on behalf of the scuba diving industry, persisting to this day. Additional concerns may derive from the recent economic crisis and resulting weakness in the coordination of the scuba diving sector by the role players, also resulting from competition in the market. Work by Markantonatou, Noguera-Méndez, Semitiel-García (2016) on Portofino MPA's social network structure identified the scuba diving industry as one of the core stakeholder groups in the Portofino MPA, highlighting the importance of the sector in the area.

2.2. Ponta do Ouro, PPMR

The PPMR is located in Southern Mozambique (Fig. 1). Established in 2009, it is under review by UNESCO to become a World Heritage Site. It is situated in the Lubombo Transfrontier Conservation Area (LTFCA), together with the Maputo Special Reserve (Mozambique) and the Maputaland MPA (South Africa). Covering a total of 678 km² and stretching for 86 km along the shore, the PPMR has 12 prominent coastal points. It extends three nautical miles offshore and to the base of the dunes inland, and is regulated by a three-zoning plan. The authority responsible for the PPMR is the Ministry of Land, Environmental and Rural Development, with the collaboration of other Ministries, the Navy, and the National Maritime Institute. Internally, the PPMR employs an appointed warden, who reports to the head of the National Administration of Conservation Areas (ANAC). Diving is regulated and monitored within the multiple use zones through permit systems and law enforcement.

The PPMR is a popular scuba diving destination among South Africans, Mozambicans, and also international visitors due to shark diving. Even in the years before the establishment of the PPMR, over 70% of the visiting tourists were scuba divers (Abrantes & Pereira, 2003; Bjerner & Johansson, 2001). During this time, up to 62000 dives in the ocean reefs were recorded yearly (Pereira, 2003). As a consequence, during the establishment of the PPMR, scuba diving was identified as one of the major threats to the marine environment. Scuba diving operators participated in the planning of the PPMR by contributing to the creation of the diver code of conduct and special guidelines for diving with sharks. The management plan of the PPMR also prescribes a healthy dialogue

with the scuba diving industry by means of annual meetings to consult and discuss plans, progress, and issues. Some concerns emerged following the establishment of the PPMR. One is the proposed construction of a deep-water port at Ponta Techobanine, near a sanctuary zone hosting unique reefs (Celliers & Schleyer, 2008). Port construction (which at the time of writing has not yet commenced) and its impacts would affect the health of the reefs (also including the South African reefs of the Maputaland MPA), resulting in biodiversity loss and downturns in the scuba diving tourism industry (Daly, Fraser, & Snowball, 2015). Another issue is the low public awareness of the PPMR. Research by Daly et al. (2015) demonstrated how less than half of the scuba divers visiting Ponta do Ouro are aware of the existence of an MPA, pointing to the need to better inform the public about the presence and meaning of the MPA, and to attract conservation incentives in the form of user fees.

Ponta do Ouro is one of the coastal localities of the PPMR and represents its southernmost portion, with the town situated 15 km away from the South African border. It is one of the multiple use areas, hosting the majority of charter businesses operating in the PPMR, six by March 2016 (eight in 2015), and two swim-with-dolphins charter businesses. Diving charter businesses in Ponta do Ouro are allowed to operate thanks to a business permit, and individuals can dive privately only under a research permit. Chartered vessels are required to launch from a single designated area on the sandy beach of the point, from which recreational fishing and swim-with-dolphins vessels also launch. The reefs where scuba diving is allowed (at least 20 from Ponta do Ouro to Ponta Mamoli in the north) are not marked by buoys, but are normally located with a GPS; a visible surface buoy must be towed during the dive.

3. Methods

3.1. Questionnaire survey with dive operators

The first part of the research followed a quantitative, descriptive and non-experimental method of data collection via a structured questionnaire survey administered to scuba diving operators. The questionnaire contained four main sections. The first covered demographic details, while the second requested details on scuba diving experience. The third dealt with details on the diving charter business/school and the last invited the operators to indicate their level of agreement, using a 5-point Likert scale (where 1 = fully disagree and 5 = fully agree), with 81 statements concerning the scuba diving industry in their area. These covered nine 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), environmental (e.g. impacts, conservation), governance (MPA), communication (e.g. between the industry and the local community, the MPA, and scientists), science (e.g. interest and support), cooperation and promotion (e.g. using social networks for marketing purposes), and tourism (e.g. tourist behaviour and safety).

Between 2014 and 2015, all scuba diving charter businesses operating in the Portofino MPA and in Ponta do Ouro were personally invited to participate in the official launch of Green Bubbles RISE, an EU-funded project on sustainable scuba diving. The launch took place on the 18 February 2015 in Santa Margherita Ligure, and on the 8 June 2015 in Ponta do Ouro, with a total of 11 and four scuba diving operators attending, respectively (Fig. 2). Following a brief introduction, the questionnaire was administered to the operators, who completed it in approximately 20 min (Fig. 2).



Fig. 2. Launch of Green Bubbles RISE project on sustainable scuba diving with questionnaire survey and focus group discussion with scuba diving operators. Photo credits: S. Lucrezi.

3.2. Focus group and semi-structured interviews with dive operators

The second part of the research followed a qualitative and non-experimental method of data collection. After compiling the survey, the 11 operators of the Portofino MPA joined a focus group session to discuss the themes covered in the survey. In order to facilitate the process of collecting information and perceptions, these operators were divided into groups of three or four. These rotated at one of three stations, sitting with a facilitator for 10 min at each stop (“carousel technique”). The operators were asked to describe the relationship between their business and 1) society, including the general public, clients, local businesses, and the local community;

2) governance, namely the MPA; 3) environment and conservation, both marine and terrestrial; and 4) science, from environmental to social and economic. They were also asked 5) what the economic status of their business was, and 6) if non-monetary aspects (which they then specified) were adding value to their business. Each station dealt with two themes, the discussion of which was initiated by two generic questions, one per theme, asked by the facilitator, who communicated with the participants and wrote key words visible to them. An information saturation and simile-stepwise method of information collection was deployed: participants coming to a station were provided a summary of the keywords that had emerged during previous sessions at that station. They were asked to add more keywords to the discussion, or to

discuss a particular keyword further. At the end of the focus group session, the facilitators and their assistants presented a summary of all the keywords and led discussions from their station (Fig. 2).

Scuba diving operators who did not attend the focus group session were invited to participate in a semi-structured interview covering the same themes. Three additional operators were successfully interviewed in September 2015, making the group of stakeholders of the Portofino MPA a total of 14 people; the interview comprised one interviewer, the interviewee, one person taking notes, and one witness.

Operators in Ponta do Ouro did not participate in a focus group session, but during June 2015 and February 2016 they were independently invited to face-to-face interviews covering the same themes and questions. Six scuba diving operators were successfully interviewed, including the four who had participated in the questionnaire survey during the launch of the Green Bubbles RISE project.

3.3. Data analysis

Data from the questionnaire surveys were captured in Microsoft Excel (2010) and analysed using descriptive statistics in Statsoft Statistica (version 12, 2014). The notes from the focus group session and the semi-structured interviews were divided into six themes defined *a priori* (reflected in each of the six questions), facilitating synthesis and the extraction of subthemes and keywords through content analysis. Thus, these data were analysed via both deductive (themes) and inductive (emerging subthemes and keywords for each theme) open coding (themes and keywords were separated in terms of each case study).

4. Results

4.1. Operator and business profile

The profile of the diving operators and their business is depicted in Table 2. Operators generally owned the business, often also

acting as manager/CEO, instructor, and guide. Most charter businesses at both case studies were long-established with a lifespan of up to 20 years. Operations in Italy were male-dominated, whereas they were represented similarly by males and females in Mozambique. Operators in Ponta do Ouro were younger, possessing a smaller number of scuba diving certifications, and having worked half the number of years in the scuba diving industry compared with operators in Portofino. However, they tended to spend more time diving annually. While having a smaller fleet, they hired more staff during the scuba diving season.

Productivity in Portofino was reduced by about 40% (both dives and courses) from 2010 to 2014. Dives picked up again in 2014, while numbers of people doing scuba diving courses continued to decrease. In Ponta do Ouro, productivity (amount of dives) was very low in 2010 and 2011, possibly due to a severe fire in 2010 affecting the diving charter businesses in the area. In 2012–2013 diving activity increased, but decreased again by 20% in 2014, when the introduction by the South African government of stricter immigration regulations affected the general flow of tourists across the border.

4.2. Questionnaire survey

A summary of the responses to the questionnaire survey is given in Table 3. Regardless of case study, scuba diving operators felt that scuba diving greatly influences and has a positive impact on their lifestyle, and they supported the growth of the scuba diving industry. They agreed that the scuba diving industry has positive impacts, both tangible such as money and employment, and intangible such as popularity, on the local communities. They also agreed that the scuba diving industry acts in respect for local communities. They felt that the potential of the scuba diving industry is underestimated, and that the local communities do not really support the industry.

In both case studies, operators trusted that the scuba diving industry promotes conservation and environmental education, causing minimal negative environmental impacts. However, they

Table 2
Profile of the operators interviewed and characteristics of their businesses at the case study locations.

	Portofino MPA	Ponta do Ouro, PPMR
Nationality	Mostly Italian	Mostly South African
Gender	Mostly male	Male and female in similar proportion
Marital status	Single/divorced	Married/single
Age (average)	40s	30s
Education	High school diploma or equivalent (one graduate and one PhD)	High school diploma or equivalent (two graduates)
Scuba certifications (average)	17	6
Main certifying agency	PADI, TDI, SSI, UTD	PADI, NAUI, SSI
Certification type	Basic (Open, Advanced), professional (Instructor), specialties (e.g. Night diving), technical (e.g. Trimix), “dry” (e.g. Gas blender)	Basic, professional, specialties, “dry”
Total logged dives (average)	3527	1402
Years diving (average)	22	21
Dives per year	50–275 (mostly in MPA)	2–500 (mostly in PPMR)
Status in business	Owner/manager/CEO/instructor/guide	Owner/manager/CEO/instructor/guide
Years in industry (average)	20	10
Business lifespan	0–25 years (average = 7.5)	5–21 years (average = 12.5)
Fleet (vessels)	1–4	1–2
Staff in season	3–15 (average = 6)	5–17 (average = 9)
Peak diving season	Jun–Sep	Dec, Jan, Mar, Apr
Additional activities	Repairs, research, informatics, school teaching, marketing, retail	Accommodation, food, beverage, repairs, research, volunteering, retail
Productivity 2010–2014	Decline in dives and courses by 40%–2014; dives picked up in 2014, courses continued to decline	Low in 2010–2011; dives picked up by 30% in 2012–2013, then declined by 20% in 2014

Table 3
Summary of operators' perceptions of the scuba diving system from the questionnaire survey.

	PF ^a	PDO ^b
Personal		
1 Scuba diving is the reason why I live here	+	+
2 Scuba diving defines who I am	+	+
3 My business positively affects me and my personal quality of life	+	+
4 I support the growth of the scuba diving industry	+	+
Social		
5 The scuba diving industry benefits the overall management of towns/municipalities of the area	+	Mix
6 Scuba diving has more positive than negative impacts in the area	+	+
7 The potential of the scuba diving industry is generally underestimated	+	+
8 The scuba diving industry supports the local community	+	Mix
9 Revenues generated by the scuba diving industry are used to the benefit of the local community	+	–
10 The scuba diving industry acts in total respect for the local community	+	–
11 The scuba diving industry is supported by the local community	–	Mix
12 The local community recognises benefits in the scuba diving industry	–	–
13 The local community takes common initiatives to support the local economy	–	Mix
14 The local community is involved in marketing to promote scuba diving	–	–
15 The local community takes action to promote touristic packages including local businesses	–	–
16 The local community cares about the state of marine environments in the area	–	–
17 Scuba diving creates leisure opportunities for people	+	+
18 Scuba diving forms part of the “heartbeat” of this area	+	+
19 Scuba diving makes this area popular	+	+
20 This area is a world class destination for scuba diving	+	+
Economic		
21 The scuba diving industry creates employment	+	+
22 Scuba diving creates more opportunities for local businesses	+	+
23 The scuba diving industry ensures maintenance of infrastructure and services in the area	+	Mix
24 The scuba diving industry competes with cultural traditions of the area	Mix	–
25 The scuba diving industry increases property and accommodation value in the area	+	+
26 The scuba diving industry increases the total cost of living in the area	–	+
27 The scuba diving industry generates more income for this area	+	+
28 The scuba diving industry generates revenue for conservation/environmental management	+	+
29 Revenues generated by the scuba diving industry benefit environmental protection	+	Mix
Environment		
30 The scuba diving industry improves waste management in the area, both directly and indirectly	–	–
31 The scuba diving industry promotes conservation in the area	+	+
32 The scuba diving industry promotes environmental education in the area	+	+
33 The scuba diving industry is actively engaged in litter picking	Mix	+
34 Scuba diving has caused reductions in wildlife abundance and diversity in this area	–	–
35 Scuba diving has clear negative impacts on the environment in this area	–	–
36 Scuba diving increases pollution in this area	–	–
37 Industries other than scuba diving have clear negative impacts on the environment in this area	Mix	+
Governance (MPA)		
38 The scuba diving industry benefits the MPA	+	Mix
39 The scuba diving industry benefits good management of the MPA	+	Mix
40 The scuba diving industry is well managed by all interested parties	Mix	Mix
41 The scuba diving industry pays the same fees to the MPA as any other MPA user	–	–
42 The fees that the scuba diving industry pays to the MPA are worth the support from the MPA	–	–
43 The MPA works to improve the quality of diving	–	Mix
44 The MPA promotes the sustainable development of local businesses directly dependent on it	+	+
45 The MPA takes action to promote sustainable tourism in the area	Mix	Mix
46 The MPA firmly enforces diving safety rules	Mix	Mix
47 The MPA firmly enforces proper diving etiquette	Mix	Mix
48 The MPA takes a holistic approach to managing the scuba diving industry	+	+
49 The scuba diving industry is under pressure from the MPA	+	+
50 The MPA favours other industries (e.g. fishing) before scuba diving	Mix	Mix
51 Requests and concerns of the scuba diving industry are addressed by the MPA	+	+
52 The scuba diving industry is actively involved in management of and planning for dive sites	Mix	–
53 Revenues generated by scuba diving for the MPA are re-invested in the industry by the MPA	Mix	–
Communication		
54 The system in use to report details about the scuba diving industry to the MPA is effective	Mix	Mix
55 Communication between the scuba diving industry and the public is effective	Mix	+
56 Communication between the scuba diving industry, authorities, and scientists is effective	Mix	–
57 The scuba diving industry is open to communications aimed to solve issues in the system	+	+
58 The scuba diving industry has many concerns	+	+
59 Bureaucracy hampers the functioning of the scuba diving industry	+	+
Science		
60 Scientific research is beneficial to the scuba diving industry	+	+
61 Requests and concerns of the scuba diving industry are addressed by scientists	+	Mix
62 The scuba diving industry is actively involved in research	Mix	+
63 Scientists take a holistic approach when analysing the diving system	Mix	Mix
64 The scuba diving industry is well-represented by scientists	Mix	Mix
65 There are enough knowledge exchange events between scientists and the scuba diving industry	–	–
66 Scientists promote marine environmental education in the area	+	+
67 The scuba diving industry is misunderstood by scientists	Mix	Mix

Table 3 (continued)

	PF ^a	PDO ^b
68 The scuba diving industry is under pressures from scientists	–	Mix
69 There are disciplines (e.g. IT) that the scuba diving industry would like assistance from	+	+
70 Multidisciplinary consortia can represent a good approach to analysing the diving system	+	+
Cooperation/Promotion		
71 Operations/businesses in the industry are cooperative	+	+
72 Operations/businesses in the industry act in full respect for one another	–	–
73 The scuba diving industry makes use of marketing to promote itself	+	+
74 The scuba diving industry makes use of social media	+	+
75 The scuba diving industry is in competition with other industries	Mix	+
Tourism		
76 Diving tourists care about the marine environments in this area	+	+
77 Scuba diving attracts too many visitors to the area	–	Mix
78 Dive sites in the area are overcrowded during the diving seasons	+	+
79 Diving tourists follow proper diving etiquette	Mix	Mix
80 Diving tourists are fully conscious about safety procedures during diving operations	Mix	Mix
81 The scuba diving industry is under pressures from customers	Mix	+

+: Positive perceptions; –: negative perceptions; mix.: mixture of positive and negative perceptions.

^a PF: Portofino MPA.

^b PDO: Ponta do Ouro, PPMR.

felt that the industry does not contribute positively towards waste management, either directly (e.g. litter removal) or indirectly (proper wastewater discharge). The operators agreed that industries other than scuba diving may be causing negative environmental impacts in the MPAs. They also expressed mixed views about governance and the way that scuba diving is managed in the MPAs. While concurring that the scuba diving industry benefits the MPAs, generating revenue that can be used by the local authorities to manage these, they were unsure if and how the money generated by the industry is reinvested in the MPAs. In spite of some mixed views, they tended to disagree that the scuba diving industry is properly managed and supported by the MPAs, feeling excluded from the management of the MPAs and treated unequally compared with other users. While agreeing that managers take into consideration the concerns of the scuba diving industry, they were uncertain about the effectiveness of communications between the industry and the MPAs, particularly in light of complex bureaucratic processes.

The operators concurred that scientific research benefits the scuba diving industry, and that concerns of the industry are normally addressed by scientists. They were positive that multidisciplinary consortia represent a good approach to analyse the diving system, and that the industry could use assistance from a variety of scientific disciplines, such as Information Technology. However, they were uncertain that the scuba diving industry is well-represented in scientific research. They felt that not enough opportunities are being made available for knowledge exchange between the scuba diving industry and scientists.

At both case studies respondents were positive about the ability of local diving operations to cooperate and promote their business, although they also felt that some businesses may not act respectfully towards one another, and that competition exists between the diving industry and other industries in the MPAs. Concerning their clientele, the operators tended to view visiting scuba divers as caring about the environment in the MPAs, although it is not always guaranteed that they follow proper diving etiquette and that they are fully aware of safety procedures. They agreed that while scuba diving may not attract too many visitors to their area, the dive sites do become overcrowded during the scuba diving seasons, with the clientele sometimes putting the businesses under pressure.

4.3. Focus group and interviews

The results from the focus group session and the semi-

structured interviews are reported by theme. A summary of the subthemes and keywords extracted from the data for each discussed theme is provided in Table 4.

4.3.1. Society

The scuba diving operators in the Portofino MPA identified a series of problems in describing the relationship between the local scuba diving industry and society. The first was the perceived lack of support from the hospitality sector, accompanied by a limited understanding of the dynamics of scuba diving tourism in the area. Hotels wish to attract high-expenditure tourists, paying less attention to lower-expenditure divers, who could cancel bookings at the last minute due to bad weather. The operators suggested that if hotels stayed open during the low seasons, asked for more reasonable prices, and for a booking deposit, they would assist the scuba diving industry while benefitting themselves. Another issue was the poor synergy with touristic operations and travel agencies, resulting in a lack of touristic packages and offers including various products. These packages may be considered unrealistic, given the day-visitor nature of most people coming to dive in Portofino, where both scuba diving and overnight staying can be costly. The operators admitted that they did not possess a proper entrepreneurial mentality, neither promoting their business nor safeguarding their interests sufficiently. For example, they are subject to last minute cancellations by clients, and do not ask for deposits upon booking. They favoured the mentality of foreigner tourists, who tend to pay in advance.

The operators lamented the lack of infrastructural support and zoning necessary to control the clientele on land. Marinas and roads are increasingly crowded and degraded, without subsequent upgrades and proper maintenance by the local councils. Some roads required to access launching sites or dive centres are closed during festivals and other events, blocking access for clients. The operators also felt that neither local communities nor the region consider the financial revenue, tourism, and employment potential deriving from the scuba diving industry, perhaps due to the lack of political favour, or based on previous negative experiences with scuba diving businesses. There is a lack of integrated offerings, such as packaging and selling alternative tourism forms and attractions aside from scuba diving in the localities around the MPA. Thus, opportunities for increasing and improving tourism are precluded. Last, there seems to be no connection between local communities and the scuba diving world; according to operators, diving is a little-known sport which is spoken of only when there are

Table 4
Subthemes and keywords extracted for each theme during the focus group session and semi-structured interviews with scuba diving operators at the case study locations.

Theme	Subthemes		Keywords	
	Portofino MPA	Ponta do Ouro, PPMR	Portofino MPA	Ponta do Ouro, PPMR
Society	Poor support from hospitality/Divers as nuisance/Limited promotion by travel agents/Divers as day visitors/Limited support by councils, region/Lack of infrastructural-logistical support/Little interest-support from locals/Poor cooperation among operators	Diving creates employment/Lack of business sense/Cultural differences/2010 fire challenged industry/Diversified clientele/Massive flow of non-diving tourism	Industry/Clients/Hospitality sector/Area/People/Businesses/Hotels/Support/Divers/Lack/Charter businesses/Tourism/Scuba/Dive/Booking/Council/Nuisance/Community/Deposit/Relationship/Collaborations/Costs	Charter businesses/Clients/People/Boat/Dolphins/Tourists/Fire/Employment/Dive/Consequence/Ponta/Locals/Industry/Staff/Community
Governance	No representation/Diving fundamental to MPA/Taxation/Poor marketing/Fishing/Unequal treatment/MPA important/Better law enforcement and patrol/No transparency/No synergy/Excessive control/Scoters	PPMR versus government/Taxation/Bureaucracy/PPMR important/Active involvement/More staff and funding/Better law enforcement and patrol/Better infrastructure/Common sense/Road/Harbour/Trans-frontier marine park	MPA/Scuba divers/Fishers/People/Rules/Problems/Industry/Tax/Areas/Event/Use	PPMR/Government/Road/Charter businesses/Area/Money/Ponta/Use/People/Restrictions/Tax/Businesses/Establishment/Pressures/Boats/Regulations/Concerns/Reefs/Harbour/Maputo/Industry/Cientele/Department
Environment	Importance of conservation/Importance of MPA/Minimal impact from diving/Quality label/Poor collaboration with terrestrial park/More control in MPA/More MPA info for visitors/Better diving courses to reduce impact/Education programmes	Involvement in conservation/Minimal impact of diving versus fishing/Waste management issues/Perceived shifting baseline/Road from Maputo	MPA/Activities/Environment/Impact/Student/Children/Conservation	Area/Fishing/Impacts/Environment/Charter businesses/Education/People/Development/Waste
Science	Science important for diving/More interactions needed/Monitoring projects important/Feel neglected/Keeping clients interested in science/More Citizen Science events/More feedback/Costly innovative technology	Some Citizen Science/Support of scientific projects/Fear of more bureaucratic implications/Poor feedback/Marketing Citizen Science	Marine environment/MPA/Challenge/Science/Cientele/Role/Terms/Education	Data/Citizen Science/Research projects/Charter businesses/PPMR/Research/Science/People/Collection
Economy	Economic recession/Reduced service quality/Changed image of businesses/Seasonality/Diversifying/Investing/Poor marketing at local and regional level/Lack of cooperation with local businesses/National contributions/Diving union	Losses from 2010 fire/Economic recession/South African price standards/"Xenophobia" events/Restrictions on swim-with-dolphins operations/Problems at the border/Diversifying	Businesses/Portofino MPA/Area/Costs/Lack/People/Contributions/Tourism/Councils/Impact/Activities/Industry/Status	Business/Cientele/People/Charter businesses/Dolphins/Losses/Fire/Recession/Industry/Trade/Prices
Non-monetary value	Landscape/Terrestrial park/Marine life/Cradle of scuba diving/Apparent remoteness	Reef/Marine life/Uniqueness/Landscape/Climate/Safety/Remoteness	Industry/Scuba/Portofino MPA/Park/Value/Area	Aspect/Ponta/Nature/Weather/Village/Crime/Area

incidents and fatalities. Some operators acknowledged that the scuba diving industry, or at least its local segments, may be at fault in many of these issues. While it should speak with a strong voice, lack of cooperation makes it less credible. Without cohesion, the scuba diving industry cannot be properly represented as a societal entity and cannot be heard.

Most operators in Ponta do Ouro perceived the scuba diving industry as attracting the majority of tourists, providing most jobs, and creating most business opportunities for other sectors in the area. However, there were opinions that lack of proper business sense among dive centres hampers the opportunity to make good money and thus assist both the local economy and local communities to benefit. While local communities are aware of the potential economic benefits deriving from the scuba diving industry, it is still difficult to directly involve locals in diving or water-based jobs, as they tend to be more connected to the land and are fearful of the water. While some members of the local communities have learned that the sea offers ways of subsistence through fishing, many fishers still cannot swim. If motivated and trained, local people could learn how to swim and dive, with some ending up working for the charter businesses. However, most boatmen (also called *marineros*) are still unable to swim, increasing safety risks and placing the employing charter business under more pressure.

Most operators felt that they had a good relationship with their clientele. Despite the challenges, most charter businesses managed to cope by diversifying and adopting different marketing strategies. For instance, some rely on clients coming to the dive shop and

booking a dive on the spot. Others focus on a more organised, contained, and international clientele. Some market themselves locally via advertising boards, while others rely on word of mouth. A number cater for large groups and diving schools from South Africa, while others attend to small groups and families. Some attract a generalist market (e.g. shallow diving), while others attract specialised divers (e.g. deep diving, diving with sharks). Some operate with hired and seasonal staff, while others are family-based businesses. Some rely on a turnover of clients, while others mostly depend on returning clients.

Some operators still experienced problems with clients who either request for lower prices or do not pay at all for their bookings. The operators also tended to perceive tourists other than divers as a potential threat to their business. In particular, they were concerned about the massive flow of non-diving tourism travelling from across the South African border and from Maputo, the capital of Mozambique, to party and drink during the school holidays. These people tend to generate high levels of litter, which is removed by the locals and the businesses once tourists have left.

4.3.2. Governance

Operators in both case studies acknowledged that the presence of an MPA is important to the scuba diving industry, allowing their business to exist. They also believed that the establishment of the MPAs had tangible positive effects on the health of the marine environment, including a growth in the numbers of fish. However, they identified a series of issues with regard to their relationship

with the managing bodies, particularly in relation to taxation and poor law enforcement and patrolling in the MPAs.

In the case of Portofino, the operators claimed that the MPA's greatest income is generated by the diving industry, with a total of Euro 100000 in tax annually. Despite the fundamental role of the scuba diving industry in the MPA, there still is no proper representation of it in the MPA management, nor does the MPA properly advertise and promote scuba diving activities in the area. The operators felt that the treatment (from taxation to control) received from the MPA is not equal for all users, with some stakeholders, particularly fishers and ferrymen, being favoured. They suggested that in order to alleviate taxation pressures on stakeholders, visiting tourists should be taxed by means of a surcharge, annual membership (for scuba divers), or other method. The operators also raised the issue of proper zoning and use in the MPA. They lamented that fishing activities are allowed in the MPA, and that while there are few fishers in the MPA, they seem to exercise more political power to influence decisions and to be less controlled than scuba diving operators. They felt that investment in patrol and law enforcement in the MPA is currently inadequate. For instance, boat traffic moving over diving areas should be better controlled by means of speed limits and more coastguard patrols, at least during the high peak seasons for diving and boating. Some operators described a relationship with the MPA authorities lacking transparency, synergy, healthy communications and collaboration. For instance, complaints and suggestions made to the MPA concerning various problems are not addressed. Other operators viewed the management of scuba diving by the MPA as over-regulatory. Examples include the closure of dive sites due to scuba diving fatalities, and the prohibited use of underwater scooters.

The operators in Ponta do Ouro were aware that the PPMR has not come into full effect yet, and that the maritime department in the government still collects tax. In the light of this, they feared that they would be obliged to pay tax both to the government and to the PPMR until a fixed arrangement is made, or that they will bear the financial burden of the PPMR once the maritime tax is lifted. Increased taxation would imply an additional charge on dives, leading to loss of business. Operators were still disposed to pay taxes to the PPMR, provided that the money is used transparently and to the benefit of the PPMR and local communities. They were less inclined to pay tax to the government, expressing the feeling that this money would not be reinvested in the PPMR. They also expressed frustration over the intricate bureaucratic channels to be followed in order to start and run a diving business.

Operators still looked forward to the advent of the PPMR as the main managing authority, as this transition would mean better enforcement, a more sustainable diving industry, and less corruption in the area. The PPMR warden was perceived as a critical intermediary between the charter businesses and the government. Concerns regarding present and future management included limited staff; little funding (aside from taxes and permit fees); limited sea patrol and law enforcement, particularly regarding recreational fishing on reefs, harvesting, illegal fishing, jet skiing, and trawling; and minimal management of dive sites. While the concept of a *trans*-frontier marine park joining MPAs in South Africa with the PPMR was welcomed by the operators, some feared that it would result in greater restrictions in the PPMR, suffocating diving businesses and increasing the risk of tourism declines.

Two major concerns voiced by the operators included the impacts of the tar road connecting Maputo, the capital of Mozambique, with Ponta do Ouro, and the possible construction of the harbour in the PPMR. According to the operators, the road would increase accessibility but also crime, environmental damage, and degradation, thus deterring divers. The supporting infrastructure (e.g. sewerage system, water pipes, electric supply) and

services (e.g. solid waste management) and police patrols in the area were considered inadequate to handle the increasing flow of tourism resulting from the road. Further, the government should prioritise important shortfalls in the area, such as the lack of schools, a municipality, and a better clinic with a competent full-time doctor, prior to introducing the road. While some people had been included during the decision-making process concerning the road, the operators indicated that members of the local community had not been informed nor educated properly regarding its possible consequences. Some operators suggested that the road should connect the capital of Mozambique to the South African border, thus still requiring four-wheel drive vehicles if one is to reach Ponta do Ouro, and maintaining the partially secluded atmosphere of the place. Others, however, acknowledged that the road would ease the importing of products, thus reducing their cost and increasing tourists' spending power. As for the proposed harbour construction, the operators hoped that with the project currently on hold and the PPMR under scrutiny for a world heritage site listing, the Mozambican government would abandon its plans. They unanimously believed that the harbour would have irreversibly detrimental consequences on the reefs, on water quality, and ultimately on their business.

4.3.3. *Environment*

Operators from both case studies recognised the importance of keeping the marine environment in good condition, as this affects their business. They acknowledged the importance of conservation, confirmed by the positive influence that the establishment of the MPAs has had on the marine ecosystem. In this context, they generally believed that diving activities impact minimally on the marine environment.

Operators from Portofino nevertheless suggested that diving businesses should establish standards and protocols (e.g. condition of compressor, emissions of boat, safety), the meeting of which could represent a sign of quality and be rewarded with a certification of service quality. They also felt that environmental awareness campaigns for tourists would benefit from more information being made available regarding the MPA and its rules, as well as from collaborations between the scuba diving industry and the terrestrial park, for instance organising packages including activities in the nature reserves. Last, they suggested that the MPA should do more to safeguard the marine environment, for instance by increasing sea patrols and control over illegal fishing and boating activities.

Operators in Ponta do Ouro claimed to be actively involved in environmental protection and conservation actions, from simply using four stroke boat engines, to beach clean-ups, beach patrol, education, creating codes of conduct, as well as reef and wildlife monitoring. Some felt that limited interest is shown in environmental issues of the area by relevant authorities and by the general public, and that there should be more education. For example, since solid waste management in the town is a serious issue, there is an urgent need to have proper disposal bins installed either by the local council or by the PPMR, to relocate the dumping site, and to educate local people on the importance of keeping the town clean to avoid deterring tourists. Operators were concerned about the possible consequences of the construction of the tar road on the environment, including pollution, littering, and more development in the area. Some people explained that the nature of the area altered dramatically after the arrival of electricity in 2002, which opened the doors to more mainstream diving tourism, to the establishment of businesses other than diving, and to development on the frontal dunes. Operators perceived shifting baselines in the marine ecosystem, such as reduced whale shark individuals and hard coral cover, as a consequence of global climate change and

fishing (recreational fishing, angling, trawling), with the latter being very detrimental to the marine environment. While they agreed that scuba diving has minimal damaging impact on the reefs when carried out according to the rules.

4.3.4. Science

Operators in both case studies believed in the significant role of science in improving scuba diving in different ways. Those in Portofino appreciated their participation in Citizen Science initiatives including benthic habitat monitoring, recognising that these are important for education on the marine environment. However, some operators without a background in marine science felt neglected, while others requested more involvement, for instance to monitor protected and invasive species in the MPA, or to raise environmental awareness. Operators perceived challenges in engaging divers in Citizen Science programmes, given that clients tend to be day visitors. While they agreed that the technological advances combining diving with photography and video have increased the capacity of the diving sector, both in terms of clientele and environmental awareness, they affirmed that applying innovative technology has a high cost, and that tools, software, and equipment are evolving rapidly.

Operators in Ponta do Ouro were generally positive towards science. Some were actively involved in Citizen Science projects involving mammal, fish, and reef monitoring, with others being glad to offer their services (e.g. boat, dives, guide, and equipment) for the benefit of scientific research. Citizen Science was believed to be a good product that the diving businesses can offer to the public as a means to get people involved in science and earn money at the same time. However, some operators feared that becoming involved in Citizen Science or in research would imply more bureaucracy and additional permit applications to the PPMR. Others believed that competition between charter businesses precludes fruitful collaborations in Citizen Science projects. Last, there was some disappointment with the poor feedback and dissemination following participation in scientific research.

4.3.5. Economy

The operators generally lamented economic losses in their business over the last few years. Those in Portofino attributed these losses to the economic recession, resulting in greater management costs, reduced service quality, and possible degradation of their image. Other factors affecting the economic status of the businesses included climate; seasonality; inadequate marketing of scuba diving by the local municipalities and the region; poor tourism marketing in general; unsatisfactory synergy with local businesses, institutions, and the MPA; high cost of accommodation; minimal accessibility (e.g. from nearby airports); little support by the broader diving industry; and clients misperceiving charter businesses as a group of people diving as a result of their passion for it or as a hobby, rather than actual businesses. Operators also complained about the lack of support by local councils to apply for and obtain national funding for entrepreneurship activities. Strategies to overcome economic hurdles included diversifying, for example focusing on new markets, opening a diving shop or operating through on-line activities; and retaining a high service quality to increase competitiveness. Propositions included price standardisation; information sessions being held by local councils to help entrepreneurs apply for and obtain national funding; a better communication network between local businesses to promote tourism; some kind of national recognition or status (also for instructors and guides); diving unions, which would protect the interests of diving businesses and help them search for national funding; and the inclusion of a representative from the diving industry in the management of the MPA.

Operators in Ponta do Ouro blamed economic downturns mainly on the economic recession. Some added the destructive fire of 2010 as another critical cause of economic loss. A number mentioned that since the implementation of restrictions, specifically those concerning the number of operators permitted to take clients swimming with dolphins, financial losses have been significant. Others blamed the South African client base, resulting in low prices. Other causes of economic losses included the recent “xenophobic” events in South Africa, resulting in cancellation of bookings; harassment at the South African border, resulting in excessive fines; unsynchronised school holidays in South African provinces, making it difficult to pick up business in winter; having to rely on walk-in trade; and competition with recently established charter businesses. Business resilience strategies included the ability to offer other services such as accommodation; market diversification and internationalisation; family-based business models; pre-booking rather than walk-in trade; and travel agents’ assistance. Some operators suggested that they should be allowed to reinstate swim-with-dolphins services together with scuba diving.

4.3.6. Non-monetary value

Operators from both case studies recognised a number of non-monetary aspects which added value to their business. Common aspects included the aesthetically pleasing and sheltering landscape around the MPAs, the underwater marine life, and the remoteness of the area. The latter was defined as “apparent remoteness” by the operators in Portofino; the topography of the area made scuba divers perceive it as remote, and thus more attractive. Operators in Portofino acknowledged that both the MPA and the terrestrial park are very valuable, allowing their businesses to exist. One operator defined the Portofino area as “the cradle of scuba diving”.

Operators in Ponta do Ouro valued the reefs and their uniqueness before anything else. They also felt that the sandy beach is an additional asset that can be enjoyed for free. Other aspects that the operators believed contributed to the success of the scuba diving industry included the “vibe” of Ponta do Ouro, safety, friendliness of the local community, and a mild climate all year around. Last, they mentioned that since Ponta do Ouro is close to the South African border, it allows South Africans and foreigners to easily enjoy a unique experience by simply crossing the border and visiting a new country.

5. Discussion

The aim of this study was to investigate the scuba diving industry's perceptions of its relations with other key elements in the SDTS, using examples from two MPAs, one in Italy and one in Mozambique. This was undertaken in order to gather relevant information on the current issues affecting the sustainability of the SDTS and to propose concrete plans to achieve sustainability goals. The selection of case studies was based on the assumption that emerging issues and themes would differ between MPAs located in urban and industrialised areas with strong economies, typical of developed countries, and MPAs located in rural, more isolated areas with weaker economies, typical of developing countries (Badalamenti et al., 2000). This difference may help generate a richer interpretation of the phenomenon under study, grasping the characteristics and dynamics of the scuba diving industry in response to various, either similar or dissimilar, influences. This interpretation would also support recommendations for both case studies, some of which may be generalised to other locations worldwide.

It is acknowledged that the SDTS of other parts of the world and

even close to the case studies assessed here face various challenges, some of which did not emerge in this particular research, yet requiring much attention and interventions. For example, recent work by D'Anna, Fernández, Pipitone, Garofalo, and Badalamenti (2016) on the governance of the Egadi Islands MPA in Italy showed that scuba diving is not yet seen as an important economic activity, despite the potential of the MPA's underwater landscapes for scuba diving tourism, and the perceived lack of conflict between scuba diving and conservation in the MPA. Other research, such as by Oracion, Miller, and Christie (2005) in Mabini, Philippines, revealed that the issues faced by the scuba diving industry in MPAs may go beyond conflicts with fishers, to include more serious problems like improper deliberation and enforcement of MPA ordinances and ignorance among MPA managers regarding the laws of MPAs.

5.1. Perceptions on the scuba diving industry: common denominators and divergences

The data collected from the questionnaire survey and the face-to-face discussions with the scuba diving operators revealed basic similarities in the perceptions of the scuba diving industry, regardless of the case study under consideration. On the one hand, operators all recognised the importance of the scuba diving industry not only to themselves, but also to host communities and MPAs. They recognised the benefits of MPAs to the scuba diving sector, acknowledging favourable effects such as ecosystem recovery and protection. They also believed in the potential of the scientific world to help the industry improve. Generally, they felt that scuba diving is an activity leading to minimal ecological impact, especially when compared with other activities in MPAs. On the other hand, they perceived little support from local communities; exclusion and unequal treatment by MPA managers; economic hurdles; doubts on the efficacy of communications among members in the SDTS; and misrepresentation and neglect by the scientific community. This mixture of positive and negative views provides a basic understanding of the current state of the scuba diving industry in its broader context. Scuba diving appears as an industry which, against the backdrop of a changing economy, provides many benefits yet does not receive the needed support from the broader SDTS in order to be resilient to change and be sustainable. This picture has partly emerged from research analysing views by the scuba diving community of how the system should work, especially in the context of MPAs (Jentoft et al., 2012).

Based on such a picture, a series of general recommendations and solutions could be proposed to fill in gaps that hamper the proper functioning of the scuba diving industry within the SDTS. Those frequently mentioned in the literature include: 1) immediate engagement in the planning and management of MPAs; 2) education on many levels; 3) new or revised regulations and/or restrictions stemming from participatory and well-informed decisions; 4) re-zoning and segregation of conflicting activities; 5) improved communications and interactive experiences with other stakeholders; 6) more research using holistic and participatory approaches to analyse the scuba diving industry; 7) promotion and market diversification; 8) cooperation and partnerships among stakeholders; 9) environmental activism; 10) active governance and/or self-regulation (e.g. through entrepreneurial MPAs); 11) self-advocacy; 12) some form of compensation or negotiation at the local level, e.g. for a commitment towards environmental monitoring; 13) softer meta-governance mechanisms aimed at rewarding good business performance; 14) engaging and influencing tourists; 15) exploiting new marketing channels; 16) transparency by relevant authorities with respect to revenue use; 17) reducing economic leakages; 18) social responsibility; and 19)

consultation with external organisations and scientists (Badalamenti et al., 2000; Brown et al., 2001; De Groot & Bush, 2010; Dimmock & Musa, 2015; Dimmock et al., 2013; Fabinyi, 2008; Haddock-Fraser & Hampton, 2012; Hillmer-Pegram, 2014; Jentoft et al., 2012; Rees et al., 2015; Rodríguez- Rodríguez et al., 2015; Townsend, 2008; Wongthong & Harvey, 2014). Many of the above solutions are certainly applicable to the case studies observed here.

There were also some important divergences between case studies. Fig. 3 and Fig. 4 are diagrams conceptualising the state of the scuba diving industry in the SDTS of the Portofino MPA and of Ponta do Ouro, as perceived by the operators. The diagrams illustrate influential cause-effect and matter-solution/action relationships for the industry. Both show that influential relations for the scuba diving industry tend to revolve around some key themes, reflected in the large number of arrows (denoting relationships) converging to and diverging from boxes (denoting themes) in the conceptual diagrams. On the one hand, in the case of the Portofino MPA, all themes are in some way connected so as to form a single cluster of relations. On the other hand, the SDTS of Ponta do Ouro is perceived as four independent clusters of relationships, presented in the four shaded backgrounds in Fig. 4. Therefore, the SDTS in Ponta do Ouro is perceived as less integrated in comparison with that of the Portofino MPA. One reason may be that the system in Ponta do Ouro is relatively young and still evolving, as is also reflected in the profile of the dive operators and their business profile. Certain factors influencing the state of the scuba diving industry may not yet be perceived as relevant enough to be properly integrated in the broader picture of the SDTS. Dialogue may help operators grasp important and previously overlooked connections (e.g. Citizen Science and conservation) between factors in the system.

The key themes around which perceived relations revolve are not all the same for the two case studies. The peculiarity of each case study, reflecting the diversity of SDTSs existing worldwide, makes it imperative to inspect key matters in detail, embedded in their context and interacting with other elements that are likely to exacerbate or neutralise them. For this purpose, the following sections contain a discussion of the scenarios described by the scuba diving industry in the case studies separately, with the authors advancing a number of context-specific and *ad hoc* measures to address critical issues. In this exercise, the authors drew from what were considered major issues by the industry but also used positive images suggested by the industry to advance sustainable propositions.

5.2. Portofino MPA

In reference to Fig. 3, most relationships which are influential for the scuba diving industry revolve around the core themes of: lack of cohesion among the diving operations (mainly a cause); lack of a societal entity representing the industry (largely a cause); improper representation in the MPA management (mainly an effect); scuba divers being mostly day visitors (mainly a cause); economic losses (largely an effect); the importance of keeping the marine environment in good condition (mostly a matter that is recognised as requiring action); and the political power of fishers (a mixture of cause and effect).

While it might be assumed that various benefits can be exploited more easily in cases where the SDTS revolves around MPAs in developed countries, this may not occur due to the poor relationships between the elements operating within the SDTS, and mismanagement by the MPA itself. Many sources of resilience in response to social and economic perturbations might come from within the scuba diving industry through self-organization,

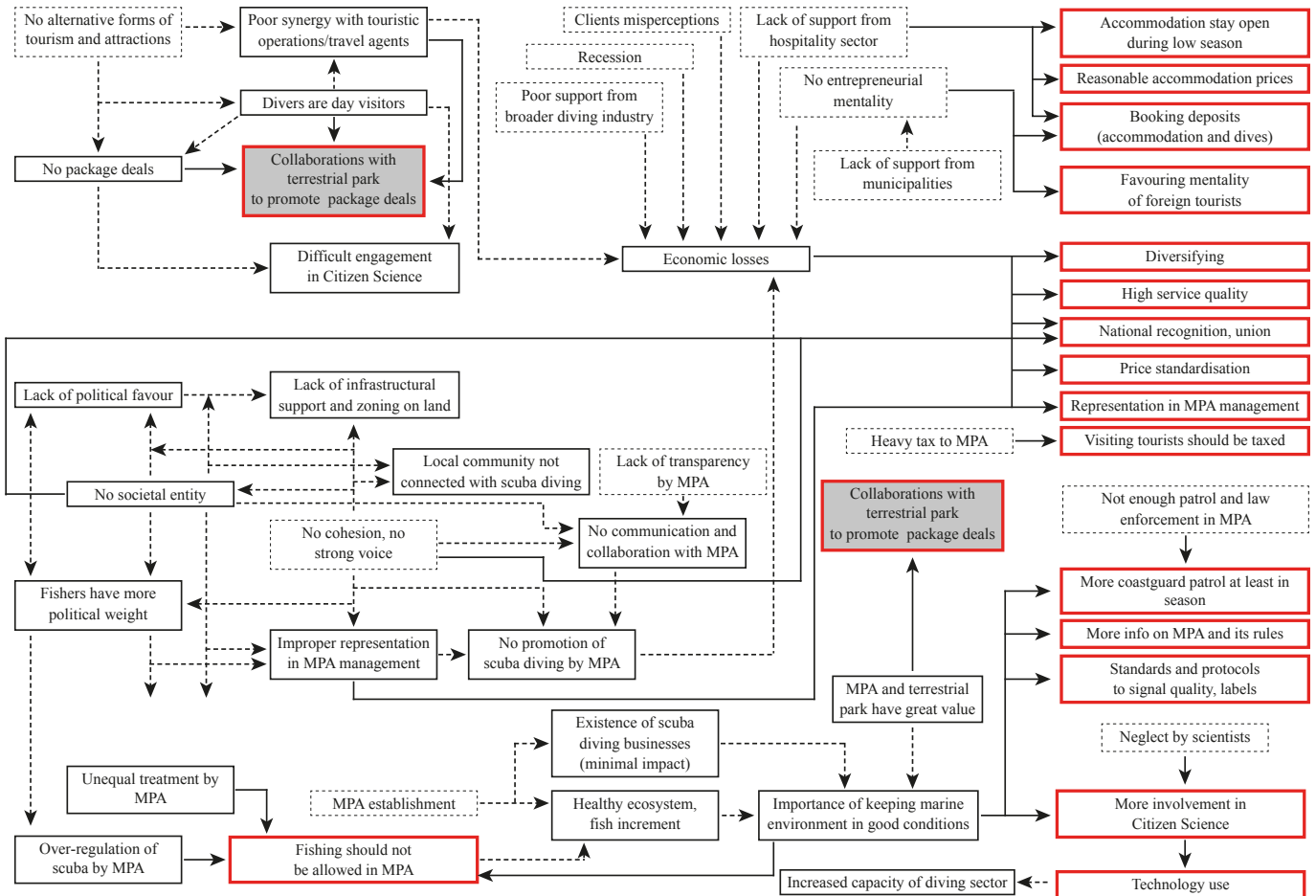


Fig. 3. Conceptual diagram of the state of the scuba diving industry in the Portofino MPA's SDTS, as perceived by the scuba diving operators. The dashed arrows refer to cause-effect relationships, while the solid arrows refer to matter-solution/action relationships. The red boxes denote solutions/actions proposed by the industry to solve various issues. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

allowing scuba diving businesses to maintain the resilience of their livelihoods (Hillmer-Pegram, 2014). The scuba diving industry is also capable of creating legitimacy and authority over marine conservation as well as building local capacity for the co-management of MPAs, particularly in cases where issues such as limited funding lead to poor governance delivery (Bottema & Bush, 2012; De Groot & Bush, 2010). It has been shown that divers in the Portofino MPA desire to participate more actively and take on responsibilities for the management of the MPA, and their familiarity with web technology increases the capacity of this group to support monitoring and increase awareness (Markantonatou et al., 2016). However, these efforts may be hampered by the larger social and political systems, as was perceived in this case. Implementing adaptive governance may also be difficult in a context where social and political systems are intricately connected with the SDTS through various forms of legislation, bureaucracy, or other. The perception of being targeted and treated unequally by managing authorities in the SDTS exacerbates these difficulties, infusing a sense of distrust by the scuba diving industry in other role players (Fabinyi, 2008).

The perceived political power of fishers was a critical element in the discourse of the scuba diving operators being related to the lack of cohesion among operators, and to the improper representation of scuba divers in the MPA management and as a societal entity. This element was also linked to the importance of keeping the marine environment healthy, with the scuba diving operators

finding it ironic that fishing is allowed in a place intended to preserve marine life. Disputes between the scuba diving industry and the fishing communities using MPAs are common (e.g. Jentoft et al., 2012; Mangi & Austen, 2008), and in this case emerging conflicts are a delicate matter to tackle, considering that MPAs are expected to operate with respect for various user groups, including fishers. The Portofino MPA contains three zones where various activities, including small-scale fishing, recreational fishing, and scuba diving, are regulated. However, this type of zoning does not take into account the necessary separation of those activities which are in conflict. The proposition made by the scuba diving community, to get rid of fishing activities altogether, may be justified by the visible impacts that fishing activities cause to the underwater environment in such a small MPA, typically consisting in the loss of fishing gear, boat traffic, and the damage to or removal of species.

The first and foremost step to take in order to facilitate various relationships in the SDTS of the Portofino MPA is to ensure that the industry becomes unified, while preserving its diversity. Markantonatou et al. (2016) confirmed that although the scuba diving industry in Portofino is central to MPA management, it lacks strong ties within itself and with other relevant stakeholders. Effective integration of scuba diving into the social capital of the Portofino MPA demands the support of the MPA and of the local and regional governments, which can and should grant recognition to the scuba diving industry in the area, especially given its long history. The cultural importance of scuba diving in Portofino could

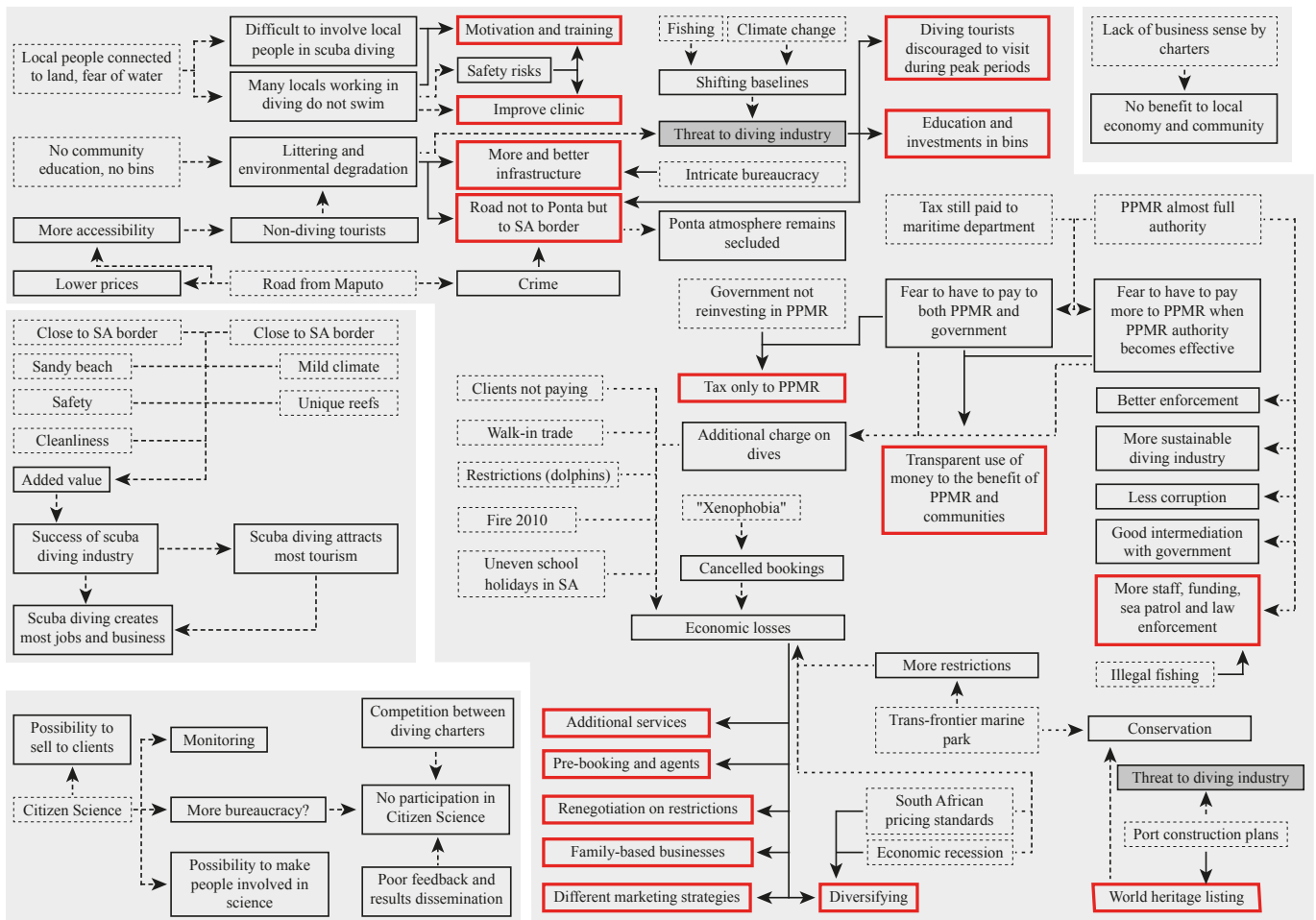


Fig. 4. Conceptual diagram of the state of the scuba diving industry in Ponta do Ouro's SDTS, as perceived by the scuba diving operators. The dashed arrows refer to cause-effect relationships, while the solid arrows refer to matter-solution/action relationships. The red boxes denote solutions/actions proposed by the industry to solve various issues. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

be highlighted in the same manner as that of local traditional fishing activities.

Another recommendation is that new zoning at a finer scale be considered, with delimited sub-areas for fishing and for scuba diving, such as completely separate buoys allocated to scuba diving and fishing while being at an appropriate distance from one another, where possible. Buoys are currently not designated for fishers who are not allowed to moor at diving buoys, although they still fish at or near scuba diving sites. Presently, the closure of dive sites to allow fishing during certain times is seen as damaging to scuba diving activities, and while it may be the case that this type of zoning cannot be reconsidered, it should nevertheless be discussed in a fair manner among the key user groups and the MPA. The management board of the Portofino MPA has recently taken steps in order to address these issues, by closing a section in the general reserve to game fishing for 24 months starting from January 2016. This action has been implemented both in recognition of the notable harm caused by ghost nets and discarded fishing lines, and in answer to a plea by the scuba diving community (Levante News, 2016; Liguria Nautica News, 2016).

The creation of a concrete diving core along with a successful stakeholder engagement strategy initiated by the MPA management board could result in positive outcomes regarding these issues. This was the case for the Kas-Kekova MPA, where divers and fishers agreed to design exclusive diving zones according to divers'

and fishers' experience (Walton, Gomei, & Di Carlo, 2013). Such an engagement might result in a gradual change of perceptions as the representatives of the scuba diving industry become more involved in direct discussions with the MPA and other role players in the SDTS (Jentoft et al., 2012). A recent development in the Portofino MPA has been the nomination of a representative of the scuba diving operators; while not exercising legal power, this person will be allowed to participate in board meetings (C. Cerrano, personal communication, April 05, 2016).

The industry recognised a general lack of cohesion, causing inability to play a central role in decision-making processes for the MPA. Whether or not this is true, the industry alone cannot gain the national recognition and status it wishes for, without the work of other stakeholders, namely the MPA, the local councils, and the greater government. The idea of scuba diving unions is not unimaginable and should be seriously considered, given that its actuation would facilitate the work of stakeholders on many levels, from legislative to taxation, contributions, and insurance. In this respect, issues raised in the Portofino MPA case study may well apply to the wider scuba diving industry in Italy.

The issue of scuba diving tourists being mostly day visitors was linked with the perceived lack of support from the hospitality sector. Research assessing the socio-economic effects of MPAs establishment has demonstrated that the receptive industry including accommodation and tourism businesses may not see

MPAs as having an impact on them, possibly due to a general lack of understanding of the potential benefits of MPAs to them (Rodríguez-Rodríguez et al., 2015). This may be the case for the receptive industry in Portofino, also given the regrettable lack of a connection between the local community and the scuba diving industry. An understanding of the mechanisms shaping tourism revolving around MPAs, together with potential hurdles and benefits, is essential for the success of the industries involved. However, this requires a framework of fine-tuned collaboration between the representing stakeholders, and considerable effort by the MPA to increase understanding and awareness. The operators advanced a series of possible realistic solutions, which would benefit both scuba diving and the receptive industry. However, the application of these solutions remains mostly a prerogative of the receptive industry. Portofino is an established elite tourism destination where most stakeholders may still be getting used to the idea of MPA. In light of this, substantial changes in business models demanding mind-set shifts may be difficult to foresee, despite the economic recession potentially stimulating such changes. In addition, it is obvious that the promotion of scuba diving by the MPA is very limited. In other cases, such as the Great Barrier Reef, marine biodiversity is closely linked to diving, which is the most popular activity when considering the marine environment (Tobin et al., 2014).

Whether or not the solutions proposed by the scuba diving industry will be embraced, a long-term answer would be to invest in the generation of sound societal awareness first of the MPA and second of the local scuba diving industry. Awareness could be achieved through the education of the resident youth as described by Badalamenti et al. (2000), some of whom would become the future entrepreneurs of the local area. This initiative is already partly being addressed by the scuba diving industry and by the MPA, through a series of initiatives (www.scuoladamare.it; www.outdoorportofino.com). However, these will only be able to gain momentum if embedded in a broader and solid framework of support and understanding by the local and regional governments, together with direct collaboration between the MPA and the scuba diving industry in carrying them out. Further, an appropriate education plan by the MPA that includes underwater experience would not only raise awareness among the general public and scuba divers, but also promote the development of the scuba diving sector.

The importance of keeping the marine environment in good condition was a theme stimulating a number of propositions by the scuba diving industry to ensure proper conservation efforts in the MPA. This is understandable in that the industry is well aware of its dependence upon a healthy marine environment (Haddock-Fraser & Hampton, 2012; Mota & Frausto, 2014). While some of the propositions related to responsibilities which should be undertaken by the managing authorities of the MPA, others pertained to enhancing the quality of the scuba diving charter businesses by following quality standards signalling sustainable approaches. These standards could fall under the umbrella of a quality label for sustainable scuba diving operations and are normally encouraged, as they foster collaborations among stakeholders in the SDTS and further the education of visiting scuba divers (Dimmock et al., 2013). Examples of valuable actions in this regard include partnerships with restaurants selling sustainably fished seafood; Citizen Science; promoting the surrounding natural attractions; and underwater clean-ups. The successful establishment of environmental standards may improve relations and might foster cooperative partnerships between the private sector and MPA managers, leveraging tourism as a force for conservation, as occurred in the Mesoamerican Reef (Wilkinson, 2008). These actions could also expand to involve aspects such as promoting local cultural

activities; safety programmes; and ecological economics. Certifying agencies and NGOs have already implemented initiatives regarding quality labelling and branding for scuba diving businesses (Hunt, Harvey, Miller, Johnson, & Phongsuwan, 2013). In engaging scuba diving operations, however, it is important to ensure that peer-pressures or economic gains (whether they involve giving or receiving funding) from participation by any parties do not become the ultimate motivator.

5.3. Ponta do Ouro, PPMR

Core themes affecting most relationships within the scuba diving industry and between the industry and other elements in the SDTS of Ponta do Ouro (Fig. 4) include: economic losses (effect and matter requiring action); the state of authority of the PPMR (mainly a cause); fear of having to pay more tax to the governing authorities (cause, effect, and matter requiring action); the added value to the scuba diving industry (largely an effect); littering and environmental degradation (cause, effect, matter requiring action); and the scuba diving industry being under threat (effect and matter requiring action).

Economic losses suffered by the scuba diving industry in Ponta do Ouro may be attributable to a notable dependence of the industry on the South African market. A positive aspect is that the industry is willing to adapt via strategies like internationalisation, or reshaping business models. Due to the proximity to South Africa and the dependence on its fluctuating economy, Ponta do Ouro experiences influences that are markedly different from those affecting the economy of other scuba diving destinations in Mozambique. Given the relatively secluded nature of Ponta do Ouro, granting it some degree of isolation and control over population growth, internationalisation may not necessarily translate into significant growth in scuba diving tourism. Rather, it could represent a method to stabilise the client base and the revenue. The tar road from Maputo is likely to alter this scenario, by increasing access for international scuba divers flying to Maputo, or by increasing the flow of non-diving tourism to the area, or both. This modification in scenario may result in excessive growth, with impacts that may not necessarily be positive for the local community, such as uncontrolled waste production on land, and degradation of the reef. These impacts would also be particularly detrimental if urban re-planning and infrastructural upgrades are not prioritised.

It may take time before significant changes are noticed following the application of new business strategies, and the South African market should remain included in future business growth plans, as it represents a nearby source of clients' turnover, especially thanks to the diving schools operating in cities such as Pretoria, Johannesburg, and Durban. A more effective marketing of the MPA, first by the manager and also by the diving charter businesses and other touristic operations, also possesses the potential to alleviate the economic struggles of the scuba diving industry in Ponta do Ouro, as better promotion of the PPMR may represent a way to engage visitors and incentivise conservation through levying a visitors' tax (Daly et al., 2015).

As most of the operators in the area and clients are of South African origin, there is a slight risk of money leakages, with negative consequences on the local economy. This is a frequent phenomenon of case studies in developing countries, where foreigners tend to monopolise the scuba diving industry (Badalamenti et al., 2000; Townsend, 2008; Wongthong & Harvey, 2014). In this case it is worsened by the lack of connection between locals and the ocean, making it easier for outsiders to establish and run scuba diving businesses; by the high prices, inducing many visitors to bring and take back their own supplies; and by unavailability of products (e.g. boat engines) and services (e.g. equipment

maintenance) any closer than Durban and Johannesburg in South Africa. This problem is partially being addressed through the promotion of the local market and employment of locals by the industry, for example as boatmen.

The greater inclusion of the local community in scuba diving is a need recognised by the industry which, together with the PPMR, is trying to address it by means of sponsored training and school campaigns. As well as positive impacts on the local economy, this is also expected to foster a sense of ownership towards the marine environment, in turn serving to counteract predictable negative consequences typically associated with development and tourism-related economic growth, such as littering, pollution, and various forms of overexploitation of resources. However, funding and staff required to carry out these initiatives are still not adequate, and the government would have to prioritise other investments, such as basic infrastructure. Tourists and external sources of funding, such as those from research projects and NGOs, continue to represent valid sources of assistance to address the issues described here. However, meta-governing bodies, such as certifying agencies, could see their way clear to offering additional support in this regard, especially in light of the notion that Ponta do Ouro exists almost entirely on scuba diving tourism. In any case, the involvement of the local community in scuba diving is a process which may take many generations and will not be able to be concretised unless the government also acknowledges the need to invest in and regulate local employment in tourism.

The status of the authority of the PPMR and the fear of having to pay more tax to the governing authorities were rather important issues for the operators of Ponta do Ouro. The PPMR warden was perceived as a critical intermediary figure, and operators held a positive attitude towards the MPA. However, uncertainty about the future governance approaches in the MPA, coupled with a general distrust in the government and its development plans, contributed to the perceived threat faced by the scuba diving industry in the area. The scuba diving industry might be demoralised in places where external or internal support cannot be counted on, and where governments do not act as a glue holding stakeholders together, identifying and addressing problems for the benefit of the local economy, the local communities and industries, and the environment (Fabinyi, 2008; Haddock-Fraser & Hampton, 2012; Hillmer-Pegram, 2014; Wongthong & Harvey, 2014). In the case of Ponta do Ouro, there is hope that the transition from centralised to decentralised management in the PPMR will result in a more transparent and tangible use of the resources available to this MPA. However, the scuba diving industry may not be able to achieve sustainability goals if this transition will result in greater taxation or if external taxation pressures will coexist with internal ones. Against the background of a difficult economic position, increased taxation would result in greater challenges to maintain service quality and deliver on conservation and social responsibility goals (Wongthong & Harvey, 2014). A compromise between these two extremes could be the establishment of greater taxation powers for the PPMR provided that the money is reinvested in management initiatives that receive priority, such as patrols and enforcement. The scuba diving industry, from diving charter businesses to diving tourists, could undergo a transition from distrust and suspicion towards governments to willingness to pay for user fees. However, this transition cannot take place if transparency is not guaranteed and demonstrated through tangible conservation actions from maintenance to patrol, infrastructure, and monitoring projects (Fabinyi, 2008). The answer to the issues described may be to recommend better horizontal and vertical integration (Wongthong & Harvey, 2014) which is evidently difficult to achieve, also given the cultural differences between local groups in Mozambique and between Mozambicans and foreigners. Nevertheless, intervention

and consultation by potentially regulatory parties such as NGOs and academic institutions, coupled with self-regulatory actions where possible, should mitigate tensions and help establish some kind of dialogue between stakeholders.

The value added to the scuba diving industry was very important to the operators in Ponta do Ouro. The “vibe” of the area seems to be connected with the quality of the scuba diving experience. However, development plans create uncertainty as to whether this atmosphere will be retained in the area, and whether it will affect the scuba diving industry and, if so, how. Research into the local perceptions of contentious management issues such as development in natural and rural areas has indicated that these issues would affect the sense of place felt by resident communities and businesses (Davenport & Anderson, 2005). A major recommendation is to include stakeholder engagement in planning processes. In the case of Ponta do Ouro, it may be the case that the construction of the tar road will change the character of the area, although the operators seem to partially comprehend the resulting trade-offs. Nevertheless, the problems remain: of poor information and inclusion of resident communities in the planning process, lack of vision towards the long-term sustainability of the area, and lack of urban planning strategies to cope with the consequences of the road. Solving these issues presently remains a prerogative of decision-makers, and needs to be prioritised, although institutions and NGOs may act as intermediaries, also providing consultation.

6. Conclusions

This study considered two MPAs as case studies to explore and address views by the scuba diving industry on its relationships with different elements within the SDTS, given the heterogeneity that characterises each area. Owing to the substantial number of differences between the study areas, in a backdrop of changing economies and in a system as complex as an MPA, the scuba diving industry finds itself under different pressures, still having to deliver on sustainability goals.

The MPA of Portofino is a very small yet much contested territory amongst the principal users. The success of the SDTS in this area is hampered by a general lack of communication and collaboration, both within the scuba diving industry and between this and other stakeholders in the system. The poor connection between local communities and scuba diving places additional pressure on the scuba diving industry in Portofino, given the limited interest of the former in what most likely adds value to the local area. It must be noted that social capital and respect for the scuba diving industry by residents may be negatively influenced by the poorly cohesive and unstable image of the industry as depicted in this case. The scuba diving industry in Portofino calls for a new generation of resident youth developing a passion for the sea and for water-based activities; a better network of communication within the whole SDTS; transparency and openness on behalf of the MPA and its collaborators; recognition at the national level (the legal and social national system recognising scuba diving, not only in Portofino); and coordinated action to promote scuba diving in the framework of sustainable tourism. What the scuba diving industry can offer in return ranges from marine monitoring and conservation (e.g. direct involvement in scientific research and clean-up activities) to education, revenue, employment, and a sense of pride in the local community and new generations. These elements all form part of what could be defined a sustainable scuba diving industry.

Ponta do Ouro may appear like another case of a tourism destination in a developing country, where the temptation to extract resources and promote limitless tourism jeopardises sustainability. However, the dynamics of this area and its scuba diving

industry call for a more appropriate interpretation of the case study. As in other cases, a difficult balance must be achieved by supporting local communities through development, while also protecting the assets that allow such development (in this case the reefs) and considering the needs of those stakeholders generating revenue for themselves and the local communities through such assets (in this case the scuba diving industry). Considering the internal management of the PPMR, genuine attempts are being made for this purpose, despite the limited resources available to do so. However, external managerial elements, including the greater government, do not seem to be in tune with these attempts, and the scuba diving industry clearly perceives this in proposed plans for development which may jeopardise its future, together with that of sustainable tourism in general. In the case of Ponta do Ouro, a transition from external to internal management and control may be the best avenue yet to ensure more protection for the scuba diving industry, giving it more space to strive for sustainability.

The scuba diving industry cannot achieve sustainability goals without the support of other key role players in the SDTS, namely managing authorities (both in MPAs and in the government), local communities, and bodies such as academic institutions and NGOs. Support by NGOs and funded projects are increasingly considered as a method to enhance sustainability for various forms of tourism. Interventions are designed to first establish a dialogue between those disciplines required to analyse tourism holistically. Second, to assist tourism systems initially by giving stakeholders the chance to collectively voice their concerns and needs, then to come up with proactive solutions and products that can be realistically taken up by the system. In doing so, they can act as a mediator between stakeholders; also ridding the situation of the typical top-down management feel that often undermines relationships between role-players in contexts such as MPAs. While tourism systems are able to be open towards such initiatives, as demonstrated by this study, this openness is accompanied by expectations of trust, communication, clarity, transparency, constancy, and concrete help. It is critical to ensure that these expectations are met, in order to motivate the scuba diving industry to endeavour to achieve sustainability and feel proud of doing so.

Acknowledgements

The authors wish to extend their gratitude to all the diving charter businesses/schools who participated in the surveys and interviews, which are included in the list reported here: <http://www.greenbubbles.eu/?cat=70>. Special thanks go to Miguel Gonçalves, warden of the PPMR; the Peace Parks Foundation; the management board of the Portofino MPA; and the Kaya Kweru Resort in Ponta do Ouro; Chiara Magliozzi; Fabrizio Torsani; Davide Ferraris; Daniela Pica; Monica Preati; and Stefano De Cantis. Authorship order followed the Sequence Determines Credit (SDC) approach (Tscharrntke et al., 2007). This study was funded by the Green Bubbles RISE project, H2020-MSCA-RISE-2014. The project has received funding from the European Union Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 643712. This paper reflects only the authors' view. The Research Executive Agency is not responsible for any use that may be made of the information it contains.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.tourman.2016.09.004>.

References

- Abbrantes, K. G. S., & Pereira, M. A. M. (2003). *Boas vindas 2001/2001: A survey on tourists and tourism in southern Mozambique*. Maputo: Endangered Wildlife Trust.
- Area Marina Protetta Portofino. (2016). *Subacquea*. Retrieved 01.04.16, from <http://www.portofinoamp.it/it/subacquea.html>.
- Badalamenti, F., Ramos, A. A., Voultsiadou, E., Lizaso, J. L. S., D'Anna, G., et al. (2000). Cultural and socio-economic impacts of Mediterranean marine protected areas. *Environmental Conservation*, 27(2), 110–125.
- Bjerner, M., & Johansson, J. (2001). *Economic and environmental impacts of nature-based tourism. A case study in Ponta d'Ouro, Mozambique*. Göteborg: School of Economics and Commercial Law, Göteborg University.
- Bottema, M. J. M., & Bush, S. R. (2012). The durability of private sector-led marine conservation: A case study of two entrepreneurial marine protected areas in Indonesia. *Ocean and Coastal Management*, 61, 38–48.
- Brown, K., Adger, W. N., Tompkins, E., Bacon, P., Shim, D., & Young, K. (2001). Trade-off analysis for marine protected area management. *Ecological Economics*, 37, 417–434.
- Cappanera, V., Venturini, S., Campodonico, P., Blini, V., & Ortenzi, C. (2012). *Valutazione dell'impatto antropico legato alle attività svolte nell'Area Marina Protetta Portofino. Le attività di fruizione 2010-2011* (Portofino: Portofino AMP).
- Celliers, L., & Schleyer, M. H. (2008). Coral community structure and risk assessment of high-latitude reefs at Sodwana Bay, South Africa. *Biodiversity and Conservation*, 17, 3097–3117.
- Daly, C. A. K., Fraser, J., & Snowball, J. D. (2015). Willingness to pay for marine-based tourism in the Ponta do Ouro partial marine reserve, Mozambique. *African Journal of Marine Science*, 37(1), 33–40.
- Davenport, M. A., & Anderson, D. H. (2005). Getting from sense of place to place-based management: An interpretive investigation of place meanings and perceptions of landscape change. *Society and Natural Resources*, 18(7), 625–641.
- De Groot, J., & Bush, S. R. (2010). The potential for dive tourism led entrepreneurial marine protected areas in Curacao. *Marine Policy*, 34, 1051–1059.
- Dimmock, K., Cummins, T., & Musa, G. (2013). The business of scuba diving tourism. In G. Musa, & K. Dimmock (Eds.), *Scuba diving tourism* (pp. 161–174). Abingdon, Oxon: Routledge.
- Dimmock, K., & Musa, G. (2015). Scuba diving tourism system: A framework for collaborative management and sustainability. *Marine Policy*, 54, 52–58.
- D'Anna, G., Fernández, T. M., Pipitone, C., Garofalo, G., & Badalamenti, F. (2016). Governance analysis in the Egadi islands marine protected area: A Mediterranean case study. *Marine Policy*, 71, 301–309.
- Fabinyi, M. (2008). Dive tourism, fishing and marine protected areas in the Calamian Islands, Philippines. *Marine Policy*, 32, 898–904.
- Haddock-Fraser, J., & Hampton, M. P. (2012). Multistakeholder values on the sustainability of dive tourism: Case studies of Sipadan and Perhentian islands, Malaysia. *Tourism Analysis*, 17, 27–41.
- Hillmer-Pegram, K. C. (2014). Understanding the resilience of dive tourism to complex change. *Tourism Geographies*, 16(4), 598–614.
- Hunt, C. V., Harvey, J. J., Miller, A., Johnson, V., & Phongsuwan, N. (2013). The Green Fins approach for monitoring and promoting environmentally sustainable scuba diving operations in South East Asia. *Ocean and Coastal Management*, 78, 35–44.
- Jentoft, S., Pascual-Fernandez, J. J., De la Cruz Modino, R., Gonzalez-Ramallal, M., & Chuenpagdee, R. (2012). What stakeholders think about marine protected areas: Case studies from Spain. *Human Ecology*, 40(2), 185–197.
- Levante News. (2016). *Portofino: Limiti ai pescasportivi. Punta chiappa: Ormeggi meno cari*. Retrieved 05.04.16, from <http://www.levantenews.it/index.php/2016/01/22/portofino-limiti-ai-pescasportivi-punta-chiappa-ormeggi-meno-cari/>.
- Liguria Nautica News. (2016). *Portofino: Divieto di pesca sportiva per 24 mesi*. Retrieved 05.04.16, from <http://www.newsliguria.com/pesca-news/portofino-divieto-di-pesca-sportiva-per-24-mesi/40156/>.
- Mangi, S. C., & Austen, M. C. (2008). Perceptions of stakeholders towards objectives and zoning of marine-protected areas in southern Europe. *Journal for Nature Conservation*, 16, 271–280.
- Markantonatou, V., Noguera-Méndez, P., & Semitiel-García, M. (2016). Social networks and information flow: building the ground for collaborative marine conservation planning in Portofino Marine Protected Area (MPA). *Ocean and Coastal Management*, 120, 29–38.
- Mota, L., & Frausto, O. (2014). The use of scuba diving tourism for Marine Protected Area management. *International Journal of Social, Education, Economics and Management Engineering*, 8(10), 3171–3176.
- Oracion, E. G., Miller, M. L., & Christie, P. (2005). Marine protected areas for whom? Fisheries, tourism, and solidarity in a Philippine community. *Ocean and Coastal Management*, 48, 393–410.
- Pereira, M. (2003). *Recreational SCUBA diving and reef conservation in southern Mozambique* (Master's thesis). South Africa: University of Natal.
- Rees, S. E., Mangi, S. C., Hattman, C., Gall, S. C., Rodwell, L. D., Peckett, F. J., et al. (2015). The socio-economic effects of a Marine Protected Area on the ecosystem service of leisure and recreation. *Marine Policy*, 62, 144–152.
- Rodríguez-Rodríguez, D., Rees, S. E., Rodwell, L. D., & Attrill, M. J. (2015). Assessing the socioeconomic effects of multiple-use MPAs in a European setting: A national stakeholder perspective. *Environmental Science and Policy*, 48, 115–127.
- Salmona, P., & Verardi, D. (2001). The marine protected area of Portofino, Italy: A difficult balance. *Ocean and Coastal Management*, 44, 39–60.

Tobin, R., Bohensky, E., Curnock, M., Goldberg, J., Gooch, M., Marshall, N., et al. (2014). *The social and economic long term monitoring program (SELTMP) 2014, recreation in the Great barrier reef. Report to the national environmental research program*. Cairns: Reef and Rainforest Research Centre Limited.

Townsend, C. (2008). Dive tourism, sustainable tourism and social responsibility: A growing agenda. In B. Garrod, & S. Gössling (Eds.), *New frontiers in marine tourism: Diving experiences, sustainability, management* (pp. 139–152). Amsterdam: Elsevier.

Tscharntke, T., Hochberg, M. E., Rand, T. A., Resh, V. H., & Krauss, J. (2007). Author sequence and credit for contributions in multi-authored publications. *PLoS Biology*, 5(1), e18. <http://dx.doi.org/10.1371/journal.pbio.0050018>.

Walton, A., Gomei, M., & Di Carlo, G. (2013). *Stakeholder engagement. Participatory approaches for the planning and development of Marine Protected Areas*. Rome, Silver Spring: World Wide Fund for Nature and NOAA— National Marine Sanctuary Program.

Wilkinson, C. (2008). *Status of coral reefs of the world: 2008*. Townsville, Australia: Global Coral Reef Monitoring Network and Reef and Rainforest Research Centre.

Wongthong, P., & Harvey, N. (2014). Integrated coastal management and sustainable tourism: A case study of the reef-based SCUBA dive industry from Thailand. *Ocean and Coastal Management*, 95, 138–146.



Dr. Serena Lucrezi PhD works as a post-doctoral research fellow for TREES at the North-West University, Potchefstroom campus, South Africa. She obtained an Honours degree in Zoology at the University of Dundee, Scotland, UK, and a PhD in Marine Ecology obtained from the University of the Sunshine Coast, QLD, Australia. Her work focuses on two research areas. The first involves the use of ecological indicators, including ghost crabs and coastal dune vegetation, to assess ecological impacts of recreational and other human activities on sandy beaches and coastal dunes. The second involves the study of environmental awareness, knowledge, and perceptions in coastal tourism, particularly scuba diving and beach tourism and recreation. She has authored 20 scientific papers.



Dr. Martina Milanese PhD is managing director and co-founder of Studio Associato GAIA s.n.c., Italy. She has a Degree in Biology (2000) and a PhD in Marine Sciences (2004) obtained at the University of Genoa, Italy. She is an experienced scuba diving instructor, dive master, and underwater videographer. She has leading experience in the ecology of sponges, environmental education, awareness promotion, and the design and preparation of dissemination material (books, CD-ROM and magazines) dealing with marine ecosystems. She has authored 11 scientific papers.



Dr. Vasiliki Markantonatou PhD is a marine ecologist, specialising in marine conservation and the sustainable management of marine resources. She has recently completed her doctoral studies as a Marie Curie fellow at the Polytechnic University of Marche (Italy) and currently works at the Department of Marine Sciences, University of Aegean, Greece. Her research focuses on monitoring human activities and assessing their footprint on biodiversity components, implementing ecosystem-based management approaches and marine spatial planning, and systematic conservation planning for the design of Marine

Protected Areas. Moreover, her research interests include the study of social networks for enhancing stakeholder participation in natural resource governance.



Prof. Carlo Cerrano is Associate Professor of Zoology at the Department of Life and Environmental Sciences (DISVA) at the Polytechnic University of Marche (Italy). His research is focused on the taxonomy, ecology and biology of benthic organisms, in particular Porifera and Cnidaria. His current activities are addressed towards the study of the effects of climate change on marine coastal environments, down to the mesophotic zone. He is involved in several international projects focused on the conservation of marine habitats. He is author/co-author of about 180 scientific papers in peer-reviewed journals.



Dr. Antonio Sarà PhD is managing director and co-founder of Studio Associato GAIA s.n.c., Italy. He has a Degree in Biology (1997) and a PhD in Polar Sciences (2002) obtained at the University of Genoa, Italy. He is specialised in sponge ecology, statistical analysis of data, graphic design and editing software. He has participated in the design and editing of thematic scientific books. A diver since 1980, he has performed underwater research in the Mediterranean Sea and the Indian Ocean, where he was also involved in educational activities. He has authored at least 22 scientific papers.



Marco Palma is a PhD student at the Department of Life and Environmental Sciences (DISVA) at the Polytechnic University of Marche (Italy). His work focuses on coastal marine habitat mapping, semi-automatic image classification and public engagement in underwater research programmes. His mapping approach is based on photogrammetric methods and 3D data processing using consumers' devices.



Prof. Melville Saayman is the director of TREES at the North-West University, South Africa. He is an executive member of the South African National Recreation Council (SANREC); a member of the advisory board of the International Sports Tourism Council; a member of the Marco Polo Committee on Statistics of Travel and Tourism (COSTT); a member of the executive committee of the Association of International Experts in Tourism (AIEST); and a resource editor of *Annals of Tourism Research*. He serves on the World Tourism Organization's panel of experts. Currently, he is active in the field of tourism marketing, tourism economics and development.