Sustainable Development of Tourism, 180 credits

Sustainable Management of Scuba Diving Tourism

A Study of the Marine Reserves of Bongoyo and Mbudya, Tanzania

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Sustainable Development of Tourism, 15 credits

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Abstract

With an increasing understanding for the impacts of scuba dive tourism on the marine environments and local communities world-wide, research has recently expanded to include the perspectives of ecology, socio-culture and economy. However, due to the common lack of a transdisciplinary view, the following research aims at fulfilling the gap by viewing the management of scuba dive tourism at the two marine reserves of Bongoyo and Mbudya, Tanzania, through a sustainable perspective. Thereby, the research examines the ecological state of the marine environment as perceived by the scuba divers, the operation of scuba diving, as well as how scuba dive tourism relates to the major possibilities and challenges of the marine reserves. Supported in nature-based tourism management and the theories of recreation specialization and recreational succession, questionnaires were handed out to divers and interviews were conducted with stakeholders of the marine reserves, including a scuba dive operator, conservation groups and a private interest. The results portrayed degradation of the coral reef, with scuba diving constituting a minor influence, in comparison to the greater challenges of destructive fishing methods and lack of regulations. Thereby, the research illustrates scuba diving as a positive contributor to the marine environment, raising awareness on the need for conservation within both the local and the scuba diving community. Finally, the research concludes with proposals of sustainable management strategies for the operation of scuba diving within the marine reserves.
## Table of Contents

1. Introduction
   1.1 Scuba Diving  
      1.1.1 Previous Research  
   1.2 Dar es Salaam Marine Reserves  
   1.3 Research Aim  
   1.4 Nature-based Tourism Management  
      1.4.1 Theory of Recreation Specialization  
      1.4.2 Theory of Recreational Succession  
      1.4.3 Theory of the Destination Life Cycle  
2. Science Theory and Research Methodology
   2.1 Case Study  
   2.2 Questionnaire  
   2.3 Semi-structured Interview  
   2.4 Processing, Presenting and Analysing Data  
   2.5 Validity and Reliability  
3. Results
   3.1 Diver Characteristics  
   3.2 Perceptions of Ecological Developments Through Time  
   3.3 Recreation Specialization  
   3.4 Divers’ Experiences of Recently Completed Dive  
   3.5 Scuba Dive Operator  
   3.6 Possibilities and Challenges  
      3.6.1 Economic Aspects  
      3.6.2 Ecological Aspects  
      3.6.3 Socio-cultural Aspects  
4. Discussion
   4.1 Analysis  
      4.1.1 Educational Management Techniques  
      4.1.2 Regulatory Management Techniques  
      4.1.3 Economic Management Techniques  
      4.1.4 Physical Management Techniques  
   4.2 Management Propositions  
   4.3 Conclusion  
6. List of References  
7. Appendix
   7.1 Definition of Terms  
   7.2 Questionnaire  
   7.3 Interview Questions
List of Figures and Tables

FIGURE 1. Snowball Effect for Stakeholders 15
FIGURE 2. Locals, Expats and Tourists 19
FIGURE 3. Returning Clientele 19
FIGURE 4. Perceived Ecological Alterations 20
FIGURE 5. Instructions and Precautions 22
TABLE 1. Area Coverage of Dar es Salaam Marine Reserves 6
TABLE 2. Methods for Managing Marine Tourism 9
TABLE 3. Number of Absent Answers per Question 21
TABLE 4. Perceptions on Environmental State 26
1. Introduction

Coral reefs have long been valued for their natural beauty, vast biodiversity, and their various services for human use. Regardless of their essence, however, coral reefs are increasingly being exposed to numerous human induced threats, ranging from coastal development to marine-based activities. [1-5] Within the latter, tourism, and more specifically, scuba diving tourism, constitutes one such component. Nevertheless, with regards to previous research on scuba diving, it seems as though the study of impacts related to dive tourism and the possibilities to manage the marine environments, upon which the activity relies, is a relatively recent phenomenon, which has merely been practiced during the latter decades. [6-8] As such, the geographical spread has yet to been focused on the less frequently dived sites [9-14], such as the two marine reserves off the coast of Dar es Salaam, Tanzania - Bongoyo and Mbudya. Furthermore, there tends to be a lack of multiple methods across the borders of ecology[10], socio-culture[9], and economy[11], although these perspectives constitute the base of sustainability, and thereby, sustainable development. Therefore, the aforementioned aspects will be represented within the following study, focusing on the management of scuba dive tourism at the marine reserves of Bongoyo and Mbudya.

1.1 Scuba Diving

Along with the invention of the self-contained underwater breathing apparatus during the first half of the 20th century, the general public was enabled to submerge under the surface of the water for recreational purposes of exploring the marine world.[15-16] Since then, scuba diving has gained numerous participants which in 2007 was estimated to involve ten million divers according to PADI (see Appendix 7.1 for definition), through Garrod and Gössling.[16] Additional statistics show a steady increase in the number of certifications for both entry level and continued education. With a number of approximately 900,000 certified divers annually, throughout the last 16 years, the participants in the recreational activity steadily increases.[17] Moreover, WTO (see Appendix 7.1 for definition) projects that one third of the active participants will travel abroad, on an annual basis, combining their interest of diving with their holiday. As such, divers are often tourists as well.[18]
1.1.1 Previous Research

Recreational scuba diving was long thought to be an ecologically benign activity up until researchers studying scuba diving started presenting findings of negative ecological impacts during the 1990s.[6-8] From then on, there has been an evident increase in the interest and comprehension of the impacts deriving from scuba diving, with a major proportion of the research originating from the past years. During this time, research focus has shifted from an ecological to socio-cultural and economic perspective.[6,9,19,20] The methodology used within previous research¹ primarily consisted of quantitative methods, followed by qualitative methods, and where a mix of the two was the least used.[6,10,12,13,21-23] Furthermore, the geographical preponderance of the previous research is mainly constrained to tropical areas, based upon or in the proximity of coral reefs. More specifically, the majority of the studies targeted the Mediterranean[9], the Red Sea[10], the Gulf of Mexico[11] and the Caribbean[12], as well as Oceania[13], and Southeast Asia[14]. Clearly, there is therefore a lack of research based upon the east coast of Africa.

Although the activity is non-extractive and less detrimental than other marine-based activities, it is clear that diving does pose negative effects upon the natural environment.[12,19,24-30] Anchorage by boats which transports the recreationists to the intended dive sites, for example, poses a great threat for the marine environments, wherefore the installation of mooring buoys is viewed as an effective management tool.[31] Moreover, the presence of divers have, proven to decrease the amount of hard[12,31] and branching coral cover[28], thus giving way to softer corals and algae[31]. The most common impacts resulted from inexperienced[24,28,32-34]; male[24,27]; camera-carrying[21,27,28,34,35] divers, during the initiate phase of the dive – when searching for buoyancy control[25,27]. Moreover, direct impacts most often resulted in the abrasion or fracture of corals[10,27,32,35] whilst the raising of sedimentation on to corals, was a recurring phenomenon within previous studies[10,24,25,36], implying negative, indirect impacts of scuba divers upon the marine ecosystems as well. On the other hand, researchers have found that the level of experience and specialization within the recreational activity of scuba diving coheres to the level of environmental consciousness and behaviour of divers.[23,37,38] Additionally, pre-dive briefings[38] and leader intervention have shown to lessen the current

¹ Based upon a review of over one hundred previous research articles from the databases Web of Science, Academic Search Elite, and JSTOR.
rate of deterioration.[21] Moving on, a common view embraces the generated income derived from scuba diving tourism as positive. The reason originates in the perspective of dive tourism constituting the status of a comparatively conservation amiable activity in relation to other marine-based activities, whilst simultaneously providing finance for the continued management of the marine environments.[23,28,38,40-42] The combined impacts resulting from recreational activities, has lead to a focus on management measures and conservation efforts within previous research on marine environments.[1,4,43]

1.2 Dar es Salaam Marine Reserves

As scuba diving has increased on a global level, new destinations have spread across the world, including dive sites in, and in the proximity of, the marine reserves of Dar es Salaam, Tanzania. With a tropical climate averaging 26°C and shallow waters, reaching a maximum depth of twenty meters in between the islands, the geology of the reserves are primarily composed of limestone and coral reef. The reserves were initiated after the formulation of the Marine Parks & Reserves Act No. 29 of 1994 and were provided a General Management Plan for the period of 2005-2010 by the Tanzania Ministry of Natural Resources and Tourism. The General Management Plan contains information about, as well as rules and regulations within the marine reserves and has received no updated version within the last years. More specifically, the protected area includes the islands of Bongoyo, Mbudya, Pangavini, and Fungu Yasin with a boundary that demarcates at a depth of ten meters around the islands. Mbudya and Bongoyo make up 1,171.7ha and 753.8ha respectively, thus, representing 63% of the total area of the marine reserves (see Table 1 for the total area of the respective reserves).[44] The reefs within the marine reserves are essential for coastal protection, fishing and recreational activities. However, they are simultaneously under threat from similar factors; including natural forces as well as anthropogenic stresses (see Appendix 7.1 for definition of term), such as overexploitation and lack of knowledge and resources for coastal development, tourism planning and reef management.[44]
TABLE 1. Area Coverage of Dar es Salaam Marine Reserves
Coral reefs are found within the inter tidal areas. Adopted from the GMP[44], altered by Emilia Gunnarsson.

<table>
<thead>
<tr>
<th>Island</th>
<th>Inter Tidal Area (ha)</th>
<th>Sea Grass Area (ha)</th>
<th>Land Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bongoyo</td>
<td>388.5</td>
<td>284.8</td>
<td>80.5</td>
</tr>
<tr>
<td>Mbudya</td>
<td>788.4</td>
<td>330.3</td>
<td>53.0</td>
</tr>
<tr>
<td>Pangavini</td>
<td>67.8</td>
<td>104.3</td>
<td>3.7</td>
</tr>
<tr>
<td>Fungu Yasin</td>
<td>445.4</td>
<td>497.7</td>
<td>0</td>
</tr>
</tbody>
</table>

Previous research performed within the reserves date back to the severe bleaching event of El Niño Southern Oscillation in 1997 (see Appendix 7.1 for definition on bleaching), which resulted in mass death amongst the coral reefs in the Indian Ocean. Due to the natural disaster, a major inventory project was initiated for an eight-year period, to evaluate the degree of degradation for the coral reefs of Tanzania. The research provided information on decreasing coral cover and composition due to overfishing and the use of destructive fishing methods.[44,45] Nonetheless, it was stated that the species and structure of the reefs of Bongoyo and Mbudya persisted despite the damage, thus, presenting a high conservation value as they had a relatively high degree of recovery rate, without having been object for protected area management.[43-47]

The marine reserves have long attracted recreational visitors, with the majority guesting the islands of Bongoyo and Mbudya due to their beaches. Visitors travel either through various local operators offering ferry services or by private boats. An entrance fee is charged for all visitors to the reserves which is later passed on to the Marine Parks and Reserves Unit. Following the economic liberalisation within the United Republic of Tanzania in the 1980’s, the tourism industry expanded abruptly, wherefore recreational activities have increased greatly within the reserves. Moreover, and in association with, a lack of capacity to manage and control the increasing amount of visitors and activities, increasing participation in the use of water vessels and in aquatic sports renders possible damage to the natural environment through erosion, litter or the fracturing of corals, to mention a few.[44] One of the aquatic sports includes scuba diving, which is organized by three different operators.[44,48] There is a fear that the lack of regulations and guidelines for such sports,
along with the possibility that amateurs from neighbouring resorts may participate in scuba diving within the reserves, may pose a negative impact upon the ecosystem.[44]

1.3 Research Aim

Although there is a lack of previous research related to scuba diving off the coast of East Africa, and at the marine reserves of Dar es Salaam in particular, the situation of the marine reserves is portrayed with ongoing degradation of the natural environment, involving concern over the impacts of scuba diving. Additionally, research has so far, seldomly involved a cross-over between ecological, socio-cultural and economic perspectives, nor has a combination of quantitative and qualitative methods been applied in a greater extent than merely using a single method. However, as scuba diving tourism is constituted of environmental, socio-cultural and economic aspects, management will need to apply a transdisciplinary view in the process of producing and implementing management strategies. In order to fill the existing gap within the research of scuba diving, the following research will focus on studying the current management of scuba diving at the marine reserves of Bongoyo and Mbudya, permeated by the perspective of sustainability. Thereby, the aim of the research encompasses the following questions:

- What is the ecological state of the marine reserves as perceived by the scuba divers?
- How is scuba diving currently operated within the marine reserves?
- What are the major possibilities and challenges in the management of the reserves, related to scuba diving?
- How does scuba dive tourism relate to the aforementioned possibilities and challenges?

In order fulfill the aim, the current situation will be examined and set in context to previous research on scuba diving as well as theories of nature-based tourism management, and finally, compared to the former General Management Plan. The analysis will in turn enable the proposition of various developments and alterations for an increasingly sustainable management of scuba diving tourism at the marine reserves.
1.4 Nature-based Tourism Management

As the UN initiated the Millennium Development Goals, wherein *Ensure Environmental Sustainability* constitutes one of eight goals, natural resource management is a significant issue for the global society today.[49] Moreover, rising touristic flows put additional pressure on natural resources and infrastructure, giving rise to increasing need for targeted management interventions.[1-5] Researchers claim there is a need to know just how vital wildlife is to human welfare, involving, for example, the identification of economic and social values derived from the use of such resources. Within wildlife tourism, conflicts often appear when conservation priorities, visitor satisfaction, economical benefits, as well as the local community’s support are set against each other.[50]

However, studies have identified four different aspects in which nature-based tourism can be of assistance in the perseverance of natural habitats and support of conservation. To begin with, enterprises can add to the local economy, thereby, affecting the policies in a pro-preservation direction, for example through the implementation of national- or marine parks, regulations, and entrance fees. Secondly, tourism enterprises can directly improve the local environmental conditions, by involving in conservation. Thirdly, positive visitor experiences can increase environmental awareness and pro-environmental behavior of tourists. Finally, tourists can become environmental ambassadors, communicating their new knowledge of environmental issues as they return home, thereby spreading awareness on conservation.[5,51]

The means used to manage ecosystems and their associated resource users vary considerably; ranging from full closure to various forms of restricted use.[52] As an example, public authorities allocates marine protected areas with the aim of managing and protecting coral reefs, in which the high ecological values of the area often attracts tourists. However, in order to minimize tourism related impacts and managing marine protected areas, there is a need for financial support. Further, as authorities may lack direct access to the tourists, as private operators offers the possibility to participate in activities, they could instead collect entrance fees or other financial support through the private operators.[16] Additionally, marine-based tourism is exposed to socio-economic and environmental impacts, such as security concerns, economic recessions, and resource availability to mention a few. To
understand the consequences which such impacts have upon marine-based tourism is vital for the implementation of sustainable management.[53,54]

Further more, means to simplify management of marine tourism, is presented in Mark Orams four-category model, including physical, regulatory, economic and educational management techniques (see Table 2). Whilst physical techniques refers to the manipulation of the destination, regulatory techniques involves the control of visitor access. Additionally, economic management strategies involves the use of price as an incentive to affect behaviour, whilst educational strategies aim at encouraging desirable behaviour and simultaneously, increase visitor awareness.[55]

### TABLE 2. Techniques for Managing Marine Tourism
The model, which is adapted from Mark Orams[55] and altered by Emilie Sörholm, portrays various techniques which can be used for managing marine tourism. After applying various techniques, in order to fulfil an intended purpose, further implications may occur. These do not necessarily relate to the purpose of management and may be either positive or negative.

<table>
<thead>
<tr>
<th>Technique</th>
<th>Description</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>Alterations of physical environment</td>
<td>Minimize ecological impact</td>
</tr>
<tr>
<td>Regulatory</td>
<td>Limiting visitor access and activities</td>
<td>Control visitors’ impacts</td>
</tr>
<tr>
<td>Economic</td>
<td>Incentives for controlling visitors</td>
<td>Stimulate positive behaviour, Provide finance</td>
</tr>
<tr>
<td>Education</td>
<td>Raise awareness of appropriate behaviour</td>
<td>Encourage appropriate behaviour, Reduce visitor related impacts</td>
</tr>
</tbody>
</table>

Moving on, there are several perspectives to consider when implementing a sustainable management plan for marine environments. These include the use of applied science, active investigation and evaluation.[52]

### 1.4.1 Theory of Recreation Specialization
The theory of recreation specialization aims at explaining how recreationists get more involved and versed in issues related to resource conservation, as they gain more experience
and knowledge about their recreational activities. Recreation specialization places recreationists on a coherent line from generalist to specialist, where the generalist has broad interest and minimal involvement, whilst the specialist has skilled interest and high involvement in their activity. Consequently, increasing experience ought to relate to an increased understanding and tolerance towards activity-based regulations, rules, and conservation-aimed practices.[56,57] Further there are three dimensions in the context of recreation specialization; behavior, skill and knowledge, as well as commitment. As specialization in the behavioral dimension increases, so does skill, knowledge, and commitment as well, and vice versa.[20]

1.4.2 Theory of Recreational Succession
A theory associated with trends and effects of increasing numbers of tourists, encompasses the concept known as recreational succession. First defined by Stankey in 1985, recreational succession may be compared to a chain of events, initially involving the discovery of a pristine natural setting, which subsequently, becomes victim of recreation. Thus, the attributes of the natural site are deteriorated in relation to an increasing number of visitors to the area. Simultaneously, the first explorers move on and discover new settings, which in turn, are suspected of gradual deterioration, through minor alterations to the natural environment.[55] As such, there is a risk that the mere attendance and participation of tourists in various activities may evoke negative effects relating to an accelerated degradation of the ecological values. Divers may thereby come to affect what constitutes the foundation of the diving tourism industry to begin with - the marine environment.[8]

1.4.3 Theory of the Destination Life Cycle
In order to show how various destinations develop through time, Butler created an evolutionary model for tourist areas. In coherence with the product life cycle, destinations experience an initial phase of low visitor numbers due to a lack of infrastructure and knowledge. Thereafter, and in relation to a continuous development and implementation of the aforementioned factors, the number of tourists will escalate. As carrying capacity is reached, in form of either environmental, social or infrastructural factors, and the attractiveness of the destination declines, the number of tourists will stagnate before finally,
continuing on toward a stage of rejuvenation or decline. However, there is a possibility to avoid overexploitation, which commonly leads to the stage of stagnation, through destination management. Therefore, Butler stated: “Tourist attractions are not infinite and timeless but should be viewed and treated as finite and possibly non-renewable resources”.[58]
2. Science Theory and Research Methodology

Based within the science theory of interpretationism,[59,60] the combined use of qualitative and quantitative methods enables the examination of several perspectives of the greater phenomenon; the management of scuba diving tourism at the marine reserves. Such a method is known as crystallization and refers to how a crystal parts a beam of light into different segments, thus providing a complex and nuanced depiction of the phenomenon.[61] As a result, the methods chosen for gathering data involved the use of a case study, questionnaires, as well as interviews, wherein the first was chosen in order to demarcate the study through the aspects of time and geographical spread[61,62]. Further, the aim of the questionnaires involve the provision of a breadth of representative data[63], derived from scuba divers, whilst the depth of data was based on interviews, in order to apprehend, experience, and understand the complexity of the social world, as viewed by various stakeholders[59,60,64].

2.1 Case Study

Case studies involve the research of a single entity of a phenomenon, of which it is possible to identify several, through the use of complementary methods.[61,62] As such, the following study may set the achieved knowledge from the single case of Bongoyo and Mbudya into a greater context of sustainable management of scuba diving tourism, especially as the methods are based upon, and the results will be analyzed to, previous research and theories of the subject. However, whilst a certain degree of generalization exists, and is desirable to achieve, it is important to comprehend that a case study involves the research of a single case, and may therefore, equally be viewed merely as a divergent entity of the phenomenon as a whole.[61,62] Nevertheless, as the study specializes in the two respective marine reserves - with data collection proceeded in the vicinity of the areas studied and the months of March and April encompassing the delimited time range - it is possible to set the researched phenomenon in perspective to the specific prerequisites of the case.
2.2 Questionnaire

The benefits of using this method comprises the combination of easily processed data and the ability to generalize the studied aspects of the larger population through a smaller sample, wherefore it was adopted as a method to collect information from divers.\[63\] The questionnaire combines questions that focus on the respondents’ characteristics, as well as questions directly related towards the objective and purpose of the study.\[65\] Further, the questions were closed, and based upon the aforementioned theories.\[63\] The study of recreation specialization involved questions based upon divers’ certificate level, experience, and frequency against their knowledge of diving impacts upon the marine environment. Additional questions involved characteristics of the clientele, recurring divers’ perceptions of ecological alterations over time, as well as their experience of the current dive (see Appendix 7.2 for the questionnaire). Before the survey commenced, and questionnaires were distributed, the questionnaire was handed to the supervisor Göran Sahlén and local contact person Johan Sundquist for additional feedback. Furthermore, and in order to eliminate misinterpretation, an additional six questionnaires were carried out and assessed by a group of divers in Dar es Salaam to make sure the questions were comprehensible and relevant.

Moreover, as the questionnaires were to be distributed to all divers after each dive, during the time frame of March 21st to April 26th, the sampling method began as being consistent. However, the scuba dive operator, who volunteered to distribute the questionnaires to all divers after each dive, sometimes forgot to hand out the questionnaires. Therefore, there is a lack of persistence in time and collection, which in turn, implies that the sampling proceeded to being convenient.\[65\]

2.3 Semi-structured Interview

The method of semi-structured interviews was selected and applied in order to examine various stakeholders view on management within the marine reserves as it combines a pre-defined structure with flexibility.\[61\] Thereby, the method involves the possibility to adapt to the participants’ replies, when further exploration or explanation of their answers where needed.\[59,61\] The sample was chosen through the use of the snowball effect as the possible interview participants within the area of focus were relatively unknown prior to
fieldwork.[59] More specifically, the sample was defined with the scuba diving operators constituting the primary base and where criteria for selection embraced that the operator had tourists as participants on their dives. However, it was later revealed, that there was merely one such stakeholder as the same owner operates two scuba diving operations. The third operator, on the other hand, is an association which merely brings along the various members on diving tours. Therefore, the population of stakeholders involving scuba diving operators, related to tourism, was covered.

On the other hand, merely involving one interview participant implies a limited viewpoint, wherefore the sample was expanded to incorporate additional stakeholders of the marine reserves, thus, taking into account the issue of diversity within the studied population.[61] In order to avoid a limited size and instead, embrace various influencing factors, criteria for additional stakeholders was developed to cover private initiatives and public organizations. To prevent ending up with a specific network of people, and risking not to receive sufficiently diverse value orientations, however, we set certain criteria for the next person in line. As such, we aimed for two participants from each island within the additional stakeholders of the marine reserves, with one being employed through public organizations and the other, engaged through private initiatives. The first was chosen due to their involvement in tourism, management and conservation of the marine reserves, whilst the latter was criteria was selected in order to provide for additional and more neutral perspectives. However, Mbudya currently lacked private initiatives, wherefore the final stakeholders within marine conservation merely involved the public stakeholder perspective of Mbudya, but both stakeholder perspectives from Bongoyo. On the other hand, the first interview participant at Mbudya could not answer all questions and instead, referred to another, publicly employed person for a confined amount of questions, concerning Mbudya Conservation Group and the General Management Plan. As such, the final number of interviews totaled two participants for each of the respective reserves (see Figure 1).
Next, the interview questions were formulated after three themes; the first embracing previous experiences and their current positions, followed by a description of the organization or company they are employed at, and finally, their view of sustainability within their work and of the future of the marine reserves. The interview guide was structured with the help of main questions, complemented by supplementary ones and were based upon the focus of management of the marine reserves. In the final stage of developing the interview guide, feedback was sought and provided from our supervisor and local contact person, whereafter final alterations were made (see Appendix 7.3 for the interview guide).

The interviews were held at locations proposed by the respondents in order for them to feel more relaxed in the situation.[59] Moreover, the interviews were carried out by two researchers, with one comprising the primary role, conducting and leading the interview forward whilst the second researcher took notes and asked complementary or clarifying questions, merely during specific times of the interview. The reason for taking separate functions during the interview was to avoid any confusion, disturbing the flow, or minimizing the efficiency of the interview. Further, the argumentation for having two researchers attend
the interviews was to further guarantee that adequate information be generated, than would otherwise be possible, should only a single person act as both listener and interviewer.[59] The reason for applying the same person for each of the respective responsibilities was to receive a consistency between the interviews in form of presenting the questions or seeking moments where further explanation was needed.

Prior to the interview, consent was sought and received from the participants related to the presence of two interviewers and the management of the data; involving its collection, storage and presentation.[59,61] Further, it was proposed and agreed to provide partial anonymity to the participants. Partial anonymity implies that the participants are guaranteed confidentiality in the form that their names and any company names would not be mentioned, whereby the titles of the organizations of the conservation groups of Bongoyo and Mbudya, on the other hand, were fully conveyed. However, it was explained that the possibility for the participants, and other people in their vicinity, to recognize each other would still exist.

2.4 Processing, Presenting and Analyzing Data

When processing the data of the questionnaires, the results were translated into numbers and recorded in a table, in which invalid responses - such as encircling two possible answers instead of one or leaving a question unanswered - were noted but not calculated. Later, Spearman’s rank was applied to statistically analyze whether or not recreation specialization existed within the studied population, as well as if there was any relation between alterations of the dive site over time and diver experience. The remaining findings of relevance were presented through diagrams.

The entire interviews were recorded so as to receive the full answers of the participants as well as to allow for the researchers to place their full attention on the interview.[59] Later, the recordings were transcribed in order to gain an overview of the gathered data and to more effectively group the results into the aspects of the scuba dive operator as well as possibilities and challenges. Within the latter, the data is further divided among the aspects of sustainability in order to create coherence and context. Such a method is known as mapping and involves the charting of various relevant aspects of a greater phenomenon.[66] Within the themes, the results of scuba dive operator are presented along
with the statements of the additional stakeholders which are applied to underpin or contradict the results of the scuba dive operator.

Finally, analysis was proceeded through the use of the model “Techniques for managing marine tourism”. Through categorizing the results within the different techniques, they were compared and discussed along with previous research on scuba diving, nature-based management theories, as well as the former General Management Plan.

2.5 Validity and Reliability

When discussing the validity and reliability within the research, the aspects of relevance and repeatability, are sought to be highly fulfilled.[61,67] To ensure high validity of the questionnaire, a draft was exposed for a review by external experts as well as subjected for a test panel of experienced divers to ensure relevancy. Moreover, due to the gap in previous research, the results are of great relevance.

As objectivity is an essential and related concept to the discussion of reliability,[67] the researchers, in this case, complement each other, with one being a keen diver, and the other never having dived. Combined with the study constituting the researchers’ first travel to Tanzania, allowed for the design of the questionnaire to consider different angles and perspectives, as well as eliminating subjectivity. Further, the choice of applying closed questions for the main part of the questionnaire sought to eliminate respondent errors as well as to ensure the possibility of recreating the survey, aspects of relevance in order to gain high reliability.[67]

Moving on, as the researcher constitutes an active part of the research process,[61,68] qualitative research is not repeatable, but will vary in accordance with time, settings, researchers and participants.[64] Thereby, the conditions for quality within qualitative research rather relate to the dependability of the researcher and the degrees of credibility and transferability of the data from research theories, into real life situations.[61] When discussing the use of interviews within the research, it may therefore be argued that a high degree of dependability is maintained throughout the research process. The reasons for such a statement firstly adhere to that the interview guide was adjusted so as to fit all stakeholders, no matter their position or work within the marine reserves, wherefore, the interviews were arranged in similar matters, following the main questions in equal order. Secondly, the two
respective researchers occupied the same responsibility within all interviews. As such, the questions were similarly formulated and similar aspects were expected and demanded to be answered within the interviews. Thirdly, the data management of the interviews were attended on equal conditions involving recording, transcription, processing and presentation. Further, the choice of recording and transcribing the interviews signifies that the complete answers from the interviews were assembled. Thereby, the extent of interpretation was limited up until the stage of processing the data. However, as the themes for processing were omitted beforehand, and citations were chosen after correspondence to the themes and in relation to the statements of the scuba dive operator, the aspect of credibility may be regarded as high. Finally, transparency permeates the various stages of the research, with the aim of providing a clear understanding of how previous research and theories have been conveyed into the case study and later, analyzed in relation to each other. As such, a high degree of transferability is provided through the various steps of the research process as well.
3. Results

3.1 Diver Characteristics

Out of the entire population of respondents, four (11.8%) were locals, twenty (58.8%) were expats, whilst ten (29.4%) of the respondents were tourists (see Figure 2). There was one absent answer in the questions which constitute the aforementioned divergence. As such, 88.2% of the clientele were of foreign origin.

Further, it was found that 88.6% of the respondents were recurring divers to the reefs of the marine reserves of Bongoyo and Mbudya (see Figure 3), as nineteen respondents (54.3%) had dived at the reserves over ten times, whilst another twelve (34.3%) had dived there between two and ten times. Finally, the minority of four respondents (11.4%) dived at the reserves for their first time right before answering the questionnaire.

3.2 Perceptions of Ecological Developments Through Time

Through the use of Spearman’s rank, significance was proven to exist between the number of previous dives in the marine reserves in relation to the perceived alterations of the overall reef condition \((p = 0.01)\). With a \(r_S\) value of 0.627, there was a strong positive relation, implying
that quality was perceived to have increased with an increasing number of dives. However, a negative relation was found when examining the divers’ perspectives on alterations of overall reef condition over time related to the when they first dived at the marine reserves, through the use of Spearman’s rank (p = 0.01; rs = -0.587). Thus, quality has been perceived to decrease over time.

Figure 4 portrays the general perceptions of a slightly decreasing standard of the reefs within all ecological aspects as ratings above the line of “no difference” implies a negative trend for all aspects except amount of dead coral and litter on the reef, for which the opposite applies. Further, it becomes evident that a clear distinction exists in comparing the perception of those who have dived at the reefs of the marine reserves for a longer period of time than of the divers who first dived there during the past five years. Whilst the ones with a longer
experience have perceived greater alterations of the marine environment, the divers with shorter experience have most often observed similar alterations, although not as large. Thus, they lie closer to the line of “no difference”. Further, whilst the greatest alterations were perceived to include the coral condition and number of wildlife species, followed by the overall reef condition, the aspect which was generally thought to have undergone least changes over time was the amount of dead coral. The number of absent answers per question related to ecological alterations are presented in the table below.

### TABLE 3. Number of Absent Answers Per Question

The absent answers for the questions related to the ecological alterations over time were counted as invalid. For the questions concerning overall reef condition, coral condition, or water condition, there were no absent answers.

<table>
<thead>
<tr>
<th>Number of absent answers per question</th>
<th>All divers Total: 26 respondents</th>
<th>1996-2010 Total: 9 respondents</th>
<th>2011-2015 Total: 17 respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of different wildlife species</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Number of scuba divers simultaneously</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Amount of dead coral</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Amount of litter on the reef</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

### 3.3 Recreation Specialization

The certificate level of the respondents varied between open water diver to instructor and technician, with eight (22.9%) being open water divers, twelve advanced open water divers (34.3%), five rescue divers (14.3%), four dive masters (11.4%), four instructors (11.4%), and one technician (2.9%). Further, an additional respondent (2.9%) was currently a trainee for becoming an open water diver. In examining recreation specialization, relation was sought between each respondent’s total number of correct answers, of the questions related to scuba divers impacts upon the marine environment, and their respective certificate level. Through the use of Spearman’s rank, no correlation was found, as the p-value equalled 0.809. Thereafter, the divers’ aforementioned knowledge was set in relation to the respondents’ total number of dives, followed by their dive frequency, for which a p-value of 0.296 and 0.327
respectively, did not show any significance. On the other hand, the question which received most right answers involved whether hard or soft corals are most vulnerable, in which the answers of hard (=1) and soft (=2) averaged at 1.18, signifying a high degree of right answers. On the contrary, the most difficult question involved at what point of the dive, divers exerted most impact on the reefs, averaging at 1.65 where initiate phase (=1) involved the correct answer and mid-dive or final phase (=2) represented the wrong answer.

3.4 Divers’ Experiences of Recently Completed Dive

The respondents who completed the questionnaire experienced their recently completed dives as good, averaging at 3.3 on a scale of one to four; where one represented “Very poor” and four, “Very good”. During the dive, the boat which brought them to and from the dive sites, floated around, in wait for the divers to finish their dive, according to all respondents. Furthermore, pre-dive briefings were provided for the entire population\(^2\) and, as Figure 5 portrays, was well followed by the divers.

\[ \text{FIGURE 5. Instructions and Precautions} \]

The left bar shows the respondents’ perceptions of how well they have personally followed the instructions and precautions mentioned during the pre-dive briefings. The right bar portrays how well they believe others have followed the same. There was one fall-out per question.

\(^2\) There was one absent answer in for the question concerning pre-dive briefings.
However, out of a total of thirty five respondents, ten (28.6%) mentioned that they experienced a diver to have caused disturbance to the reef during their dive. On the other hand, these ten respondents dived during six respective days, wherefore the number of divers who caused disturbance are not necessarily as many as the respondents who conceived the activity. When asked to describe the form of disturbance, six (60%) of the respondents who perceived a disturbance, referred to the diver having touched the reef, wherein two (20%) elaborated the answer, implying that the diver touched the reef with their fins. Additional answers included “Looking for shells”, “Unintentional”, “Sand kick-up”, and “Damage”. With the exception of two absent answers for the question concerning whether or not a dive leader intervened during disturbance, five of seven respondents (71.4%) perceived that disturbance was disrupted.

3.5 Scuba Dive Operator

The scuba dive operator’s main mission is teaching and allowing for customers to practice scuba diving with the aim to establish a diving community in Tanzania. The aim is sought to be fulfilled by spreading awareness of issues related to scuba diving and the marine environment, through educational and recreational scuba diving activities, and by involving the local community, as well as schools.[69]

“We start with schools as well. We just had Dar International School, so it's a big group of them and luckily we have a mixture of groups between expats and local people. So if you can get the local people more involved then hopefully they can tell dad what is the problem and dad can help. Because it's most people in the government we are in need of assistance from. But most of them don't dive because most of them don't even swim so it's quite a problem.”[69]

As the most positive aspects of the current management, the scuba dive operator describes the possibility to raise awareness concerning issues occurring beneath the surface of the ocean, and through their clientele also enable engagement from international partners.[69]
“I think we get awareness for people that dive and we have a lot of people from the embassies that dive and are involved so when they go to the meetings, they know what is going on. So it does help to tell the international partners what is actually effects and what is going on [...] I said the more people you can get under water the better it is.”[69]

The company operates at an all year round basis, wherein the peak season consists of the larger European winter- and summer holidays and weekends constitute the general high season. Furthermore, the main clientele is identified as expats living in Dar es Salaam for a confined number of years, whilst tourists make up for about 5-10% of the customers, and local Tanzanians represent about 1%, due to the costs being out of their market range. However, the company have noticed there is an increasing interest for scuba diving amongst younger Tanzanians.[69]

“Well, basically, 90% of our clientell is expats. [...] Local Tanzanians are not even 1% representative. Some of them, it is out of their market range or their price pocket but the younger generation are now starting to come. [...] Tourism has been about consistent and in the frame that is people who come and visit expats [...] the expat community has increased lots so I'll get more [...] So my tourist business I think is overall through the year between five to ten percent of my business.”[69]

Further, the scuba dive operator mentioned benefits of low tourist numbers, related to an elevated, environmental behaviour.[69]

One of our big advantages is that we have people diving on a regular basis with us. So in that way it is much easier to teach the people, or make sure that they control buoyancy and things like that. [...] But if you only have straight tourists it is normally a nightmare to control them under water; get them to follow you and don't break corals and things like that.[69]
3.6 Possibilities and Challenges

When it comes to the possibilities and challenges facing the management of the marine reserves there is consent in the perception that there exists a possibility of developing the areas as destinations. Referring to the development of destinations, the scuba dive operator accentuates the fine quality of the reefs as well as the good diversity of fish, which is currently found within the area. However, the marine reserves are in need of additional support in order to manage current challenges.[69]

“if we could get a little more help from the government to stop the dynamite fishing it will be a good dive destination”[69]

In relation to tourism in general, the private interest in Bongoyo agrees, claiming that tourism in Tanzania possesses “all the perfect ingredients for a thriving, robust tourism”[70]. Further, it was implied that there is currently a need for an increased understanding and organization of the tourism sector, on both a more extensive as well as local level.[70,71]

“support groups like the conservation group and people that like to expand the tourism business. They have to make friendlier policies to attract tourists, lower the park fees, and the costs.”[70]

3.6.1 Economic Aspects

The interview participants mention economic capital in various circumstances, related to entrance fees, salaries, as well as public and private interests. The scuba dive operator, the conservation groups of Bongoyo and Mbudya, as well as the private interest of Bongoyo, all mentioned that entrance fees are collected from people who enter the marine reserves by disembarking on the islands. The entrance fees are later collected by the Marine Parks and Reserves Unit, which in turn, performs under the government. However, they expressed that the money does not get reinvested into the marine reserves.[69-72]

“It doesn’t go into any specific marine park which you actually pay the money for. [...] What happens to the money, no one knows.”[69]
“The problem my government, he don’t bring any money from here. He get lot of money from this island and from Bongoyo island but here he don’t bring more money to go protect this area.”[72]

Finally, it was mentioned that the islands are under threat from privatization through either hotels in the vicinity or by various operators from the outside.[69,70] On the other hand, the interview participant from Bongoyo stated that the government will merely allow for public-private partnerships.[71]

“And also there's speculations that they're going to get privately developed, the islands, which is … I don't know if it's the best thing in the world to do to involve the hotel and ... I'd prefer they just stayed out.”[69]

“Like mbudya, bongoyo is under a threat, from private interests. Any beautiful places with economic potential are the target of people wanting to take advantage of that. So it needs to be protected. Lets pray that it remains a public space.”[70]

3.6.2 Ecological Aspects

The stakeholders were asked to describe the ecological state of the coral reefs and the wildlife within. The appreciations contradict each other with certain stakeholders implying a negative trend to have taken place during the past years, whilst others see a positive change, as shown in Table 4.

<table>
<thead>
<tr>
<th></th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coral reefs</strong></td>
<td>Scuba Dive Operator</td>
<td>Scuba Dive Operator</td>
</tr>
<tr>
<td></td>
<td>Mbudya Conservation Group</td>
<td>Private Interest in Bongoyo</td>
</tr>
<tr>
<td></td>
<td>Bongoyo Conservation Group</td>
<td></td>
</tr>
<tr>
<td><strong>Wildlife (fish)</strong></td>
<td>Mbudya Conservation Group</td>
<td>Scuba Dive Operator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Private Interest in Bongoyo</td>
</tr>
</tbody>
</table>
The scuba dive operator explained how the past decades have implied ecological alterations such as diminishing fish life, especially referring to larger, marine species such as dolphins, bull sharks, and whale sharks, leaving merely juveniles left at the marine reserves. Further, coral cover was said to have decreased in shallow waters, in the near vicinity of the islands. On the other hand, deeper waters, including the majority of the dive sites, have seen an improved state of coral health and coral cover since the bleaching of El Niño during the latter part of the 20th century.[69]

On the contrary, all stakeholders of the marine reserves brought forth, and were unanimous in the judgement that, one of the major environmental challenges involved the management of destructive fishing. The fishing methods mentioned to cause damage to the marine environment includes the use and dragging of nets as well as fishing with dynamite.[69-72]

“I mean it’s more unusual not to hear a blast than to hear a blast.”[69]

“dynamite fishing, I can literally see it. You could see the exploded coral. It’s a major problem. [...] It’s like an assault on the ocean.”[70]

Indirect effects of dynamite fishing were said to influence erosion and tourism. An example of the first included an event which took place approximately two years ago, during a month of bad weather, in which, the lack of coral reefs increased the currents and thereby, almost eliminated the beach of Bongoyo in two weeks.[70] Likewise, erosion was mentioned as a challenge at Mbudya as well, although presumptions of the cause were not further elaborated. [72] The influence on tourism does not merely involve decreased quality of dives[69,70], but, as explained by the private interest of Bongoyo, could directly be harmful for the tourist, should he or she be too close to a dynamite blast.[70] As such, the conservation groups of Bongoyo and Mbudya work with preventing destructive fishing methods. Nevertheless, they state that prevention is demanding work as they are continuously opposed by the fishermen. Firstly, traditions of fishing stretch far back in time, as explained by the interview participants from the respective conservation groups. Secondly, the lack of demarcation for where the boundary of the marine reserves go, implicates further challenges.[71,72]
“And I don’t have delimitation so [...] it is not easy. I say no. Even if they go to court they win.”[71]

Thirdly, the fishermen may pose great threat to those who stand in their way, aiming at preventing them from fishing.[70-72]

“People who are dynamite fishing, that crazy people. If you go there without a maybe a police, they can take a bomb and they can fire to you, straight. It’s a challenge.”[71]

Moving on, the conservation groups lack public support and additional assistance from the authorities in controlling the fishermen.[71,72]

“government can help you, but government they don’t help me so …”[72]

“they (Department of fisheries/Fisheries ministry) are suppose to come to the sea to control people, but they don’t come to the sea; they don’t even know how to … they don’t even have boats.”[71]

Further, and in spite of the existing challenges, the scuba dive operator views the future positively, seeing improvements in the prevention of both dynamite fishing and the dragging of nets.[69]

“the dragging of nets and things like that. I think they are starting to control it a little bit better now so it (corals) will grow back. [...] And there is private organizations involved in the dynamite fishing. They have arrested people. They have put people in jail and so it looks like there is a future. I think it will be good.”[69]

Additional environmental challenges relate to the lack of moorings. As the absence of various buoys for mooring results in the use of anchors, the risk for destroying corals becomes increasingly probable.[70-72] Contradictingly, at least one of the marine reserves have previously possessed, and been able to offer their visitors the use of, buoys.[72] However,
during the past five years, the buoys have been absent from the reserves, located somewhere else, in the custody of the government. [70,72]

“Because my government he buy some buoy like this one and put some this area. But government office, fiver years he don't put there.”[72]

“there is a mooring marine fee for the island but there is a lot of complaints that there is not any place to moore. You have to use your own anchor, which then destroys the coral. And apparently there was mooring [...] provided by the American government, but they are somewhere sitting for the last five years, in some government compound”[70]

3.6.3 Socio-cultural Aspects
Continuing to the socio-cultural aspects, both the scuba dive operator and the private initiative on Bongoyo stated it to be of essential value to involve locals in the management of, and as tourist to, the marine reserves. Thus, the sense of collective responsibility for the marine environment would increase, according to the scuba dive operator, who further implied that improvements in local involvement are soon to be detected.[69,70]

“And the younger kids now, that's about 18, they can swim and when they have money I think they will come diving. So they get more involved and things like that so definitely, I think there will be improvements.”[69]

Moreover, the scuba dive operator stated that it was easy to operate in the marine reserves, referring to various legislations, licensing, and fees. With the mere element needed to take into consideration for the scuba dive operator, involving the licensing of their commercial boats, the interview participant proceeded to speculate in the reason for the lack of regulations on scuba diving. The conclusion was appreciated to lie in the lack of knowledge related to the industry.[69]

“Only thing if you run a boat commercially, the boat have to licenced by the Tanzanian authorities. [...] In the water, there is no extra permits or anything like that. So even if we dive outside of the marine park, or on the ocean side of the
marine park, we don't need to pay any marine park fees or anything like that. [...] it's quite an easy place to operate. Because there's hardly anybody in the government who know about diving or what's going on about diving so legislation on that is very small. I mean if I have to work with new business licenses, it's always a trick with what category they put me in because they don't know what I belong to." [69]

Finally, to obtain an understanding for the use of the General Management Plan within the marine reserves, the question was raised to all stakeholders, of whether or not they knew about its existence as well as if they worked to implement the plan within their business. All of the participants, except for the private initiative on Bongoyo said that they knew about the General Management Plan, but that the implementation of the policies are limited or inadequate. None of the participants worked to actively follow the plan, nor had they seen any renewed or updated version since 2010. [69-72]
4. Discussion

4.1 Analysis

Based upon the respondents’ and participants’ perceived decrease in ecological quality over time within the dive sites of Bongoyo and Mbudya, it may be thought that the reason relates to the expanding number of scuba divers. Such a statement coheres to the theory of recreational succession[56,57]. However, as the major alterations have occurred within the aspects of number of wildlife species and coral condition, it seems unlikely to have resulted from scuba divers. Although certain divers were viewed to have come in contact with the reefs, or in other ways, had disturbing effects upon them, the scuba dive operator implied that the divers had minimal impact upon the reserves. The reason relates to the numerous amount of frequent divers who exercise a comparatively innocuous behaviour, as was described by the scuba dive operator and further, accentuated by the respondents. Instead, the negative ecological trend may be caused from other anthropogenic stresses, such as destructive fishing methods, which were merely controlled with slight success. Dynamite fishing and the use of nets were mentioned by all participants as the primary challenge for the marine reserves, having detrimental effects on the environment, which in turn, is supported by previous research on the reserves[43,45] as well as the General Management Plan[44]. The causes of such activities coheres more evidently with the scuba divers perceptions on the environmental state; with dynamite fishing and the dragging of nets destroying corals and decreasing the amount of wildlife species.

4.1.1 Educational Management Techniques

The first aspect of educational management techniques refers to the existence and use of recreation specialization. No recreation specialization was found through comparing the divers’ level of knowledge to their certificate level nor to their level of experience at the specific case of Bongoyo and Mbudya. However, previous research states that coherence between the environmental consciousness and behaviour of divers and their level of experience and specialization has been found to exist within the recreation of scuba diving in general.[56,57] As such, the case of Bongoyo and Mbudya differs from previous research. On the other hand, focus on divers’ involvement in conservation within the questionnaires
concentrated on their awareness related to which activities and behaviours exert most impact on the reefs as well as what corals are the most fragile. Thereby, the examination neither measured the divers general knowledge of the marine environment nor whether or not the divers practice conservation-amiable behaviour. Therefore, recreation specialization may instead portray positive correlations between other factors than the few incorporated in the research.

The scuba dive operator expressed that recurring divers have less detrimental affect upon the environment, than those who dive less frequently. Therefore, aspects such as behaviour and skill might have increasing impact on the diver with increasing experience. In turn, the dive experience may improve, as the diver becomes more calm in the situation, which would thereby, relate to the result in which an increased number of dives was found to increase the perceived quality of the reserves. Likewise, the diver may acquire knowledge of species identification with increasing involvement in the recreational activity. Such a statement is based on that the question which was most accurately answered, when examining the divers’ knowledge level, referred to species identification and not to the diver’s own impact. Additionally, a greater awareness for what is viewed under the surface of the water, could improve the dive experience. Thereby, it may be concluded that the divers at the marine reserves of Bongoyo and Mbudya portray a correspondence to the theory of recreation specialization as increased behaviour and skill increases with increased participation, thus, minimizing diver impacts.

Further, Thapa, Graefe, and Meyer have found that previous research mainly has focused on examining correlations between specialization - including behavioural, cognitive, and affective components\(^3\) - and environmental behaviour, conservation attitudes, motivations, preferences, perceptions within scuba diving.[37] More specifically, results from previous research portrays that diver specialization positively correlates to pro-environmental behaviour\cite{28,33} and marine-based knowledge, which additionally, also relates to pro-environmental behaviour.\cite{37} However, although marine-based knowledge anticipates environmentally responsible behaviour, the level of specialization presents greater impact on the desired behaviour of scuba divers.\cite{37} Thereby, it seems as though a gap exists in\[^3\] 

\[^3\] Whilst the behavioural component refers to the level or frequency of experience and participation, cognitive components involve skill and knowledge, and affective includes the individual’s own lifestyle and attachment to the activity.
examining the relation between the degree of specialization to knowledge and awareness on what activities and behaviours have an impact upon the natural environment. By increasing the apprehension of such a relation, directed educational efforts may be created in order to generate a raised awareness of the divers own environmental impacts, decreasing their negative effects further, and rendering possible for a more effective management of scuba diving.

The final aspect within educational management techniques, pre-dive briefings were perceived to have been well followed by the respective divers, according to the respondents. Moreover, as the dive leader intervened during the majority of the occasions when a diver practiced a destructive behaviour, the rate of deterioration was minimized in comparison to a similar situation in which pre-dive briefings and leader intervention would be missing.[21,39] Thus, the aim of the scuba dive operator, to spread awareness of issues related to scuba diving, through education and participation, seem to have payed off.

4.1.2 Regulatory Management Techniques
The need for applying regulatory management techniques was identified as the questionnaire results as well as previous research on the reserves[44,45] showed that there has been an impairment in the overall condition of the coral reefs within the last two decades. Based upon the interviews, there is an evident need for authorities to further develop policies with guidelines involving which activities are allowed within the area, as well as how many tourists should have access simultaneously. According to the General Management Plan, all recreational tourism activities were to be regulated in relation to conservation and further stated examples of permitted and prohibited activities, in which scuba diving was allowed.[44] However, as the General Management Plan was never implemented, according to the interview participants, and the activities within the marine reserves are still poorly controlled, implies that a stage within the process of implementation has failed. When reviewing the General Management Plan, a trend becomes evident in the lack of responsible authorities and additional actors whose purpose is to implement the plan and regulate the marine reserves based upon the management strategies within.[44] Thereby, it is of vital essence to develop more functioning and effective regulations than is currently the case; involving the distribution of responsibilities and the application of consequences. By
providing more regulation for the management of destructive activities, as well as support for tourism operators who exert pro-environmental impacts, such as the scuba dive operator, general awareness may be raised and attitudes changed. In relation to the lack of implementation of the General Management Plan, previous research has shown similar trends in that the management of marine protected areas are general insufficient.[73]

Moreover, in recognizing that scuba diving is an increasing phenomenon worldwide and practitioners are growing in numbers, suggests there to be a rising demand for scuba dive destinations. However, as the combined results show, the majority of customers diving with the scuba dive operator are recurring divers and residents in the area. The second largest group consists of tourists who, according to the scuba dive operator and WTO[18], combines their interest with their travel. Hence, the current scuba diving performed in the marine reserves of Dar es Salaam is rather to be viewed as a leisure activity than a distinct tourist activity. These factors, as well as the absence of other dive operators, implies that the area is positioned at the initial phase of Butler’s destination life cycle model and is therefore, not yet developed as a dive destination. Considering that the area is not yet fully developed as a tourist destination, indicates there still is a possibility to implement clearer rules and control[58], as to what is allowed within the reserves, which is currently perceived as lacking. Accordingly, the General Management Plan coheres to the aforementioned, implying the need to apply a precautionary principle in the regulation of activities, in order to avoid exceeding carrying capacities.

The theory of recreational succession comprises the concept that natural sites deteriorates in relation to increasing numbers of visitors, implying that is the case within the marine reserves of Bongoyo and Mbudya as well. Such a theory could be supported in the the degradation of the natural environment along with a minor increase in the number of tourist. However, the scuba dive operator suggests that the aim of bringing more people under water, as well as through educational activities, spread awareness about issues related to the marine environment in the local community would help prevent further deterioration. Although this coheres with the previous theories stating that tourists can become environmental ambassadors, as well as the tourism operator being able to contribute directly towards an improvement in the local environment, it contradicts the theory of recreational succession. On the other hand, the interview participants agree that there are other external factors that might pose a greater threat to the coral reefs than scuba diving, thus the recreational activity may

34
instead act as a conservation tool in minimizing such destructive impacts. Similarly, the General Management Plan accentuates the education and raised awareness for communities and stakeholders concerning conservation, management, and sustainability.[44]

4.1.3 Economic Management Techniques

Through the implementation of marine reserves, it seems as though the aim of the authorities in Tanzania is to protect and manage the marine environments, which is acknowledged through the General Management Plan[44]. Hence, financial support is required in order to enable and implement management strategies for Bongoyo and Mbudya. However, according to the General Management Plan, the objective of the financial management of the marine reserves is to make them self-sufficient in relation to finance. Thus, the collection of permit, entrance, and user fees should constitute the way in which to fulfill the objective.[44] Further, “funds should be set aside to allow recruitment and purchase of equipment and facilities to enhance enforcement”[44]. As such, the application of entrance fees involves that tourists and other visitors to the islands provide finance, which in turn, is collected by the private operators and later, generated to the responsible authorities who are responsible for the marine reserves[16] - in this case, the Marine Parks and Reserves Unit. However, two challenges exist within the technique involving the economic management of marine tourism. Firstly, the scuba dive operator is not encompassed within the marine fee charges, as the mere economic contributors constitutes those who step foot on the islands. As such, consumers - such as the scuba divers - will exercise their recreational activity within the marine reserves, without contributing with financial support for continued conservation efforts upon the environment on which their activity relies. Nevertheless, it is clear, through the current and previous research, that the scuba divers exert certain impact.[12,19,24-30] Secondly, the collective opinion of the various stakeholders implies that the financial support, provided to the authority, is not reinvested into the marine reserves; neither through salary to the employees nor investments and developments. Therefore, there is a lack of support from the authority in the protection and management of the area, wherefore, conservation becomes a challenge. Additionally, concern was raised and accentuated by the interview participants, referring to the threat of privatization of Bongoyo and Mbudya. This may well relate to previous studies which have implied that the generation of income from nature-based tourism
may add to the local economy, thus, encouraging public authority to embrace a pro-preservation manner.[5,51]

4.1.4 Physical Management Techniques
Although the marine reserves are currently experiencing a situation in which they lack - and have been lacking - mooring buoys for the past half decade, the scuba dive operator has not proceeded to implementing the use of anchors. Instead of anchoring to a fixed point at the respective dive sites, the respondents stated that the boat floats around on the surface, in wait for the scuba divers to finish their dive. Further, the lack of demarcation around the reserves, through the use of mooring buoys, for example, has proved to pose challenges in controlling the activities within the area, wherefore buoys are nevertheless, coveted by the interview participants. The challenges provided for law enforcers, fishermen and recreationists by the lack of a visible boundary, is acknowledged within the former General Management Plan, in which the reason for its lacking was described to incorporate the irregular formation of the reserves’ boundaries. On the other hand, it was understood that demarcation is vital for the conservation of biodiversity and promotion of sustainable resource use within the area, wherefore the General Management Plan stated that the installation of buoys to mark the boundary would be given priority.[44]

4.2 Management Propositions
Currently, the situation involving scuba diving in the marine reserves does not pose major threats to the marine environment, wherefore the need to manage the activity does not constitute the main priority in comparison to other activities with greater influences. However, in order to manage the reserves sustainably, a long-term perspective is needed, wherefore management strategies ought to be implemented for all activities, seeking to involve the respective aspects of sustainability.

In relation to the management of the marine environment, it becomes increasingly clear that implementation of various strategies and regulations is lacking. Therefore, it would be advised to seek understanding for where in the process, implementation fails. By rectifying such aspects and further, increasing the effectiveness of regulations and control - bringing forth responsible actors and applying consequences for undesired behaviour -
management strategies could be more successfully followed. Additionally, it is of vital essence to provide a visible demarcation of the marine reserves. Thereby, the control of all activities within the reserves will be simplified, as boundaries enables the applied demand on all people who enter the reserves, to follow set regulations. Thus, consequences may be easier exerted on those who break the rules as legal authorities would be able to support the conservation groups. Therefore, the implementation of mooring buoys is requested for the area.

Further, as identified through the analysis, the two main challenges involved the scuba dive operator not financially contributing to conservation efforts although the divers exert certain impacts upon the marine environment. On the other hand, the money gained from various activities within the reserves are not reinvested into conservation efforts from the authority. Therefore, it does not seem as an alternative to require the scuba dive operator to contribute to such a fee, especially, as the scuba dive operator contributes with other values of worth. Such include the raised awareness of scuba divers, locals and authorities to what is going on beneath the surface, which in turn, may have positive effects. However, other reasons exist for why scuba divers notwithstanding, should contribute with financial support to conservation which is also related to the issue of raised awareness. By paying a fine for the may set in relation to participation in an activity within the reserves, the recreationist could receive insight in conservation and their own affect upon the environment, provided that such information is communicated. In a situation wherein the fees are reinvested into the area, this would be highly recommended for the authorities and the scuba dive operator to take into account.

Further, it is advised to examine which factors of recreation specialization within scuba diving influence and relate to each other. The acquired knowledge will further enable the control of impacts derived from divers. In the case of diving at Bongoyo and Mbudya, the major clientele consists of experienced divers who dive on a regular basis, thus exercising minor impact. However, as the area is observed to constitute the initial phase of Butler’s destination life cycle model, the number of scuba dive tourists is expected to increase. Since frequency has a greater impact upon the divers’ environmental behaviour than their knowledge, and frequency comprises the more difficult factor to control regarding tourists, it is vital to prevent as much of their other impacts as possible. These would, as stated by previous research and as currently executed by the scuba dive operator, involve the avoidance
of sensitive areas when immersing into the water, providing pre-dive briefings and have dive leaders intervene during disturbance. However, other management strategies could include the concentration of divers to specific areas of the reserves, thus, enabling for other areas to elude undesirable effects.

4.3 Conclusion

In conclusion, the research portrayed evident results of a degrading ecological state of the marine environments, with external factors exerting the major influences within the reserves. Such influences include the utility of various destructive fishing methods and the lack of efficient management and implementation of various regulations constituting the primary challenges. Within the current situation, scuba diving, therefore, merely comprises minor environmental impacts, but instead, positions the possibility to raise awareness for issues from under the surface. Thereby, scuba dive tourism enables the mobilization of people, toward pro-environmental management, wherefore it is positive for the area.
6. List of References


[69] Scuba Dive Operator. [Interview].;[9th April 2015].

[70] Private Initiative Bongoyo. [Interview].;[10th April 2015]

[71] Bongoyo Conservation Group. [Interview].;[9th April 2015].

[72] Mbudya Conservation Group. [Interview].;[21th April 2015]

7. Appendix

7.1 Definition of Terms

**PADI** is the abbreviation for the Professional Association of Diving Instructors, a global scuba diver training organization.¹

**WTO** is an abbreviation for the World Tourism Organization (UNWTO), and is the United Nations agency for promoting sustainable, and globally accessible tourism.²

**Anthropogenic stresses** is a term which refers to human induced impacts upon the marine environment.

**Bleaching** refers to the event in which increasing water temperatures lead to coral death. The cause lies in that the zooxanthellae within the Hermatypic corals are ejected, causing the coral skeleton to become visible. Hermatypic corals are the most common known type, found within sunlit, shallow, tropical waters with temperatures of 22-28°C.³ ⁴

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² Who we are. [Internet]. Available from: http://www2.unwto.org/content/who-we-are-0
⁴ Korallrev,Nationalencyklopedin.[Internet].,[cited 2015]. Availiable from: http://www.ne.se/uppslagsverk/encyklopedi/lång/korallrev
7.2 Questionnaire

**Questionnaire**

This questionnaire will be treated anonymously. The answers will be used as part of a study on diving perceptions of the reefs of Bongoyo and Mbudya. We are grateful for your participation.

Please fill in the blanks so that they best apply to you.

<table>
<thead>
<tr>
<th></th>
<th>Today's date: __________________________</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ] Male</td>
<td>[ ] Female</td>
</tr>
<tr>
<td>Age:</td>
<td>Highest diving certificate level: ______</td>
</tr>
<tr>
<td>Nationality:</td>
<td>Total number of logged dives: ______</td>
</tr>
<tr>
<td>Nation of residence:</td>
<td>Number of dives during the past two years: ______</td>
</tr>
</tbody>
</table>

In relation to diving in general, please mark one of the following answers to which you agree the most.

1.) Which type of coral do you believe to be the most fragile?
   - [ ] Hard coral
   - [ ] Soft coral

2.) At what time of the day do you believe diving to be the least harmful for the reef?
   - [ ] Day
   - [ ] Night

3.) Which type of contact do you believe to be the least harmful for corals, when viewing the total amount of contacts between a group of divers and the reef?
   - [ ] Accidentally touching
   - [ ] Touching on purpose

4.) Do you believe that touching a sandy bottom could cause disturbance of the corals?
   - [ ] Yes
   - [ ] No

5.) When diving, which of the alternatives result in the least number of coral contacts?
   - [ ] Diving with a camera
   - [ ] Diving without a camera

6.) During what phase of the dive do you believe that the impacts of diving may cause the most disturbance on the reefs?
   - [ ] Initial phase (immersion & first buoyancy control)
   - [ ] Mid-dive (movement & continued buoyancy control)
   - [ ] Final phase (accendance)

7.) What do you believe to be an acceptable distance between:
   - i.) diver and reef in order to avoid disturbance?
   - ii.) diver and marine wildlife in order to avoid disturbance?

Mark with METERS or FEET.

PLEASE TURN THE PAGE

45
Please answer the following questions with respect to the dive you’ve just completed.

8.) How would you rate your dive experience?

9.) Did you experience any pre-dive briefings before entering the water?
   i.) If yes, how do you believe that you followed the instructions and precautions?
   ii.) How do you think others followed the instructions and precautions?

10.) Did you experience any diver to have caused disturbance to the reef?
       i.) If yes, in what way?
       ii.) Did a dive leader intervene?

11.) How was the boat parked during the dive?

12.) Including this dive, how many times have you dived at the reefs of Bongoyo and Mbudya combined?

If you have dived at Bongoyo or Mbudya before this dive, please answer the following questions. If not, thank you for your participation!

13.) What year was the first time you dived at Bongoyo or Mbudya?

14.) In comparison to your first dive at Bongoyo or Mbudya, have you experienced any of the following changes?
   i.) Overall reef condition
   ii.) Coral condition
   iii.) Water condition

   iv.) Number of different wildlife species
   v.) Amount of dead coral
   vii.) Number of scuba divers simultaneously

   1 = Much better; 2 = Better; 3 = No difference; 4 = Worse; 5 = Much worse

   1 = Major increase; 2 = Minor increase; 3 = No difference; 4 = Minor decrease; 5 = Major decrease

Thank you for your participation!
7.3 Interview Questions

Personal:
How long have you lived in Dar es Salaam?
    ❑ What was the reason you moved here?
What do you work with?
What are your previous experiences related to the work you have today?
How did you get your current job?

Daily work:
Could you please describe the company/organisation you work for.
    ❑ What does the company/organisation work with?
    ❑ What is the aim of the company/organisation?
    ❑ How does the company/organisation work to fulfill the aim?
    ❑ How does the company/organisation work with tourism?
    ❑ Do you cooperate with any partners/other companies/organisations?
        ❑ Are there any companies/organisations which you do not cooperate with, but believe you should?
What kind of work do you carry out on or around the marine reserves of Mbudya/Bongoyo?
    ❑ What would you describe as the positive aspects of your work within the marine reserves?
    ❑ What challenges do you face?
Do you believe that the marine reserves have changed in any way since you first started working with/near them?

- Overall reef condition?
  - Coral condition?
  - Amount of dead coral?
  - Amount of litter?
  - Water condition?
  - Wildlife species?
  - Tourism?
  - Private boats?
  - Other?

What do you think about tourism in relation to your work at the marine reserves?

- Are there any positive aspects?
- Are there any negative aspects?

Management:
What is sustainability according to you?

There was a general management plan for the marine reserves outside Dar es Salaam for the period of 2005-2010. Have you seen it?

- Why do you believe that you haven't seen it?
- What did you think of it?
- Do you believe that the regulations set by the management plan are worth following although the plan is no longer valid?

How do you view the future of the marine reserves?

- What are the possibilities?
- What are the challenges?

Do you think that tourism may affect the future of the marine reserves, positively or negatively?

- In what way?
"As the world becomes increasingly explored, and fewer destinations are left for tourists to discover, there is a trend to travel to unusual 'territories'.

Travel underwater is therefore gaining appeal in the marketplace."

- WTO
Emilia Gunnarsson

Emilie Sörholm