



## **Environmental Impacts of Diving Tourism on Coral Reef Areas**

Recommendations on how to enhance environmental education in the certification policy of the International Dive Training Organization PADI

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May 2013

NHTV Breda University of Applied Sciences

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Breda, May 2013

I hereby declare that this thesis is wholly the work of Alina Glückstadt. Any other contributors or sources have either been referenced in the prescribed manner or are listed in the acknowledgements together with the nature and the scope of their contribution.

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Signed by Alina Glückstadt

## **Preface**

*This thesis was written as the final graduation project of the International Tourism Management and Consultancy (ITMC) program of the NHTV, University of Applied Sciences in Breda, the Netherlands.*

*My passion for the marine environment and the desire to protect the fragile and diverse ecosystem formed the topic of this work. For many years I have been fascinated by the biodiversity of coral reefs and take every possibility to dive into this world. In 2012, I finally had the financial resources and qualified as a PADI Open Water Diver while in Ecuador. But during my first experiences with the dive industry, I also had to observe situations where the marine environment was not treated in an appropriate fashion. I actually realized that the dive sport can harm the marine environment, especially diving activities in highly visited areas. Therefore, I decided to combine my fourth year specialization in sustainable tourism with my passion diving, and to research and write about the negative environmental impacts of diving tourism and how dive organizations can implement improved educational information related to environmental issues with the hope of reducing damage to coral reefs.*

*Due to financial limitations, I was not able to carry out research at a certain dive locations. However, the use of the communication tool 'Skype' enabled me to build up and communicate with an international network of important stakeholders in the dive industry.*

## **Acknowledgements**

Looking back to 20 weeks of intense research and the process of developing this work, I realized that this was only possible with the help and support of those people mentioned below.

First of all I would like to thank all the research participants for sharing information, thoughts and insights with me. I would like to direct a special thanks to Paula Wantke, who took time in her busy schedule and provided me with very interesting and important information. I would also like to thank the participants of the focus group discussion for an inspiring discussion and a great evening.

Special thanks go to Jeffrey Sanow and Vic Ferguson who shared their insights of reef conservation management. They want to publish my results on their website, which has been a huge motivation to do the best possible research on the topic, and also enabled me to obtain great international contacts.

Thank you, Robert Childs, for being of great and proactive support during the period of writing the thesis. Your comments, thoughts and inputs were of high value for me and completed this written work flow a bit smoother.

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## Executive Summary

Diving tourism is one of the fastest growing recreational activities in the world and more and more people enter the world of scuba diving. The rising market demand for scuba diving has caused increasing pressure on the marine environment at many destinations and it has been reported that divers can be significant factors of disturbance and damage to coral reefs, along with other global threats. Therefore, the purpose of this thesis is to research and write about the negative environmental impacts of the dive tourism industry on the already fragile marine environment, and to demonstrate that there is a high need for dive training organizations to sufficiently educate instructors and divers in order to create a greater environmental awareness. Environmental education plays a decisive role in this but little effort has been made to improve the environmental education among divers. For that reason, the certification requirements for students, dive schools and instructors used by the largest international dive training organization the *Professional Association of Diving Instructors* (hereafter referred to as PADI) will be analyzed, raising the crucial question as to how much importance is really given to the topic of environmental education by the most influential of dive organizations. The work will finally present feasible recommendations on how PADI can improve its certification criteria related to environmental education.

The research goal is to analyze the environmental impacts of dive tourism on coral reefs and to assess certification criteria and corresponding environmental education materials of PADI with the help of in-depth expert interviews and a focus group discussion to identify solutions on how PADI can enhance environmental education in their certification policy. In order to achieve the research goal, the following main research questions have been formulated to structure the paper:

1. What are the characteristics of diving tourism in coral reef areas?
2. What are the environmental impacts of diving tourism on coral reefs?
3. What are PADI's certification requirements for divers, instructors and dive schools and how are environmental issues included?
4. What are some possible identified improvements in the certification policy of PADI that might limit the negative environmental impacts of diving tourism on coral reef systems?

The topic was investigated using primary and secondary research. In order to gain an insight into the topic of diving tourism and environmental education, an extensive literature review was conducted with the use of various books, journals, online databases, case studies, websites and reports. Along with the literature review, another source of valuable information was to conduct in-depth interviews with experts representing the main stakeholder groups. A total of 12 in-depth expert

interviews were conducted with representatives of PADI and the Project AWARE Foundation, dive shop owners and dive instructors, coral reef conservation managers and biologists. The interviews were recorded, transcribed and evaluated. A focus group discussion, as another qualitative research method, was organized to receive insight into the perspective of certified recreational divers and their opinions about environmental education in the dive sport. A total of six recreational divers, with different dive levels from beginner to experienced, participated in the focus group discussion and it was also recorded, transcribed and evaluated as part of this paper.

In regard to the research goal and questions, the following conclusions have been reached. Scuba diving is a very quickly growing tourist activity due to the increase in education and wealth levels worldwide, along with the possibility of learning to dive at almost any location in the world, and to become qualified in a relatively short period of time. However, the majority of divers do not continue with further education, and thus have limited dive skills. In popular dive destinations, diving tourism is seen as one of the major direct causes of reef degradation, aside from global threats like climate change. It can be concluded that the destructive reef behaviors are often due to inadequately trained and environmentally unaware participants. This is due to a lack of environmental education in the dive sport industry, especially at the beginners level, and most divers do not know the consequences of inappropriate behavior on the coral reef systems. Therefore, environmental education is tremendously important and accepted as one of the best practices for creating greater environmental awareness to mitigate the impacts of the sport. If a diver understands and appreciates the marine environment, he will be more concerned about protecting it. Therefore, the largest dive training organization PADI and its certification policies have been analyzed with the following conclusions. PADI communicates its responsibility as the market leader towards the environment with the integration of sustainable programs and cooperation with the Project AWARE foundation. However, those programs are not directly integrated into the training manuals and certification policy of PADI and therefore some recommendations are formulated on how PADI could improve this situation.

As outlined, greater environmental education in the dive sport industry is crucial to minimize the negative environmental impacts on coral reefs. Therefore, it is recommended that PADI integrates environmentally-related questions into the survey that it randomly sends out to students after the completion of a PADI course. This way, environmental education might achieve a higher importance during the certification course, as dive instructors try to implement required standards from PADI. Another way of further integrating environmental education is to include a chapter on the importance of the marine environment into the certification manuals. This chapter would make all

relevant environmental information easily accessible to the students. It is further recommended that PADI should cooperate with other reef conservation organizations in order to share relevant research outcomes and to integrate and develop conservation programs for divers as well as to find feasible alternative ways of marine conservation.

The research period for this paper was limited to 20 weeks which resulted in opportunities for future research. It is recommended to further research on how PADI, but also other international dive training organizations, integrate environmental issues in their most up-to-date materials and how they implement environmental education in their certification policy. Furthermore, it is recommended to research the divers' behavior with improved environmental education and the resulting impacts on the marine environment.

## Table of Contents

<b>Preface</b> .....	<b>ii</b>
<b>Acknowledgements</b> .....	<b>iii</b>
<b>Executive Summary</b> .....	<b>iv</b>
<b>Chapter 1: Problem Analysis</b> .....	<b>1</b>
1.1 Background Analysis.....	2
1.2 Relevance and Research Justification .....	2
1.3 Motivation.....	3
1.4 Research Goal and Research Questions.....	4
1.5 Methodology .....	6
1.5.1 Secondary Research .....	6
1.5.2 Primary Research.....	6
1.6 Structure of the Thesis .....	8
1.7 Limitations.....	10
<b>Chapter 2: Characteristics of Diving Tourism</b> .....	<b>11</b>
Chapter summary.....	12
2.1 Defining Diving Tourism .....	12
2.2 Historical Overview of Diving Tourism .....	13
2.3 Development of Diving Tourism in Coral Reef Areas .....	14
2.4 European Market Segments.....	15
2.5 Importance of Diving Tourism on a Global Scale .....	18
2.6 Trends and Development of Diving Tourism.....	19
Chapter conclusion.....	21
<b>Chapter 3: Environmental Impacts of Diving Tourism on Coral Reefs</b> .....	<b>23</b>
Chapter summary.....	24
3.1 Definition of Coral Reefs .....	24
3.1.1 Main Threats to Coral Reefs .....	25
3.2 Positive Impacts of Diving Tourism .....	26
3.3 Negative Environmental Impacts of Diving Tourism.....	28
3.3.1 Direct Impacts.....	28
3.3.2 Indirect Impacts.....	32
3.3.3 Reasons for Negative Impacts .....	34
3.4 Minimizing Negative Environmental Impacts .....	37
Chapter conclusion.....	40
<b>Chapter 4: Case Study on Diving Tourism in Egypt</b> .....	<b>43</b>
Chapter summary.....	44
4.1 Introduction.....	44

4.2 Tourism Industry in Egypt.....	45
4.2.1 Arrivals and Markets.....	46
4.3 Diving Tourism in Egypt.....	46
4.3.1 Environmental Impacts.....	48
4.3.2 Stakeholder Involvement.....	50
Chapter conclusion.....	52
<b>Chapter 5: Certification Policy of PADI .....</b>	<b>53</b>
Chapter summary.....	54
5.1 Introduction to PADI.....	54
5.1.1 PADI’s Mission Statement.....	55
5.1.2 Facts and Figures .....	55
5.1.3 PADI Certification Courses .....	55
5.1.5 PADI’s Unique Selling Points.....	57
5.2 PADI’s Certification Requirements for Divers, Instructors and Dive Schools.....	57
5.2.1 Certification Requirements for Divers .....	58
5.2.2 Certification Requirements for PADI Instructors.....	58
5.2.3 Certification Requirements for Dive Schools.....	59
5.2.4 PADI’s Quality Management.....	60
5.3 Quality and Quantity of Environmental Education .....	62
5.3.1 Project Aware .....	62
5.3.2 Environmental Specialty Courses .....	64
5.3.3 Teaching material .....	66
5.3.4 PADI Green Star Award.....	69
5.3.5 PADI’s Perspective on Environmental Education .....	70
5.3.5 Customers Perspective on Environmental Education .....	71
5.3.6 Expert’s Perspective on Environmental Education.....	72
5.4 Responsibilities of PADI towards the Marine Environment .....	73
Chapter conclusion.....	77
<b>Chapter 6: Conclusion and Recommendations .....</b>	<b>79</b>
Chapter summary.....	80
6.1 Conclusion .....	80
6.2 Recommendations for PADI .....	84
<b>References.....</b>	<b>90</b>
<b>Appendices.....</b>	<b>95</b>

## List of Figures

<i>Figure 1: PADI Worldwide Individual Members</i> .....	15
<i>Figure 2: Diver Certification Promotion in Borocay, Philippines</i> .....	20
<i>Figure 3: Technical diver</i> .....	20
<i>Figure 4: Perfect buoyancy of a diver</i> .....	28
<i>Figure 5: Scuba diver feeding fish</i> .....	29
<i>Figure 6: A group of underwater photographers</i> .....	30
<i>Figure 7: Scuba diver touching a blowfish</i> .....	30
<i>Figure 8: Dive magazine</i> .....	36
<i>Figure 9: The correlation between the number of dives per year and the observed and calculated percentage of coral damage recorded from the examined sites around Hurghada, Egypt</i> .....	47
<i>Figure 10: Change over time of hard and soft coral cover</i> .....	48
<i>Figure 11: PADI's Brand Logo</i> .....	54
<i>Figure 12: PADI Certification Courses and educational hierarchy</i> .....	56
<i>Figure 13: Quality Management Flow chart of PADI</i> .....	60
<i>Figure 14: Brand Logo Project AWARE</i> .....	62
<i>Figure 15: Divers very close to marine environment</i> .....	67

## List of Maps

<i>Map 1: The Red Sea</i> .....	45
<i>Map 2: Red Sea dive sites</i> .....	46
<i>Map 3: Famous dive destinations of Egypt</i> .....	47

## List of Abbreviations

AWARE - Aquatic World Awareness, Responsibility and Education

CSR - Corporate Social Responsibility

EEAA - Egyptian Environmental Affairs Agency

EGP - Egyptian Pound

EIA - Environmental Impact Assessment

ESIS - Egypt State Information Service

GDP - Gross Domestic Product

HEPCA- Hurghada Environmental Protection and Conservation Agency

ISO - International Organization for Standardization

LAC - Limits of Acceptable Change

MPA - Marine Protected Area

NAUI - National Association of Underwater Instructors NCS - Natural Conservation Sector

NGO - Non Governmental Organization

PADI - Professional Association of Diving Instructors

RSTC Europe - Recreational Scuba Training Council of Europe

SCUBA - Self Contained Underwater Breathing Apparatus

TDA - Egyptian Tourism Development Authority

UNWTO - United Nations World Tourism Organization

WWF - World Wildlife Fund

# Chapter 1: Problem Analysis



## 1.1 Background Analysis

Diving has been a recreational activity for over 75 years and there has been a significant growth in the number of qualified divers over the last 30 years. Thus SCUBA (Self Contained Underwater Breathing Apparatus) diving became a recreational activity in its own right, with now more than 10 million active divers worldwide, and rapidly growing (PADI, 2007). The rising market demand for diving has caused increasing pressure on the marine environment at a number of destinations. According to Lindgren et al. (2008), divers have been reported as significant factors of disturbance and damage to coral reefs, but are rarely the sole cause of environmental change in the marine environment (Lindgren, Palmlund, Wate, & Goessling, 2008). The increasing popularity of dive tourism has resulted in irresponsible behavior by inadequately trained divers, resulting in the degradation of the marine environment. The responsibility for this lack of training in environmental education and awareness falls on the dive operators and schools (Cater & Cater, 2007). However, little has been written about the responsibility and certification procedures of international dive organizations, and how this might result in negative impacts by divers on coral reefs.

To regulate this recreational tourism activity, there are several dive organizations which train and manage dive tourism. Amongst them is PADI, one of the largest dive organizations, which trains about half of the divers worldwide and thus has a high impact and responsibility within the dive industry. However, research has shown that PADI has little environmental education included in their study material of its certification process, especially for the beginner Open Water course. PADI initiated the Project AWARE (Aquatic World Awareness, Responsibility and Education) in 1992 which aims to '*conserve underwater environment through education, advocacy and action*'. However, it is too little mentioned in the Open Water dive book, thus raising the crucial question as to how much importance is really given to this topic during the certification process of dive schools, instructors and students. (Cater & Cater, 2007)

## 1.2 Relevance and Research Justification

This paper will outline characteristics of the increasing dive tourism industry and its environmental impacts on coral reefs. In order to examine the impacts, an applicable case study on diving tourism in Egypt will be investigated. In addition, the thesis will result in the clarification of environmental impacts on coral reefs due to dive tourism, the reasons for those impacts and how they relate to the environmental education level of certified divers. The results will further outline the environmental education level of certification programs of PADI and possible gaps in the certification and of

available study materials. Finally, the outcome of this research will display concrete recommendations on how PADI can enhance environmental education in their certification policy.

The purpose of this thesis is to research and write about the negative environmental issues within the dive tourism industry, and to demonstrate that there is a high need for dive organizations to sufficiently educate instructors and divers to create a greater environmental awareness. Therefore the work will define solutions and develop recommendations on how PADI could adjust their certification procedures in order to limit the negative environmental impacts on certain dive sites. Consequently, improvements and techniques need to be identified in order to foster environmental education during dive certifications. Final recommendations will focus on PADI's certification criteria and corresponding education systems, which should allow divers and instructors to become more environmentally sensitive while getting certified. The concrete outcomes and recommendations will hopefully be of high interest to PADI, and should be applicable to other international dive organizations as well. PADI can use this information to carry out necessary improvements in this educational program, thus maintaining their credibility as a responsible dive organization. Many divers and their organizations have recognized the increasing pressure on and responsibility towards the marine environment and see the importance of future protection. There is a growing interest in fostering more sustainable behavior, and much of this interest originates in the divers themselves asking for environmental education. Therefore, the results of this study are also relevant to international reef conservation organizations who may use the results for their own work and who could publish parts of the work on their internet site.

### **1.3 Motivation**

The main reason this topic has been chosen is due to my personal experiences making me curious as to how divers affect their environment. While taking my Open Water PADI dive course in 2012 in Ecuador, I came in contact with the diving world and PADI. I am fascinated and passionate about the underwater world and the marine environment, and feel the importance to protect this fragile and vital part of our world. During my dive course, I had some negative experiences with both the dive behavior and the management of dive operators. I witnessed many divers behaving disrespectfully towards the environment, doing things like touching of corals with hands and/or fins. Furthermore, many dive centers think in terms of profit and try to fill up the dive boat at every opportunity. This causes the groups to be so large that dive instructors cannot supervise all divers all the time, leading to inappropriate behavior by divers that cannot be seen and acted on. Furthermore, during the Open Water PADI course, I realized that the educational information included in the course hardly covers any environmental aspects, such as how divers can mitigate their negative impacts on coral reef

systems. Due to those observations, I asked myself if this inappropriate behavior from divers and dive operators might result in an increase in negative environmental impacts on the marine environment and coral reefs. I also wanted to ascertain why some divers behave poorly underwater, and determine if their behavior is possibly due to a lack of environmental education in the certification programs of PADI.

Due to the fact that the marine environment is very fragile and that coral reefs are dying off in many parts of the world, it becomes important that there is an improved environmental education and awareness imbedded in the certification process. Dive tourism is a growing market worldwide, and as it is very easy to receive a diving license through the dive organizations, and as they are the sole guidance that most divers receive on dive ethics, it becomes their responsibility to educate and train appropriate behavior underwater.

#### **1.4 Research Goal and Research Questions**

The research goal is to analyze the environmental impacts of diving tourism on coral reefs with the use of a case study on diving tourism in Egypt and to assess the certification criteria and corresponding education materials of PADI with the help of in-depth expert interviews and a focus group discussion. This research will show if there is a lack of environmental education involved in the certifications process for divers, schools and instructors, followed by offering suggestions on how PADI can improve certification criteria related to environmental education.

The research objective can be summarized as follows: analyze the environmental impacts of diving tourism on coral reefs (research question 1 and 2) with an applicable case study on some dive areas in Egypt, and assessing PADI's present certification criteria and education systems (research question 3) in order to define solutions in the forming of actionable recommendations of how to improve the certification and education systems of PADI (research question 4).

In order to achieve the research goal, the following research questions are used as guidance and direction for the thesis and will be answered throughout the work.

##### **1. What are the characteristics of diving tourism in coral reef areas?**

- a. How can dive tourism be defined and what is its historical context?
- b. How did diving tourism in coral reef areas develop over the years?
- c. What are the European market segments and characteristics of divers' behavior?
- d. What is the importance of dive tourism on a global scale?

- e. What are trends and developments of dive tourism?

**2. What are the environmental impacts of diving tourism on coral reef areas?**

- a. Definition and characteristics of coral reefs?
- b. What are global threats to coral reefs?
- c. What are the positive and negative impacts of dive tourism on coral reefs, and what are the causes for those impacts?
- d. How can the negative impacts caused by dive tourism be reduced?
- e. What are the impacts of diving tourism at a popular dive destination? Case study on diving tourism in Egypt.
- f. What important results can be drawn from the case study?

**3. What are PADI's certification requirements for divers, instructors and dive schools and how are environmental issues included?**

- a. What are the present certification procedures for PADI's divers, instructors and dive schools?
- b. Are those requirements linked to environmental issues?
- c. What is the opinion of experts and qualified divers on the quality of environmental education imbedded in the PADI instructional materials?
- d. What are the social responsibilities of PADI in regards to environmental issues given their dominance in the dive industry?

**4. What are some identified improvements that could be made in the certification policy of PADI that might limit the negative environmental impacts of diving tourism on coral reef systems?**

- a. What are the identified gaps in the certification processes of PADI for divers, instructors and dive schools in regard to environmental issues?
- b. How can PADI improve the certification policy in order to create a higher environmental awareness and education level?
- c. What are the benefits for PADI in improving their certification procedure given that they already dominate the dive industry certification process?
- d. Which methods and techniques can be used by PADI to improve their environmental education?

## 1.5 Methodology

The topic for the work was researched with the help of primary and secondary research. As a method of referencing, the sixth edition of the APA-style was used throughout the whole paper.

### 1.5.1 Secondary Research

Due to the rather theoretical nature of research question 1 and 2 '*What are the characteristics of dive tourism*' and '*What are the environmental impacts of dive tourism on coral reef areas*', and the availability of valuable references on these topics, secondary research was used to reach many of the conclusions. In order to find relevant information on diving tourism, the NHTV library was a very helpful and valuable source. In order to find information about the topic, various books, previous theses, scientific articles, newspaper articles and databases provided much information in answering these research questions. To receive an insight into the impacts of dive tourism, previously written case studies proved to be of high value and were used in the research.

### 1.5.2 Primary Research

Aside from written work, other ways of obtaining valuable information is to conduct in-depth interviews with expert representing the main stakeholder groups and to organize a focus group discussion with recreational divers.

This thesis was written in the city of St. Gallen, Switzerland. Due to the fact that one of the head offices of PADI Europe is located in Switzerland, it was possible to ensure excellent outcomes and quality for the primary research. Being on location enabled smooth data collection and the possibility to conduct a valuable interview with PADI as well as dive schools close to the Bodensee region. With the use of the global communication tool *Skype*, further expert interviews were conducted with conservation managers and dive school owners around the world in order to receive a broader insight into the diving tourism market. A total of twelve interviews were conducted with PADI, Project AWARE, dive schools and dive instructors, and coral reef conservation managers around the world in order to receive in-depth insights into the dive organizations' management and educational structures. PADI was a very important and relevant information source for this work to receive an insight into the education structures of a dive certification organization. In addition, the information received from the dive schools was of high importance to the outcomes to obtain an insight into the perception of dive instructors towards their own certification processes in relation to environmental education. Conservation managers of coral reef areas have also been a valuable source of information of how to find solutions for the future of diving tourism and reef conservation. Appendix

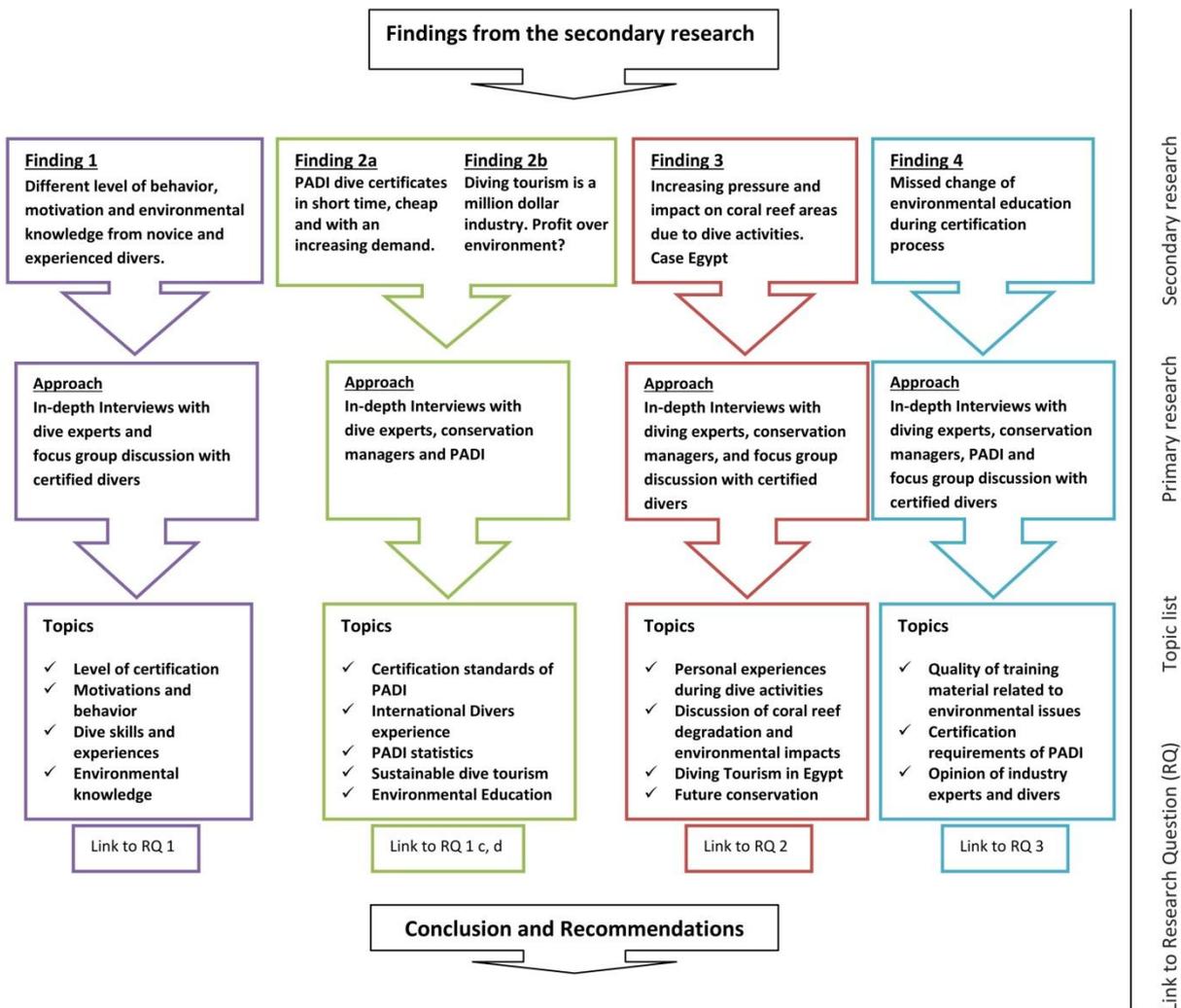
1 lists all of the conducted interviews and background information of the interviewees as well as the topic list of the interviews. The topic list was specifically adapted to each interviewee. All interviews were recorded and afterwards transcribed and evaluated. The outcome of the conducted expert interviews will be discussed throughout the paper. The Interviews were conducted in both languages, German and English. All interview transcriptions can be found in Appendix 12 on the attached CD on the backside of this work.

As another form of collecting qualitative research material, a focus group of certified recreational divers was created whose purpose it was to discuss the issue of environmental education in the dive sport. With this method, it was possible to obtain an insight into the perception of the customer perspective, recreational divers, and their level of environmental education, and to further explore the divers' knowledge and experiences in the dive world. The format of a focus group discussion was very flexible and encouraged interaction between participants. A topic list was designed and sent to the participants beforehand (Appendix 2). In the preparation phase, statements and questions were formulated in order to facilitate a fluent discussion. The use of open-ended questions allowed the participants to share their knowledge and stories in a detailed way. The participants of the focus group, all of Swiss nationality, were invited to a discussion group in the city of St. Gallen, Switzerland. In total, six participants with different levels of dive experience, from beginner to highly experienced, discussed the topic of environmental education within the diving tourism industry. All six respondents share the passion of recreational diving, have international dive experience, are highly educated and are very concerned about the environment. Further information on the participants' background, dive level and experience can be found in Appendix 2. The group size of six participating members allowed good eye contact with each participant and more personal conversations for tracking non-verbal expressions. An assistant was present to help detect the non-verbal expressions and made general observations. The discussion was recorded and a summary was transcribed (Appendix 13 on the attached CD on the backside of this work). The outcome of the discussion will be discussed in chapter five.

### 1.6 Structure of the Thesis

In order to structure the data collection, a conceptual framework was created. The framework will outline the main findings from the secondary research and makes sure that the primary data collection has a clear rationale. In this way the framework clearly demonstrate the coherent link between secondary and primary research. The four main findings resulted from secondary research formed the foundation for the primary research. The framework demonstrates the four main findings and the link to the selected data collection methods the as well as the topics discussed and the relevant link to the research questions.

#### Conceptual Framework



The thesis is subdivided into six chapters, with each chapter providing a small chapter summary at the beginning and a brief chapter conclusion. The first two chapters introduce the thesis topic and discuss relevant theories and definitions.

**Chapter One** (Problem Analysis) is a general introduction and problem analysis for the thesis. The chapter outlines the relevance and research justification, describes the research motivation, discusses the research goal and research questions, explains the methodology and points out the research limitations.

**Chapter Two** (Characteristics of Diving Tourism) defines the relevant terms and discusses the historical development of diving tourism, clarifies the market segments and the importance of diving tourism on a global scale. The chapter concludes with identified trends and development of diving tourism.

The following two chapters focus on the environmental impacts of diving tourism on coral reef systems and its reasons. **Chapter Three** (Environmental Impacts of Diving Tourism on Coral Reefs) defines the relevant terms and looks at the main threats to coral reef areas worldwide. The chapter goes on to briefly discuss the positive impacts of diving tourism, and then concentrates on the negative environmental impacts on coral reef due to diving tourism and on how those negative impacts can be minimized.

**Chapter Four** (Case Study: Diving Tourism in Egypt) is a summary of an applicable case study of diving tourism in Egypt. Its results are used to support the findings presented in chapter three. The case study outlines the current situation of diving tourism in Egypt, its negative environmental impacts on coral reefs and challenges for future coral reef conservation.

**Chapter Five** (Certification Requirements of PADI) concentrates on PADI as the leading dive organization worldwide and analyzes the existing certification requirements for divers, instructors and dive schools. It further outlines the quantity and quality of environmental issues covered in the study material and discusses the responsibility of PADI in the dive tourism market.

Reflecting on what has been written in the first five chapters, **Chapter Six** (Conclusions and Recommendations) summarizes the most important findings, provides answers to the research questions and outlines recommendations for PADI.

## 1.7 Limitations

Acknowledging that this research project was of a very large scope, some limitations were encountered or introduced in order to meet certain deadlines and still obtain valid conclusions. As one example, one of the main limitations was the restricted time period of 20 weeks for researching and writing the thesis.

Another limitation was encountered while conducting secondary research. Finding accurate statistics on dive tourism numbers was challenging due to the fact that most of the resources available are published by PADI and thus show only certification numbers and statistics from PADI certified divers and not for the other dive organizations. This was deemed acceptable within the scope of this paper due to PADI's previously mentioned dominance in the market.

During the primary phase of the research, some unexpected roadblocks were encountered that limited certain aspects of the information gathering process. One of the more important of these limitations was that the contact person of the PADI office in Switzerland was very busy during the period from January to March because of tourism fairs, and the contact and information sharing was very difficult and much of the information was not received until April.

Furthermore, it was surprisingly challenging to obtain information from the dive schools and international conservation organizations. Repeated emails to international organizations and dive schools only resulted in a small number of replies, thus limited the amount of in-depth interviews.

## Chapter 2: Characteristics of Diving Tourism



## Chapter summary

**The following research question will be answered in this chapter:**

- ✓ What are the characteristics of diving tourism in coral reef areas?

This chapter defines the term “diving tourism” and outlines the historical context of that activity. Furthermore the chapter gives an insight into the development of diving tourism in coral reef areas and defines the market segment. The chapter continues to discuss the importance of diving tourism on a global scale and summarizes the main trends and development in the diving industry. By the end of the chapter, the research question: *What are the characteristics of diving tourism in coral reef areas* will be answered. This chapter is mainly based on primary research, but some secondary research was also important in forming several outcomes.

### 2.1 Defining Diving Tourism

Most academic studies and reports on diving tourism do not provide an explicit definition of diving tourism (Santander-Botello & Propin-Frejomil, 2009). According to the World Tourism Organization (WTO) scuba diving tourism can be defined as follows:

*“persons travelling to destinations with the main purpose of their trip being to partake in scuba diving. The attraction of the destination is almost exclusively related to its dive quality rather than any other factor, such as the quality of accommodation or land-based attractions.”*

(WTO, 2001, p. 85)

However, according to Garrod & Gössling (2008), this definition raises more issues than it clarifies and certain aspects need to be further distinguished. For one thing, the individual’s travel motivation tends to vary considerably. On one end of the scale is the dedicated diver who will make the choice of holiday timing and destination largely based on the quality of dive locations. On the other end of the scale will be the occasional diver for whom the timing and destination choice have little to do with the opportunity to dive (further explanation can be found in 2.4 *European Market Segments*).

Secondly, diving is not an activity that is undertaken exclusively by tourists. As the WTO (2001) acknowledged, only one in three scuba divers regularly take an overseas diving holiday. The remainder choose to dive either close to home, on a day trip basis or as a domestic trip over a period of several days. This latter group would fall into the dive tourist category because they travel away from their residence in order to undertake dive activities. Thirdly, diving tourists are not just interested in scuba diving but also in other underwater activities such as free diving, snorkeling,

*snuba* (a cross between scuba and snorkeling where the participant breathes air from air tanks that are attached to a raft on the surface of the water) and the use of *rebreathers* (enabling the user to rebreathe their exhaled air in a closed or semi-closed system to avoid bubbles). Thus individuals could go on a trip where they mix scuba diving, snorkeling, and other dive sports. Given the possible variations in dive activities, Garrod & Gössling (2008) offer a conceptual definition of diving tourism as follows:

*“Diving tourism involves individuals travelling from their usual place of residence, spending at least one night away, and actively participating in one or more diving activities, such as scuba diving, snorkelling, snuba or the use of rebreathing apparatus.”*

(Garrod & Gössling, 2008, p. 7)

That second definition includes more than one characteristic of dive tourism and thus might be more applicable for the purpose of this paper. However, it can be concluded that there is no clear definition of diving tourism due to its diverse characteristics.

## **2.2 Historical Overview of Diving Tourism**

Human involvement with the underwater environment has a long history, and diving has been a recreational activity for at least 75 years. Pearl diving, underwater warfare and deep salvage have been carried out for centuries by divers who relied on the ability to hold their breath (Dimmock, 2007). In the 1930's, sport divers in the Mediterranean were documented hunting fish by holding their breath, although they were undoubtedly not the first humans to carry out this practice. Basic forms of diving such as *free diving* (or *breath-hold* diving) and *snorkeling* requires minimum equipment, usually only a mask, snorkel and fins, whereas scuba diving requires portable air supplies to remain underwater for a longer period of time and to potentially attain greater depths. The acronym SCUBA stands for *self-contained underwater breathing apparatus* and has become the generic term to describe diving with air support (Garrod & Gössling, 2008). The first safe and reliable prototype equipment for scuba diving was developed by Jacques Cousteau and Emile Gagnan in 1943. The growth of underwater recreational activity was aided by the first publication of *Skin Diver* magazine in 1951, promoting underwater photography and dive travel. In 1960 the *American National Association of Underwater Instructors (NAUI)* became the first international training organization to certify divers worldwide, followed by the *Professional Association of Diving Instructors (PADI)* in 1966, both originating in the USA (Wognum, 2005).

Today, scuba diving is a multi-million dollar industry and is one of the fastest growing recreational sports. Over time, scuba diving has grown from being a sport pursued almost solely by adventurers, to one considered to be a very mainstream activity and featured as a popular holiday activity, especially in tropical and subtropical areas (Musa & Dimmock, 2012). According to PADI (2011), the global number of certified divers in 2008 was 17.8 million, compared with 2.5 million in 1988.

### **2.3 Development of Diving Tourism in Coral Reef Areas**

Within this work, a focus has been set on the diving tourism activities in coral reef areas due to the fact that the majority of growth in scuba diving activity has occurred in tropical environments, where clear and warm waters as well as diverse geophysical and biological features of coral reefs provide attractive settings. In fact, coral reefs in any tropical location provide a major impetus for tourism development that support dive and snorkel activities (Dimmock, 2007). The majority of *world-class* diving destinations are located in tropical regions due to the fact that the majority of reef building corals are found within tropical and subtropical waters. Additionally, reef-related tourism is increasing rapidly, growing at a rate of 20% per year. The Caribbean attracts about 57% of the world's 10 million active SCUBA divers and in 2005, diving generated about US\$1.2 billion annually (Cesar, Burke, & Pet-Soede, 2003). Other famous dive hotspots are located in the Caribbean, Indian and South Pacific Oceans and the Red Sea. The countries that are especially popular are Egypt, Australia, South Africa and Thailand (Scuba Travel, 2012).

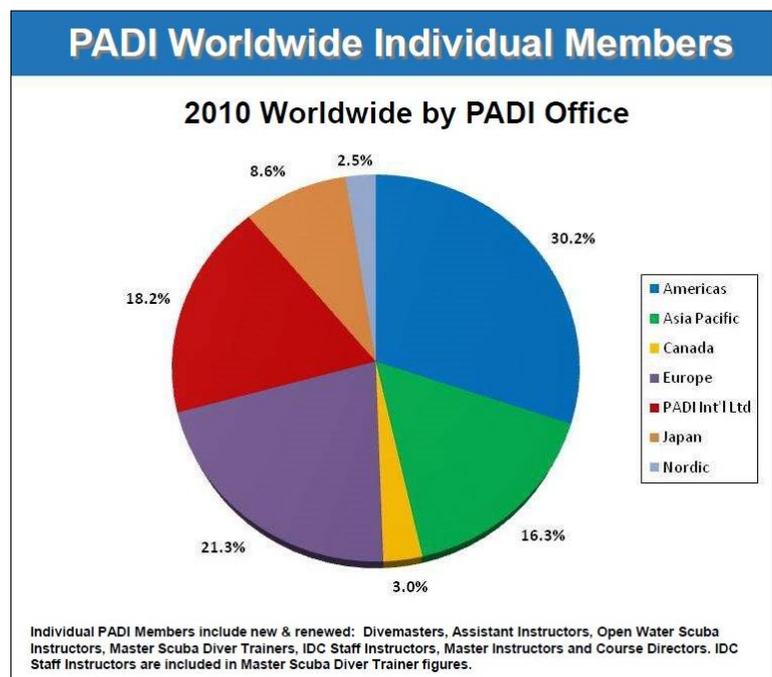
Comparing the world map of coral reef occurrence with a world map of famous international dive spots, it can be seen that most of the dive spots are also in coral reef areas (Appendix 3). Worldwide, coral reefs are famous due to their colorful, diverse and beautiful marine life, and are attracting an increasing numbers of scuba divers (Garrod & Gössling, 2008). A typical dive site is a marine location less than 30 meters in depth with impressive underwater scenery and a high biological diversity (Rouphael & Hanafy, 2007). For those rich and intact marine environments, divers are attracted to the beauty and comfort of diving in tropical environments, and spend their money on dive activities, associated accommodations and other tourist activities located in the area. Therefore, over the last 20 years, many tropical countries have developed significant scuba dive industries in order to satisfy the dive demand and increased revenue from diver presence (Dearden, Bennett, & Rollins, 2007). The result of the increasing demand for dive tourism in coral reef areas has caused an increasing and unpredictable rate of reef damage (Hodgson, 1999). This topic will further be discussed in Chapter 3 *Environmental Impacts of Diving Tourism in Coral Reef Areas*.

## 2.4 European Market Segments

As previously mentioned, diving tourism markets are extremely diverse and thus very difficult and complex to identify. Divers are not homogenous in terms of their motivations, satisfactions and characteristics (Dearden, Bennett, & Rollins, 2007). They vary widely according to their demographics, backgrounds and socio-economic status, their previous experience of diving and aspirations for the diving holiday, their needs and expectations and in many other aspects (Garrod, 2008). This subchapter concentrates on the European market profile as the this dive market is very important for PADI due to the fact that Europeans are the worldwide leading travel group in tourism (Wantke, personal communication, April 25, 2013).

### *Market Profile for Europe*

According to the *Recreational Scuba Training Council of Europe* (RSTC Europe), there are approximately 3 million active European divers, and an estimated 825,500 tend to travel to certain dive destinations while on holiday each year. The WTO (2001) suggests that one in three scuba divers regularly take an overseas holiday. During an average length of stay of 10 days, the European divers' expenditures from dive travel can, on average, mount up to around 2,800 million Euros (RSTC Europe, 2012).



Approximately one third of the 950,000 PADI certifications each year are completed by this group. Europe contains the second largest group of certified divers, after America, with 21% of the total worldwide memberships (Figure 1). (PADI, 2011)

Thus, the Europeans have a large market share of to the total dive market and are therefore very important to for PADI for two reasons. On the one hand, the domestic dive tourism has the important role of keeping divers actively involved in the sport and in their skill development, as well providing motivation to other prospective divers to become active in the sport. On the other hand, Europeans are one of the leading travel groups worldwide, and the large numbers of both local and

international divers has the result of causing dive organizations to focus on Europe as one of their strongest markets. (Wantke, personal communication, April 25, 2013)

The following list provides a summary of the dive certification numbers of all dive organizations registered in Europe, and demonstrate the high volume of dive activities and certifications. During 2006, RSTC Europe recorded following numbers of certified divers for Europe:

- Entry Level Certificates: 191,848
  - Advanced Level Certificates: 126,554
  - Number of Active Instructors: 14,514
- (RSTC Europe, 2012)

### ***Socio-demographic Profile***

Internationally speaking, and with a growing number of people traveling for the purpose of scuba diving and snorkeling, the market profile is quite dynamic. Age characteristics, for example, are highly dependent upon the destination choice. For example, visitors traveling to Byron Bay, Australia, are typically in the age range of 20-30 years old, whereas the visitor profile of the Great Barrier Reef in Australia represent visitors of three age groups: 20-30 years old, 30-39 years old and 40-49 years old (Dimmock, 2007). Overall, many surveys of divers suggest that it is a sport dominated by those in their 30's and 40's (Garrod & Gössling, 2008; Haden, 2007), which is probably related to the high cost of the sport, as demonstrated in the following paragraphs.

Scuba diving tends to attract participants who are highly educated. Statistics from PADI show that 80% of newly qualified Open Water divers have a college degree. This dominance by highly educated individuals, and who consequently have a higher-than-average income, has been linked to the high cost of certification and participation in the sport by several studies. The WTO (2001) for example, suggests that 78% of international diving tourists have full-time employment (Garrod & Gössling, 2008). This is undoubtedly related to the fact that diving is a rather expensive hobby. A single day dive costs between 50 and 100 Euros, adding considerably to the additional costs of a holiday (Cater & Cater, 2007).

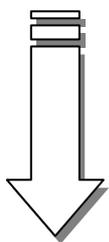
Scuba has traditionally been a male-dominated sport. Tourism Queensland (2006) claims that two-thirds of all divers certified by PADI are male. However, the male-dominated image of scuba diving is changing slowly and is reflected by the growing female participation in diving tourism (Garrod & Gössling, 2008). The worldwide statistic report from PADI confirms that scuba diving is still mostly male dominated, however, with 66% male and only 34% female participation in 2012. This number has not noticeably changed over the last few years. (PADI, 2011)

Finally, Garrod & Gössling (2008) also explain that diving tourists, as a group, are relatively more experienced than certified divers in general. Studies at different dive destinations show that most of the dive participants have a high level of dive experience, with only a small percentage of beginners participating as dive-oriented tourists.

In conclusion, it is not possible to clearly define a specific socio-demographic profile for divers due to different participation levels, qualifications and motivations, other than by stating that the average dive tourist is likely to be a fully employed college-educated male in the age range of 20 to 50 years old.

### ***Dive Motivations***

Garrod & Gössling (2008) argue that divers vary considerably in terms of their motivations, and it is thus possible to distribute diving tourists along a scale according to their principal motivations. At one end would be the *mainliners*, for whom the prime motivation would be diving, while at the other end of the scale would be the *sideliners*, who are primarily going on holiday for non-diving reasons, but who might use the possibility to dive. As the European dive tourists cannot be considered as one group, Haden (2007) summarizes the three main types of European divers below:



**sideliner:** combines diving with a family holiday or holiday with non-divers and buys a dive package.

**mainliners (short-haul destination):** travels only for diving, usually in groups with clubs or friends; likes proximity and convenience in air connections

**mainliners (long-haul destination):** generally well off, keen to dive during a long-haul holiday or travel long-haul just to dive

Clearly, most dive tourists might not cleanly fit into one of those categories, and are probably located somewhere between the extremes. But those three types of European diver categories do illustrate the diverse interest and motivation of European dive tourists.

Garrod & Gössling (2008), however, argue that in order to understand the continuum of dive motivations it is further necessary to distinguish between *fanatics* and *dabblers*, *experienced* divers and *novices*, *high quality* divers and *try* divers, *specialitics* and *generalitist*, *marines* and *socialisers*, *independent* and *group* divers, *leanders* and *enjoyers*, as well as *homies* and *remoties* (Garrod & Gössling, 2008). An explanation of these suggested continuums can be found in Appendix 4.

Rice (1992) has another way to categorize scuba divers into three groups according to their level of participation with the activity, which also influences the choice of destination, as identified in Table 1.

<b>Potential</b>	Experience scuba if it is available at destination
<b>Tourist</b>	Undertake scuba on vacation and select destination where scuba is available
<b>Hard Core</b>	Choose destination based on quality of diving conditions

**Table 1: Scuba Diver Categories** (Adapted from Rice, 1992; cited in Dimmock, 2007, p. 132 )

The three categories in the table can also be linked to a finding by Meisel-Lusby and Cottrell (2008) which confirm that motivations, expectations and satisfaction change as divers become more specialized in the dive sport and progress from novice to expert level.

Another way to understand the divers' motivation can be on the basis of Csikszentmihalyi's (1988) *flow* concept. This is the idea that divers are on a quest for flow experiences, which is the need to match advancing skills with increasing challenges and adventures. The need for challenge and adventure can be viewed as a need for self-actualization. According to Csikszentmihalyi (1988), challenge is a result of personal goal setting, thus causing the person to engage in increasingly challenging water-based experiences. Adventure is associated with moving beyond a personal comfort zone and the testing of personal abilities. The outcomes of the challenges and adventures are feelings of accomplishment and self-satisfaction. (Jennings, 2007)

In conclusion it can be said that divers are not homogenous in terms of their motivations, satisfactions and characteristics. Opportunistic divers will take advantage of a dive location if it happens to be near them, whereas specialized divers tend to have particular requirements, and if the dive site does not meet those requirements, their satisfaction level is generally lower than the less-specialized divers. (Dearden, Bennett, & Rollins, 2007)

## 2.5 Importance of Diving Tourism on a Global Scale

As already discussed above, in recent years the continuous growth and development of the diving industry on a global scale has greatly increased the number of certified divers and dive activities around the world. And according to Jennings (2007), that growth in popularity of diving and snorkeling is set to continue. Along with an increase in education and wealth levels worldwide, one of the reasons for this increase in diving tourism is that it is now possible to learn to dive in almost any location in the world and to become qualified in a relatively short period of time (Garrod & Gössling, 2008).

Estimates show that the international diving tourism market was worth 4 to 7 billion Euros in 2000, and that those numbers are on the increase. The *United Nations World Tourism Organization* (UNWTO) estimates that the global diving tourism industry generates around 8 billion Euros per annum (Haden, 2007). An example from the Cayman Islands demonstrates the economic importance

of diving tourism. In 1993, the Cayman Islands generated about US\$ 280 million from general tourism. Of this, US\$ 84 million was spent by divers for diving and non-diving related activities (Cesar, Burke, & Pet-Soede, 2003). The example of the Cayman Islands demonstrates the importance of diving tourism as a source of income, particularly as a percentage of the total economy of a relatively poor country. However, it is difficult to detect the economic value of the global dive industry because each destination is different and there are no reliable statistics available.

The UNWTO report also indicates that one in four divers are constantly searching for new dive locations, and thus more and more areas around the world are recognizing this diver-generated need and are attempting to tap into the diving tourism market and establish themselves as international dive destinations. This trend can be explained by different factors, among them being on increasing interest in the marine environment, the search for new and adventurous leisure activities as well as cheaper and easily accessible tourism destinations offering diving possibilities. (Garrod & Gössling, 2008)

In addition to that, diving tourism is seen as an important income generator, especially for emerging tourism industries found in areas such as Belize and the Philippines. A number of Asian-Pacific and Caribbean national tourism organizations stated that diving is an essential component of their tourism marketing strategy. (Haden, 2007)

Despite this emphasis and growth, diving tourism alone generates less than 1% of all international inbound arrivals each year and therefore remains a niche tourism market and reflects a relatively small part of the global tourism industry. However, diving tourism is a very important activity for destinations in tropical and subtropical areas with marine environments, with both the monetary benefits and negative impacts being focused in those areas.

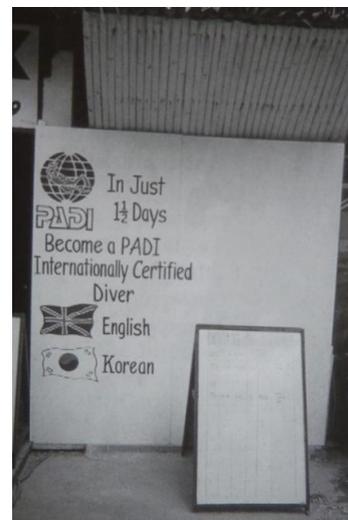
## **2.6 Trends and Development of Diving Tourism**

As discussed above, the growth in popularity of scuba diving is set to continue. The increasing popularity of marine activities has the result of increasing the coastal tourism development. According to Jennings (2007), the better accessibility and increasing income, together with the packaged diver education available at many destinations, are features of an *“industry that caters to heterogeneous global diving markets”* (Jennings, 2007, p. 140). The diving industry continues to reduce the perception of risk involved with diving activities through the promotion of appealing, affordable and uncomplicated dive products. This high demand for marine activities results in the need for a deliberate strategy for marine management. Jennings (2007) argues that the existence of

marine management areas will become a central role in the debate of the quality of natural resources.

One striking trend in the dive industry is the low number of divers who get involved in an advanced diving course. According to industry experts, around 70 % of certified divers do not continue with further education. This reflects the growing number of tourists who undergo a dive certification course while on holiday, and then continue diving on an irregular basis, perhaps only once a year again on holiday. Consequently, those divers do not have the opportunity to practice their dive skills and will probably never achieve routine experiences underwater and go on to achieve higher levels of diver certification (Haden, 2007; Noack, personal communication, January 18, 2013).

Another trend in diver certification that is important to this study is an increasing tendency from dive resorts and centers around the world to certify divers in a short period of time, with divers obtaining their beginner Open Water certification in as little as three days. This burgeoning number of novice divers with minimal training raises questions about the quality of the education they receive. According to critics, these short courses can lack important educational and safety components, suggesting that dive training organizations are putting profit before safety and education (Haden, 2007; Cater & Cater, 2007). An example from the Philippines demonstrates this issue. In Borocay, it is possible to obtain a PADI certification in only 1.5 days (Figure 2). Locals are voicing concern over damage to the



**Figure 2: Diver Certification Promotion in Borocay, Philippines (Source: Cater & Cater, 2007)**

coral reef that result from poorly trained divers. “*The beaches are crowded with divers who step on the coral [...] diving operations are only thinking about profits and filling up their boats*” (Cater & Cater, 2007, p. 28). Thus, irresponsible behavior is often due to inadequately trained and



**Figure 3: Technical diver (Source: Nautic dive, 2013)**

environmentally unaware participants. Consequently, beginner or newly-trained divers are most likely to damage fragile coral reefs.

According to dive experts, another trend during the last four to five years is the increasing popularity of *technical diving* (Figure 3). The so called *tec diving* is a form of scuba diving that exceeds the conventional scope, in terms of

depth, bottom time and type of diving. It requires specialized equipment such as long fins and the use of more than two tanks. Participants of this dive trend to have the desire to experience new challenges underwater. According to Berecke-Queisser (personal communication, February 2, 2013) those technical divers move like *dinosaurs* underwater and due to the heavy equipment can also cause more accidents. Since divers tend to mimic the behavior of their dive leaders, more and more novice divers are attempting this type of diving (Krüger, personal communication, February 4, 2013).

Another somewhat contrary trend, according to Westphal (personal communication, February 2, 2013) and Berecke-Queisser (personal communication, February 2, 2013), is the design of dive equipment to become lighter and more flexible. This is partly done for tourism purposes in order to make it more convenient for divers to move to locations around the world and take their own equipment. Berecke-Queisser (2013) considers this a positive trend because there is no need to always have heavy and inflexible equipment. Krüger (personal communication, February 4, 2013) also thinks that smaller fins, for example, would be better for the environment in order to minimize the divers' physical contact with delicate coral reef organisms and structure. However, the demand for smaller fins in the dive industry does not exist due to their perceived inefficiency at moving a diver through the water.

## **Chapter conclusion**

The chapter discussed the main characteristics of diving tourism. A diving tourist can be defined as an individual that travels to a certain destination and spends at least one night away and actively participating in one or more diving activities. The chapter outlines the growth of scuba diving, currently a multi-million dollar industry and one of the fastest growing recreational sports. Entering the dive sport is relatively easy and possible at many destinations, facilitated by the widespread global presence of PADI, and thus global numbers of dive certifications are growing rapidly with every year. Diving tourism is a very important activity for destinations in tropical and subtropical areas with marine environments and as an essential income generator, especially for emerging tourism industries. Diving tourism development has occurred especially in coral reef areas due to its warm climate and tropical environment but also the variety of marine life. The majority of *world-class* diving destinations are located in tropical regions with coral occurrence. It is difficult to define a specific market segment for the dive tourist, as they are not homogenous in terms of their motivations, satisfactions and characteristics. They vary widely according to their demographics, backgrounds and socio-economic status, their previous experience of diving and aspirations for the diving holiday, their needs and expectations and in many other characteristics. The chapter outlined some important trends and developments in the dive sport industry. One trend that is of significance

to this study is that according to industry experts, around 70 % of certified divers do not move beyond the beginner Open Water certificate. These are mostly dive tourists who go on holiday once or twice a year and do not have the opportunity to practice their dive skills. Another important trend for this paper is the possibility for a person to get certified in a relatively short amount of time, and in some destinations, at reasonable prices. This makes it is relatively easy for tourist to complete a dive course while on even a short holiday.

# Chapter 3: Environmental Impacts of Diving

## Tourism on Coral Reefs



## Chapter summary

**The following research question will be answered in this chapter:**

- ✓ What are the environmental impacts of diving tourism on coral reefs?

This chapter defines coral reef areas outlines the importance of those ecosystems and discusses the main threats to coral reefs. Apart from the more global threats, diving tourism is seen as an important factor in reef degradation. The term “diving tourism” has been discussed in chapter 2.1 *Defining Diving Tourism*, , and can be defined as the act of an individual traveling to a specific destination and spending at least one night away and actively participates in one or more diving activities (Garrod & Gössling, 2008). This chapter will outline and shortly discuss the positive impacts of diving tourism, such as increased economic income and employment. Then this chapter will discuss the negative environmental impacts of the sport and looks at the reasons for those impacts. Diving tourism can have both direct impacts on reef systems, such as diving, snorkeling, and anchoring of boats, but can also have indirect impacts, such as sport-associated resort development, and sewage disposal. This chapter concludes with some ideas on how to minimize negative environmental impacts and answers the research question: *What are the environmental impacts of diving tourism on coral reef areas*. Primary as well as secondary research was used to write this chapter.

### 3.1 Definition of Coral Reefs

Coral reefs are one of the most diverse, productive and ecologically valuable ecosystems on earth. Over 40% of the total coral reefs area is found in South-East Asia, thus this region is of special importance, both due to its quantity of reef and the high biodiversity found there (Dearden, Bennett, & Rollins, 2007; Santander-Botello & Propin-Frejomil, 2009). The *National Oceanic and Atmospheric Administration*, as part of its definition of coral reefs, states that they are “*unique as the largest and most complex structures on Earth of biological origin*”. It is pointed out that while their total area is less than 0.2% of the sea surface, coral reefs host almost 30% of all the marine biodiversity. Coral reef structures are restricted to marine waters with warm and mild temperatures, hence their localized presence in only parts of the world (Keeney, 2008). Being one of the most complex ecosystems on the planet, coral reefs are home to more than 4,000 species of fish, 700 species of coral, and thousands of other plants and animals (Coral Reef Alliance, 2013). Five hundred million people are dependent upon reefs for food, coastal protection and tourist income, and thus healthy coral reefs are extremely important (Santander-Botello & Propin-Frejomil, 2009).

### 3.1.1 Main Threats to Coral Reefs

Coral reef degradation started to be recorded in the 1980s. With the help of the program *Reef Check*, more than 1000 reefs were studied between 1997 and 2001, with the finding that coral cover in reef surfaces has dropped to 32% of its original value, and that many species of fish showed greatly reduced numbers or even disappeared altogether (Santander-Botello & Propin-Frejomil, 2009). According to the last edition of *Status of Coral Reefs of the World 2008*, 19% of the world's coral reefs have already been lost, while another 15% are under serious threat to disappear in the next 20 years (Wilkinson, 2008). *ReefBase*, a global information system for coral reefs, has published world maps illustrating which coral reef areas are most at risk. The first world map from 2011 (Appendix 5) shows the different coral reef areas under the greatest threat. The second world map (Appendix 5) illustrates the situation that might exist in 2050, and demonstrates that the situation will potentially worsen tremendously, and that increasing areas of coral reefs are under threat. Additionally, comparing the two maps shows that many sites move from a *low threat* status to *high threat* status in that time, especially in South-East Asia and Australia. (ReefBase, 2012)

Coral reefs have been used by humans as recreational areas for many years, and that increasing amount of human activity has been damaging the environment at a growing and unpredictable rate (Hodgson, 1999). There is a poor understanding of how this ecosystem responds to human activities, especially on a regional or global scale. Hence, according to Hodgson (1999) there is an urgent need to provide an annual, comprehensive assessment of reefs in order to compare changes over time in individual reefs and between reef areas.

Many recent surveys and studies have confirmed the extent of coral reef degradation, especially in the region of South-East Asia. Despite their exceptional values, coral reefs are globally facing anthropogenic stresses from human activities such as coastal development, pollution, destructive fishing methods and over-fishing, coral mining, anchor damage, increased ocean temperatures and tourism (Ong & Musa, 2011; Dearden, Bennett, & Rollins, 2007). According to Krüger (personal communication, February 4, 2013), the two main threats for coral reefs are the possibility of ocean temperatures rising above 32° C due to global warming, and the pollution of reef areas by sewage and other forms of pollution. However, Krüger (2013) points out those specific divers have little influence on those global issues.

Nevertheless, according to the *Coral Reef Alliance* (2013), careless tourism development and behavior is also an important threat for coral reefs. Resorts that empty their sewage directly into the ocean and manage their waste poorly contribute to coral reef degradation. In addition, careless

boating, diving, snorkeling and fishing can damage reefs as well, as when people grab, kick, walk on, or stir up sediment in the reefs. Corals are also harmed or killed when people drop anchors on them or when people collect coral. (Coral Reef Alliance, 2013)

Coral reefs do face various overarching global threats related to global climate change and natural disasters. However, it has been documented that human impacts play a crucial role in the degradation of coral reef areas. This is easily confirmed by comparing reef systems close to human populations with those in more isolated areas. The lower populations of humans result in lower pressures on the reefs from both pollution and fishing. (Wilkinson, 2008)

As a result, a crucial action for future reef conservation is the development of economic incentives for reef protection. According to Dearden et al. (2007), scuba diving could be one potential activity to provide incentives for reef conservation (further information is presented in Chapter 3.2 *Positive Impacts of Dive Tourism*). Meisel-Lusby & Cottrell (2008) also argue that the natural environment is a core aspect of marine tourism experiences and that there is a strong need to protect these resources in order to attract dive tourism. Thus, this issue will hopefully alert business owners and the dive industry to act accordingly.

### **3.2 Positive Impacts of Diving Tourism**

Dive tourism in coral reef areas is a source of economic income and employment, especially important for undeveloped countries. Studies show that, on average, countries with coral reefs areas derive more than half of their gross national product from coral reefs industries such as scuba diving, snorkeling and other marine tourism activities. (Coral Reef Alliance, 2013)

Literature review has revealed that scuba diving can substantially damage coral reefs (Barker & Roberts, 2004), as explored in the next section of this paper. However, as already mentioned, scuba diving could also provide incentives for reef conservation (Dearden, Bennett, & Rollins, 2007). Divers are attracted to spend their money in rich and intact marine environments, and if the local populations financially benefit from diving tourism, it may be in their best interest to conserve those coral reefs. However, those reef conservation programs need effective management (Dearden, Bennett, & Rollins, 2007). In addition, Barker & Roberts (2004) point out that there are other positive aspects of diving tourism. The economic gain from user fees can help to pay for reef conservation projects. Marine parks such as *Saba* and *Bonaire* in the Caribbean, and in many other countries of the world, have a fee system that may allow their conservation efforts to become self-financing. However, fee collection does not necessarily exclude the destruction of the coral reefs, which

depends, aside from the larger global issues, on the level of the tourism and fishing pressures, and on the effectiveness of the conservation efforts. (Barker & Roberts, 2004)

Personal communication with experts involved in coral reef conservation projects confirm the fact that there is a high interest in the diver population to protect and conserve the marine environment. Sanow (personal communication, March 1, 2013) says that he knows from personal experience that there are a lot of divers who are interested in reef conservation and are also willing to act on those feelings. As an example, he described a once-a-year beach cleanup organized by specific dive schools in Indonesia that are highly popular. They fill up five boats with approximately 300 people who scuba dive and snorkel in order to clean up the beach and shallow reef areas. *“They have a huge participation rate, so I know that there is interest for those kind of activities. Most divers are willing to invest time and are interested in the outcomes.”* (Sanow, personal communication, March 1, 2013). This high participation rate shows that there are divers who care about the reef and that this group actually has the power to make a difference.

Vic Ferguson, the founder and president of the NGO *The World Federation for Coral Reef Conservation* (WFCRC), is involved with the *Long Term Diver Participation Program*, which is a coral reef conservation program directed specifically at divers. This program of long term participation begins with challenging the diver to perform various data gathering tasks during a dive, including recording such factors as the health status of the coral and the ambient water temperature. The data gathering by divers is standardized to have credibility when shared with other marine interest around the world. All data gathered by the WFCRC divers is entered into a geo-database, and has the divers' names attached to the data for future associations. This information provided by each diver will demonstrate their expertise as well as serve as a dive log, accessible online by other divers. This program gives every diver the possibility to get actively involved with coral reef conservation. Ferguson (personal communication, March 13, 2013) is convinced that divers can play a crucial role in coral reef conservation and that they have the possibility for sharing the message about declining coral reef health.

*“Divers are consumers of ocean resources as this is the marine environment they are involved in. The ocean is a fragile area and needs to be maintained. Therefore, divers are conservationist just by the very nature of their sport. This group will be most likely to engage in conservation efforts.”* (Ferguson, personal communication, March 13, 2013)

This program is in an early stage, and Ferguson (2013) explained that they plan to contact dive schools as well as international dive training organizations, as very important stakeholders, in order to

build up a larger network of participants for the program. The community of divers is growing from day to day, and the program is constantly receiving new dive contacts who are interested in participating.

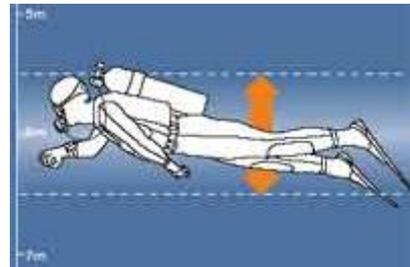
### 3.3 Negative Environmental Impacts of Diving Tourism

Various studies and literature on dive tourism have identified the negative environmental impacts of that activity on coral reefs. Although diving is less damaging than some of the other more global threats to coral reefs, a significant amount of literature indicates that diving is indeed an important source of reef damage. At certain destinations, such as the Caribbean Bonaire Marine Park and some dive sites in Egypt, diving was determined to be the major direct cause of reef degradation (Dearden, Bennett, & Rollins, 2007; Coral Reef Alliance, 2013). This brings up the important point that when discussing the negative environmental impacts of diving tourism on coral reefs, it is important to distinguish between the direct and the indirect impacts.

#### 3.3.1 Direct Impacts

##### *Diver's Behavior*

As one of the direct impacts on a reef, the diver's behavior itself can have a significant role in the damage of coral reefs. Divers can injure corals and other organisms through direct physical contact with hands, body, equipment and fins (Rouphael & Hanafy, 2007). This is a problem especially with novice divers who often do not know how to maintain neutral buoyancy, and thus damage coral reefs by holding, trampling, and kneeling on coral, as well as kicking it with fins and hitting the coral with loose equipment (Ong & Musa, 2011). The diver is supposed to have neutral buoyancy and a horizontal position (Figure 4) while



**Figure 4: Perfect buoyancy of a diver**  
(Source: PADI 2013)

diving, in order to minimize contact with coral reefs or raise sediments. However, many novice divers have difficulty finding the perfect buoyancy and consequently crash into the reefs, thus disturbing marine life such as corals and fish species through direct physical contact (Ong & Musa, 2011). Coral reefs are very fragile and vulnerable to damage, either directly or indirectly. Thus, divers' direct physical contacts, intentionally or accidentally, will cause serious harm to the coral reef structures (Ong & Musa, 2011).

Studies have shown that the majority of divers (70- 90%) have a least one contact with coral reef during a dive (Ong & Musa, 2011; Barker & Roberts, 2004). According to Krüger (personal

communication, February 4, 2013), coral reefs are able to tolerate small amounts of physical damage, and one diver touching the coral is not the problem. However, the numbers of divers that visit certain popular areas is causing significant accumulated damage. Roupael & Hanafy (2007) also point out that repeated physical injury on a reef can impair the regenerative capacity of larger corals, potentially leading to entire colony mortality.

The *Coral Reef Alliance* summarizes the divers' actions that result in degradation of coral reefs:

- ✓ touching and crushing organisms
- ✓ stirring sediment
- ✓ handling and harassing wildlife
- ✓ providing artificial food to wildlife (Figure 5)

(Wilson, 2004, p. 33)



**Figure 5: Scuba diver feeding fish (Source: Petr Kratochvil, 2013)**

A study in Australia concluded that a lack of environmental awareness by divers contributes to a great number of impacts on the reef environment (Dearden, Bennett, & Rollins, 2007). Krüger (personal communication, February 4, 2013) mentioned that most of the novice divers have contact with the coral due to unskilled movements and clumsiness, whereas advanced divers demonstrate “*consciously careless behavior during deliberate activities*” such as taking pictures. However, most diver-related impacts are often simply the result of tourists being unaware and uneducated about the fragile nature of coral reefs. Learning more about coral reef ecology generally makes divers more conscientious about impacts to the marine environment, thus indicating a strong need for a more environmentally sensitive education. Novice divers most likely contact coral reefs due to poor control of their buoyancy and the clumsiness operating in a new environment with unfamiliar equipment. According to a study from Barker & Roberts (2004), most contacts, 81%, appeared unintentional and to be caused by poor swimming techniques and incorrect weighting. This can be a result of the fact that most divers rarely move beyond their novice certification and thus cannot establish a solid dive technique (Wilson, 2004). Thus, improved training could greatly reduce this source of destruction (Auendorf, personal communication, February 14, 2013).

### ***Underwater Photographer***

As briefly mentioned above, the practice of underwater photography (Figure 6) is seen to cause an increased level of reef damage. During an underwater competition in the Maldives, Noack (personal communication, January 18, 2013) witnessed underwater photographers deliberately intoxicating fish in order to get a good photo, as well as demonstrating other generally disrespectful underwater behavior. Other dive experts have confirmed the fact that the underwater photographers do not behave according to accepted best-practice dive standards and thus are far more likely to contact the reef and cause coral breakage. Often those divers are holding onto or kneeling on the reef to take pictures. (Barker & Roberts, 2004)



**Figure 6: A group of underwater photographers**  
(Source: Nigel Wade, 2012)

### ***Uneducated and/or Unconcerned Dive Instructors***

Another issue resulting in negative environmental impacts are dive instructors who are environmentally unaware and act as a negative underwater role model. Auendorf (personal



**Figure 7: Scuba diver touching a blowfish**  
(Source: Animal Wallpapers, 2012)

communication, February 14, 2013), for example, witnessed a guide in Bali who touched a blowfish with a stick in order to show the divers how the fish inflates (Figure 7). This is a common activity by dive instructors to amuse a dive group. However, having a biological background, Auendorf (2013) goes on to state that this is highly stressful moment for the blowfish and that this stress could result in the death of the fish. Some dive instructors might not be aware of the fact, and, according to Auendorf

(2013), there is a general lack of environmental education, awareness and respect found in that group. Other studies confirm the irresponsible behavior of dive guides in respect to the marine environment, done in many cases, to satisfy their customers and perhaps receive larger tips (Wognum, 2005). The actions of such dive instructors can have a huge impact on the dive participants because the dive instructors are seen as role models underwater. If a dive instructor demonstrates such a behavior underwater, their clientele is more likely to interact with the marine environment in that fashion on future dives. Consequently, as far as dive behavior is related to reef impacts, one of the main problems is the lack of environmental education found among dive guides (Auendorf, personal communication, February 14, 2013). According to one study from Barker & Roberts (2004), the only factor that reduced diver damage was the dive-leader intervention

underwater when observing cases of inappropriate behavior, and be more likely to repeat it on another dive.

#### ***Boat Anchoring and Operation***

A significant amount of damage has resulted from boat anchors being recklessly tossed directly onto the reef. The number of tourism boats has increased dramatically over the last 20 years, leading to increased damage from anchoring and boat groundings (Hilmi, Safa, Reynaud, & Allema, 2012). Anchors can kill corals and other organisms on which they fall. Repeated anchor drops or large anchors can break up the integrity of the reef, leaving the injured corals open to infection (Coral Reef Alliance, 2013). An alternative and more sustainable way to anchor is the use of a mooring buoy installation. A diver goes down and implants a permanent cable into some non-reef substrate that is then attached to a mooring buoy which stays in place for boats to use repeatedly over time. This makes it unnecessary to throw additional anchors onto the reef (Sanow, personal communication, March 1, 2013). This is one way to operate the dive sport in a more sustainable manner with less damage on the reefs.

Damage to coral reefs from boats occurs not only due to the irresponsible anchoring, but also includes more subtle forms of damage that are the result of oil and gas residue, garbage, sewage, wash-water and food being left behind by the boat (Dearden, Bennett, & Rollins, 2007). Some boats dump the waste and sewage untreated directly into the marine environment. The human waste causes an increase in nutrient levels in the ocean, and increases the danger of diseases affecting the coral. One of the more obvious effects of that nutrient enrichment is that certain species, especially algae, then grow more quickly than other types of organisms, blocking the sunlight which is an essential element for all coral growth (Wognum, 2005). Thus irresponsible boat operations can damage near-shore environment in a variety of ways, especially in popular marine coastal destinations where the reef's resilience is overwhelmed by the numbers of boats using the water (Coral Reef Alliance, 2013).

#### ***Carrying Capacity***

Carrying capacity, in this context, refers to *"the maximum number of people that may visit a destination at the same time without causing destruction to the physical, economic, or socio-cultural environment and a decrease of the quality of the visitor experience"* (WTO 1981). Studies and literature confirm that many dive destinations are reaching and surpassing the carrying capacity of their respective dive spots, and consequently causing unacceptable damage to the reef. However, carrying capacity for tourism varies from reef to reef and also depends on a diverse range of variables, such as the amount of dive activity and the quality of its management (Barker & Roberts,

2008). Therefore, to apply the concept, all of those variables have to be assessed in order to define meaningful borders for a certain dive site (Treeck & Eisinger, 2008).

In Egypt, many popular dive sites are crowded and suffer from the high tourist demand. Auendorf (personal communication, February 14, 2013) related a personal experience from one popular dive spot, the *Black Whole*, where she has witnessed a significant decline of marine populations over the last few years due to the area over-reaching its carrying capacity of divers. Krüger (personal communication, February 4, 2013) also mentioned the point that the *mass* is making the difference, meaning that the damage on coral reefs is drastically higher if the dive numbers exceeds the carrying capacity of a site. Dimmock (2007) also agrees that sites with high visitation rates are likely to incur greater impact.

Estimates of sustainable diver carrying capacity for reefs range from 4,000 to 7,000 dives per site per year (Barker & Roberts, 2008). However, these numbers are specific to sites studied and are not automatically applicable to other dive sites. According to the Gran Cayman office of tourism, dive sites can support between 5,000 to 6,000 dives per year before the reef becomes seriously degraded. However, some dive sites on the Caymen Islands attracted 15,000 divers in one year. An ecological study of the Caymen Islands showed a significant lower hard coral cover at high intensity dive sites compared to sites with less or no diving activities (Cesar, Burke, & Pet-Soede, 2003). The exact carrying capacity varies per site and depends upon several factors, such as the experience level of divers, site characteristics and level of environmental education and knowledge (Wognum, 2005). The effective management of dive sites in Bonaire, Netherlands Antilles, confirmed that a maximum carrying capacity per site should not exceed 4,000 to 6,000 divers per year. Bonaire follows the recommendations of this study and diving activities are generally kept within these limits (Cesar, Burke, & Pet-Soede, 2003).

### **3.3.2 Indirect Impacts**

Along with the direct environmental impacts of diving tourism, there are also specific indirect impacts of diving tourism that are important to this discussion.

#### ***Tourism***

Tourism is now a common activity on coastlines all around the world, affecting the use of land, water, marine species and other coastal resources (Dimmock, 2007). Increased dive tourism at any specific destination will also necessarily increase the development of associated tourism infrastructure and facilities. The sewage of resorts often ends up in the ocean. In Egypt, but also in

Australia and many other countries in the world, tourism-generated sewage is discharged into coastal waters without adequate treatment. Furthermore, the development of harbors and marinas built to support tourism can also cause impacts by being constructed directly on a reef. (Auendorf, personal communication, February 14, 2013; Wognum, 2005)

At virtually all dive destinations, tourism increases the demand for seafood and has a consequent impact on the reef fish resources. Tourists do not fly to coastal areas and to eat beef every night. And of course they also want to take home a souvenir, and the habit of collecting or buying marine souvenirs also negatively effects the marine environment. (Gunneweg, 2004)

Looking at the potential positive and negative impacts of diving tourism is not particularly different from looking at tourism in general. Like any other form of tourism, it may result in cultural change and conflicts over the utilization of resources, such as when marine areas are closed to fishermen but open to divers. It can also cause positive changes, such as enhanced employment opportunities and increasing incomes (Townsend, 2008a). However, dive tourism differs in some respect to other forms of tourism, with one difference being higher barriers to entry for people in developing countries. Diving is an expensive business, with high costs associated with training, certification, and equipment. To work as a dive instructor also requires a high level of education as well as the knowledge of at least one foreign language common in their clientele (Townsend, 2008a). According to Kollschegg (personal communication, February 1, 2013) and Krüger (personal communication, February 4, 2013), the main problem with coral reefs, aside from more global issues like warming and ocean acidification, is the diving tourist himself. Just like *normal tourists*, they reach a destination, most likely by plane, then use water, food, and produce wastes of all types, and then use boats to reach dive spots or other types of destinations. Even before actually going diving, environmental damage has occurred.

### ***Industry Competition***

According to Dearden et al. (2007), another significant impact on the reef is caused by the fierce competition that exists at dive destinations as a result of the increased diving demand. As the dive industry has grown, an increasing number of companies have entered the business with short term, strictly monetary goals, as opposed to businesses with more long term, sustainable goals. This industry competition leads to cost cutting, which may affect things like their safety and service standards. Installing and maintaining safety equipment, for instance, is very cost intensive. Dive companies become compelled to under-cut the prices of each other, and consequently search for savings in all possible areas. This, unfortunately, includes the safety and provisions for a solid and thorough education of their guides and clients. Aside from the negative effects on the reefs, those

cost savings can be a disadvantage to the divers' health. *"Economizing on safety is bad for the health of the customers, economizing on education is bad for the health of the reef"* (Dearden, Bennett, & Rollins, 2007, p. 7). Additionally, industry competition also leads to less obvious impacts on the environment. In order to survive, low-budget operators often use low-cost boats. Those boats have no treatment systems for human waste, and their gas and oil is more likely to be found leaking into the ocean. Those impacts are likely to degrade the reef (Dearden, Bennett, & Rollins, 2007). Summing up, those cost-cutting practices and the lack of environmental standards and guidelines often contribute to an increase of environmental degradation of coral reefs.

### 3.3.3 Reasons for Negative Impacts

The environmental impacts of diving tourism on coral reefs have been summarized in the previous section, with an emphasis on the negative impacts as the topic of this paper. Those findings show that divers' impacts on coral reefs are less severe than those of larger, more general processes such as global warming, other anthropogenic influences, and natural disasters. However, diving tourism has significant impact upon coral reefs in certain dive destinations and can lead to coral disease infections. Given the worldwide loss of coral reef that has already occurred and that is predicted to occur in the future, and the importance of these ecosystems, any damage to them should be evaluated. There are several reasons for those impacts, some of which have been briefly discussed. An overview on these impacts and possible actions to minimize them are included in the table below.

Environmental impacts	How to address the impact
Diver behavior	<ul style="list-style-type: none"> <li>✓ Environmental education and awareness creation</li> <li>✓ Involvement in environmental practices, such as beach cleanup or specialization courses like Project Aware</li> <li>✓ In-water demonstrations and Interaction with dive instructors</li> <li>✓ Environmental briefings</li> </ul>
Boat anchoring and operation	<ul style="list-style-type: none"> <li>✓ Government regulations</li> <li>✓ Adopt alternative and sustainable solutions, such as mooring buoy installation</li> </ul>
Unaware photographers	<ul style="list-style-type: none"> <li>✓ Environmental education and awareness creation</li> <li>✓ Interaction of dive instructors</li> </ul>
Uneducated/unaware dive instructors	<ul style="list-style-type: none"> <li>✓ Improved environmental education during certification process</li> </ul>

Carrying Capacity

- ✓ Government regulations
  - ✓ Dive shop/resort practices, such as limiting divers per day
- 

### ***Norm Violations***

Analyzing the reasons for those negative results can be done with the help of relevant searches on the effects of human values and knowledge of depreciative behavior. Johansen & Koster (2012) argue that there is a significant correlation between environmental knowledge and pro-environmental behavior. Thus, a lack of specific knowledge about the environment is seen as a barrier to engage in environmentally beneficial behaviors. Further studies, such as those by Widner Ward and Roggenbuck (2003), suggest that the depreciative behaviors result from a failure to comply with social norms, resulting in five norm violations (Johansen & Koster, 2012, pp. 2,3):

- Unintentional
- Uninformed
- Releaser cue
- Responsibility denial
- Status confirming

*Unintentional norm violations* occur because tourists are unaware of the consequences of the behavior, or simply make a mistake. *Uninformed norm violations* occur because divers do not know the consequences of their behavior. *Releaser cue norm violations* can occur while observing depreciative behavior (for example, dive guides touching fish). The *responsibility denial norms violations* occur when the diver feel that the behavior is justified or they disagree with authorities and restrictions. And last, the *status confirming norm violations* occur when individuals engage in depreciative behavior because of peer pressure within a certain social group. (Widner Ward & Roggenbuck, 2003 in Johansen & Koster, 2012). The four types of norm violations can be linked to the findings from the secondary research and experts interviews.

### ***Lack of Environmental Education and Awareness***

The identified main reason for those negative reef impacts is the lack of environmental education and awareness (*unintentional and uninformed norm violations*). Experts as well as literature and studies see this lack as one of the most crucial reasons for the environmental impacts on coral reefs. Most divers do not know the consequences that wrong or inadequate behavior have on coral reefs and have little knowledge about the biology of coral reef areas and marine environments

(*uninformed norm violations*). Studies showed that divers were surprised to learn about the possible consequences of certain behaviors on coral reefs. Many divers were unable to define or suggest any impacts they might cause. This gap of knowledge can have two reasons: either the lack of environmental education during the certification process or unintentional behavior (*Responsibility denial norms violations*). Another clear *responsibility denial* is the behavior of underwater photographers to receive the best picture (Barker & Roberts, 2004). This lack of environmental education and awareness needs to be enhanced with improved briefings and environmental education (Dimmock, 2007).

Krüger (personal communication, February 4, 2013) has the opinion that dive tourists have high expectations and want the best experience possible for their costly vacation. Dive holidays are generally very expensive and thus the divers feel entitled to also see and experience the best possible dive, thus potentially reducing their consideration for the marine environment. It is according to the principle: *“I paid, so I am allowed”* (Krüger, 2013). They do not want to be flooded with information on what they can do or cannot to do. Krüger (2013) critically mentioned: *“Ob man da nun mit mehr Umweltbildung weiterkommt, hängt wieder von der Akzeptanz der Leute ab”*. Translated, it means that the degree of environmental education in a tourist is highly dependent upon the receptivity of the dive tourists, and if he/she is willing to deal with this subject.

### **Dive Magazines**

Another issue that is important in discussions of reef degradation is how the sport is presented in dive magazines. It is common for dive magazines to show divers kneeling in coral, working with loose equipment and not maintaining horizontal body positions. The dive images in these magazines exemplify and reinforces unacceptable values in the diving sport (Kollscheegg, personal communication, February 1, 2013). The example in Figure 8 shows a diver holding two marine animals and while maintaining an incorrect position. Obviously this image communicates the message that touching animals is permitted, reinforcing the impression that this behavior, imitating what they see in glossy magazine pictures might also give them a higher status from friends (*status conforming norm violations*). There is a tendency towards *“Proll-tauchern”*, especially found in males, which can be translated as *“status-seeking divers who want to dive longer, faster and deeper.”*



**Figure 8:** Dive magazine (Source: Dave Moran, n.d.)

*“Experienced divers take more risks than they should. Like any type of activity, and especially with men, they feel that once there are good at it they try to do different things and put*

*themselves in a more difficult dive profile. They are thinking with testosterone and not with good dive practices.”* (Sanow, personal communication, March 1, 2013)

This behavior can be exemplified and amplified by inappropriate and outdated material found in dive magazines (Kollschegg, personal communication, February 1, 2013; Berecke-Queisser, personal communication, February 6, 2013; Sanow, personal communication, March 1, 2013).

### **3.4 Minimizing Negative Environmental Impacts**

After discussing the negative environmental impacts of diving tourism on coral reefs, it can be concluded that the dive industry must act in a concerted fashion in order to reduce its negative environmental impacts while capitalizing on marine resources. Therefore, they must share an interest in protecting the marine environment and to move to operating with long-term sustainable objectives. Some dive destinations have recognized the fact that those necessary steps have to be taken for the future conservation of coral reefs. There are various ways to reduce the divers’ impacts, and this section will discuss some possible improvements.

#### ***Environmental Education***

One of the easiest and most efficient ways to reduce the diver impacts is to increase the environmental level of education during the certification process, especially for the novice divers as they are associated with higher levels of diver damage than other subgroups (Johansen & Koster, 2012). The term ‘*environmental education*’ is generally used as a formal information provision, which is aimed at changing certain behavior. Therefore, according to Townsend (2008b), environmental education can help stakeholders in the dive industry to achieve following objectives:

- ✓ To minimize divers’ direct impact on dive sites through touching or kicking coral, feeding animals, collecting shells, etc.
- ✓ To increase divers’ enjoyment of their dives through better understanding of the marine environment
- ✓ To minimize other impacts divers may have on the marine environment during their trip when not diving (e.g. the fish they eat, the souvenirs they buy)
- ✓ To increase divers’ commitment to marine conservation and their support in the future (Townsend, 2008b, p. 191)

The opinions of dive experts confirm the findings from the literature review that a lack of environmental education leads to a less environmentally conscious behavior underwater. Insufficient environmental education can have several reasons. On one hand the environmental education could

not be presented during the certification process and the dive instructor did not mention the topic, or actually behaved inappropriately underwater. On the other hand, the responsibility could lay with the tourist who has too little interest in the subject.

Barker & Roberts (2004) agree on that point and state that one obvious way of reducing the damage is by enhancing diver education. A study by Barker & Roberts (2004) showed that the divers did less damage after they were given a 45 minute illustrated dive briefing covering reef biology, impacts caused by divers and the concept of protected marine areas. This shows that there should be a priority given to enhancing the environmental management strategies taught to the divers (Johansen & Koster, 2012). However, most dive companies often give very short briefings and those briefings hardly involve environmental aspects, but rather consist almost entirely on the safety aspects of diving. (Barker & Roberts, 2004)

#### ***Dive Instructor Intervention***

Another important aspect in minimizing negative environmental impacts is the intervention by dive instructors underwater when they see divers damaging (intentional or unintentional) the reef. According to the study by Barker & Roberts (2004) in St. Luica, an island in the eastern Caribbean, the only factor that reduced the diver damage was dive leader intervention underwater. Some divers even appreciated the intervention by dive guides and wanted to avoid the contact to coral. However, high levels of damaged coral reefs may be unavoidable if large numbers of divers use a reef. Therefore, dive group size need to be small enough so that dive leaders can supervise all members of the group adequately. (Barker & Roberts, 2004)

#### ***Marine Conservation***

As already discussed as a positive impact of dive tourism, diving can potentially be seen as an incentive-driven conservation activity, such as in the establishment of Marine Protected Areas (MPA's). Divers can contribute to this establishment with diver fees, such as already exists at certain dive sites. However, there is a strong need to increase the number and size of marine protected areas and improve their management. (Hodgson, 1999)

Again, as already discussed in the chapter on the positive impacts of dive tourism, beach and reef clean-up is a popular activity that some dive schools have organized and that have drawn sufficient participation rates. Some dive shops feel that organizing beach clean-ups is part of their corporate responsibility. *“Dive shops do not make a lot of money with these activities but I am sure of one thing that they do accomplish: they keep interest growing in the scuba diving industry and raises awareness!”* (Sanow, personal communication, March 1, 2013). Being involved in an environmental

activity graphically shows the divers the negative effects of irresponsible behavior, and consequently helps divers learn how to correctly enjoy a reef and how to behave in an appropriate fashion.

Another important conservation action is to secure access to dive sites for the purpose of controlling and limiting the number and behaviors of divers in order to maintain the reef and lower the negative impacts in those areas, with the goal of guaranteeing a healthy marine environment (Dearden, Bennett, & Rollins, 2007). Furthermore, the training of novice divers should be done in sandy areas, rather than in coral reef areas, due to the high rates of damage to coral reefs in dive sites used for training. According to Roupheal & Hanafy (2007), an early warning system to show the deterioration of the coral assemblage would be an alternative management, and would go beyond the *carrying capacity* and *limits of acceptable change (LAC)* concepts. Early warning signals would allow managers to take action before coral assemblages become adversely affected. (Roupheal & Hanafy, 2007)

According to Treeck & Eisinger (2008), the dilemma with marine conservation is the necessity to find new concepts that all stakeholders can incorporate, while maintaining their economic interests and at the same time reducing impacts on the reef. Up to now, management has often simply applied restrictions rather than finding more practical solutions, such as providing alternative underwater attractions like the so-called *artificial reefs*. Those alternative underwater attractions are intended to provide relief for natural reefs, and the concept might be best in areas with already degraded reef areas. It is argued that artificial underwater scenery is capable of meeting the demand of recreational divers. Furthermore, such installations could also serve as facilities for other purposes, such as environmental education, reef rehabilitation or as dive training. Dive training is often done in reef areas with adverse consequences on coral reefs. Artificial alternatives could offer location for divers to practice routine exercises, while simultaneously providing some biological interest to the dive student. Treeck & Eisinger (2008) argue that any investment, as long as it is done in a meaningful way, will pay off. The same holds for the creation of underwater attractions in ecologically less sensitive areas that would still take pressure from fragile ecosystems.

### **Equipment**

Advanced and safe equipment is another aspect which is important in the dive industry, as it affects reef conservation. If the equipment is outdated or damaged, not only can damage result to the reef, but also the security and health of the diver (Sanow, personal communication, March 1, 2013). Krüger (personal communication, February 4, 2013) argues that easy changes, such as the use of smaller fins, especially for novice divers, could immediately make a difference and reduce the contact to coral. However, it is still a niche product as there is no demand for those fins and it is difficult to find and buy them.

### **Certification Manuals**

A study from Johansen & Koster (2012) analyzed the environmental education material of three large dive organizations, among them being the Open Water manual from PADI. The study concluded that, as already discussed in previous sections, novice divers are associated with a higher level of damage, and dive tourists who hardly move beyond the novice level of certification also lack practical skills underwater due to restricted practice or education. Therefore, *“it is essential for novice courses to impart the knowledge required for scuba divers to form personal codes of conduct and the skills to effectively adopt them”* (Johansen & Koster, 2012, p. 73). A self-analysis of the Open Water manual by PADI points out that it does address some low-impact diving principles, however Johansen & Koster (2012) argue that there is much room for improvement and emphasis.

*“There is the potential that divers certified by the agencies who fail to provide substantial low-impact diving education could be more likely to engage in depreciative behaviors, because these manuals do not sufficiently address the causes of uninformed and unintentional norms violations.”* (Johansen & Koster, 2012, p. 73)

Therefore, the dive industry and certifying bodies should adopt strategies that address the root cause of diver impacts and the depreciative behavior resulting from *unintentional and uninformed norm violations*. When more information on coral reefs and low-impact diving skills are included in the certification material, it is more likely that the diver forms a personal environmental code of conduct that will result in a more conscious underwater behavior. Consequently, the environmental information provided in the certification process and manuals is of high importance and will therefore be explored in more depth in Chapter Five: *Certification Policy of PADI*.

### **Chapter conclusion**

Coral reefs are one of the most diverse, productive and ecologically valuable ecosystems on earth and it therefore fundamental to conserve those systems. Unfortunately, on a worldwide scale, coral reefs are facing many anthropogenic stresses from human activities, such as coastal development, pollution, destructive fishing methods and over-fishing, increased ocean temperatures and tourism. Next to that, some coral reef areas are highly threatened by the direct impacts of diving tourism. The chapter outlined some positive impacts of diving tourism, such as the possibility to provide incentives for reef conservation. However, the focus was to discuss the negative environmental impacts of diving tourism on coral reef areas with the following results. The diver’s behavior itself and direct contact can have a significant role in the damage of coral reefs. Unaware and/or uneducated dive instructors can further communicate wrong dive values, such as touching marine animals to excite

the dive group. Boat anchoring and operations can also play a significant role in damaging the reefs, as can exceeding the carrying capacity of dive sites. Next to the direct environmental impacts there are also indirect impacts caused by diving tourism in general. It is, however, important to note that the impacts of diving tourism on coral reefs cannot be comparable with the global threats coral reefs are facing. One of the most important reasons for the diver environmental impacts is the lack of environmental education and awareness, as well as the lack of routine dive skills that is the result of majority of divers holding only the beginner certificate. Therefore, certain specific items have been identified as possibilities for minimizing the negative environmental impacts of diving tourism on coral reefs, and are summarized below:

- ✓ Enhanced environmental briefings and education
- ✓ Intervention by dive guides
- ✓ Small group size during dives
- ✓ Conservation projects with marine protected areas and dive fees
- ✓ Advanced dive equipment
- ✓ Environmental education in all manuals used to obtain dive certification
- ✓ Alternative conservation concepts, such as artificial underwater parks



## Chapter 4: Case Study on Diving Tourism in Egypt



## Chapter summary

**The following research questions will be answered in this chapter:**

- ✓ What are the negative environmental impacts of diving tourism on popular dive destinations in Egypt?
- ✓ What important results can be drawn from the case study on Egypt?

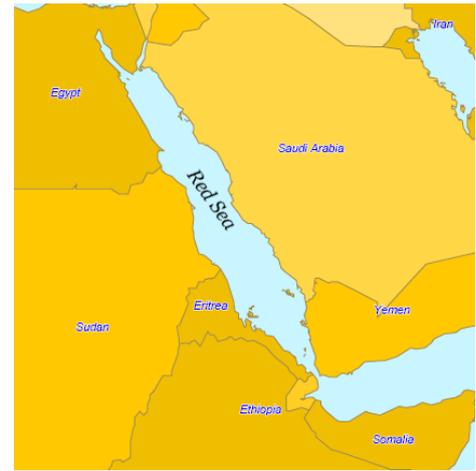
The negative environmental impacts of diving tourism on coral reefs have been discussed in the previous chapter. Therefore, this chapter will describe the situation at a popular dive tourism destination in Egypt, where those negative impacts in popular dive sites have been observed over time. The case study in Egypt demonstrates the impacts on a rapidly developed dive destination. The study shows how unmanaged and uncontrolled diving tourism can harm the environment and can lead to the degradation of coral reefs. The chapter gives a brief introduction to the area of the Red Sea as well as the tourism characteristics and markets in Egypt. The case study further discusses the dive tourism industry in Egypt, its stakeholders and related negative environmental impacts at specific popular dive sites. Finally, some conclusions are formulated. The chapter is based on primary as well as secondary research and contains answers to following research questions: *What are the negative environmental impacts of diving tourism in popular dive destinations in Egypt? What important results can be drawn from the case study on Egypt?*

### 4.1 Introduction

In order to examine the consequences of diving and its negative environmental impacts on coral reefs, an applicable case study done on Egypt will be investigated. This section has been written with the help of literature as well as with the findings from primary research. Egypt is the number one dive destination for the European market and there has been a huge development of dive-tourism over the last ten to twenty years. This chapter will outline these major developments and their resulting impacts upon the environment.

During the last twenty years the tourism industry has grown rapidly in Egypt. Egypt is seen as a developing country that is highly dependent upon tourism as a source of foreign income. Therefore, tourism development in the country has received great emphasis in the hope that it will result in an increase in needed tourism revenue, economic growth and employment opportunities. However, the relationship between tourism development and environmental health is unbalanced, with the environment suffering from the impacts of tourism. (Hilmi, Safa, Reynaud, & Allema, 2012; Wognum, 2005).

The Red Sea encompasses several unique marine habitats, including areas of coral reef, mangroves and sea grass beds. The mangroves and sea grass beds build a nursery for marine life and for that reason, Egypt is known for its amount and variety of life in the reef. It is therefore considered to be one of the best scuba diving locations of the world with many popular dive sites. The Egyptian coastline, including the Mediterranean and the Red Sea (Map 1), has a total of 2,450 km of shoreline. Most tourists visit Egypt because of the snorkel and dive opportunities in



**Map 1: The Red Sea (Source: Wikipedia, 2013)**

the abundant coral reefs. (Wognum, 2005). The political instability in recent years did not drastically slow the increase in tourism numbers, and the Egypt's Red Sea resorts will remain a diving hotspot for a long time to come (Haden, 2007). However, the long term, specific effects of the *Arab Spring Revolution* (violent and nonviolent protests, in the Arab world that started in 2010) and how this affected the tourism numbers in Egypt in the last few years is currently unknown.

#### 4.2 Tourism Industry in Egypt

Egypt is one of the largest tourism markets in the Middle East and African region, and according to the UNWTO, is one of the fastest growing tourism markets in the world. Egypt has successfully positioned itself as an affordable and accessible destination for Europeans and Middle Eastern tourists (Shore, 2011). In 2012, 14 million international tourists visited Egypt, generating nearly US\$13 billion in international tourism receipts. These receipts represent around 11% of the country's Gross Domestic Product (GDP) (Risi, 2011). The tourism receipts and GDP of Egypt from the years of 2007 to 2010 can be found in Figure 1 in Appendix 6. In 2012, travel and tourism alone directly supported 1,375,500 jobs, or 5.9% of the total employment. This is expected to rise by 1.4% in 2013. In that year, the country is expected to attract 12,114,000 international tourists. Those numbers clearly demonstrate that travel and tourism is a vital source of income for Egypt and that amount is growing steadily (World Travel and Tourism Council, 2013). Although Egypt has famous cultural attractions, a very important percentage of the revenue from tourism in Egypt is derived from the Red Sea region. Around 2.5 million visitors a year, with an increasing tendency, enjoy the tropical areas of Egypt, of which 23% come specifically to dive, with 33% participating in snorkel activities (Cesar, Burke, & Pet-Soede, 2003). Those tourist numbers provide a growing demand for tourism infrastructure, delivering important foreign revenue to the regional and national economy. (Marshall, et al. 2011)

### 4.2.1 Arrivals and Markets

Egypt's tourism visitation has more than doubled over the last decade, growing from 5.5 million visitors in 2000 to 12.5 million in 2009. That growth resulted in the development of numerous hotels, resorts, and tourist villages along the coast. Political instability in Egypt and the economic crises impacted the tourism arrivals to a small degree (Figure 2 in Appendix 6), but did not greatly impact tourism growth in Egypt. (Shore, 2011)

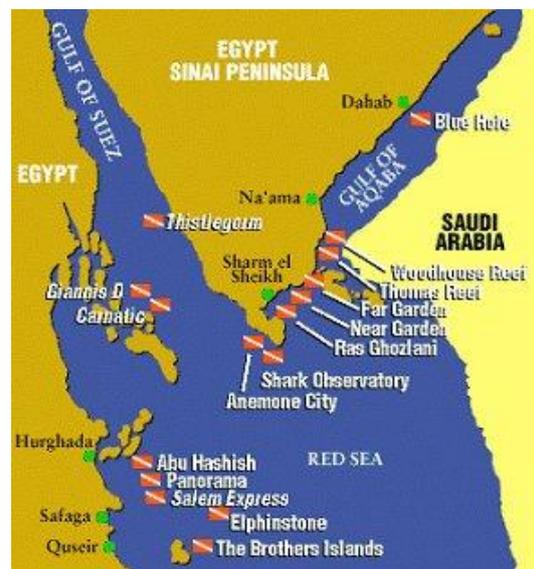
Egypt's main tourism market originates in Europe, with over two-thirds of all foreign visitors arriving from there. The three main source countries are Germany, England and Italy. An important emerging market is Russia, which is seen as one of the most dynamic outbound markets in the world. Greater wealth and more disposable income make the Russian market another principal source market for Egypt. According to the *Egypt State Information Service (ESIS)*, visitors from Russia edged to just over 1.5 million in 2008-09 (Figure 3 in Appendix 6) (Shore, 2011).

Overall, the average length of stay for tourists increased from 9.3 days in 2007 to over ten days in 2010. Package holidays are typically between 7-10 nights or 14 nights in duration (Shore, 2011).

Official government sources in Egypt state that they aim to attract 16 million international visitors by 2014 and over 25 million tourists by the end of 2020. Obviously, the Egyptian government will continue to invest in developing the tourist infrastructure and marketing to ensure the tourism industry continuing to be a big contributor to the GDP. (Shore, 2011)

### 4.3 Diving Tourism in Egypt

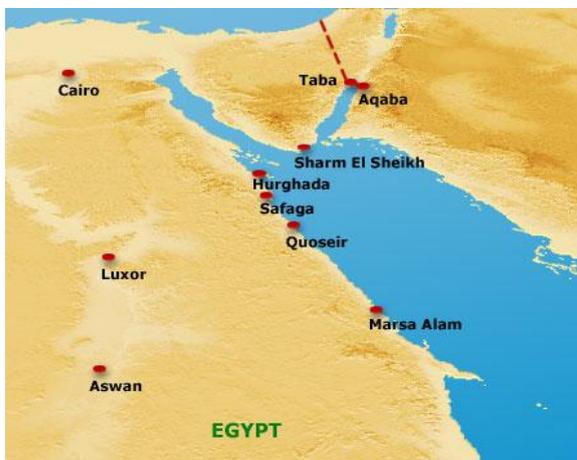
The diving industry started in the early 1980's in the area of the South Sinai Peninsula with the famous dive destination Sharm el Sheikh, and then further developed south into the region of Hurghada (Map 2). Today, those two destinations are still the most popular dive destinations in Egypt. New developments also starting more to the south where dive tourism is not yet that developed, and at which unspoiled nature can still be found (Wognum, 2005). The Red Sea coast of Egypt is approximately 1800 km long, and is considered to be one of the most beautiful dive destinations in the world with more



Map 2: Red Sea dive sites (Source: Diving & Safaris, 2013)

than 500 warm-water dive sites (Shore, 2011). The reef landscapes offer various dive possibilities, such as wall-dives, drift dives, and wreck dives, as well as more adventurous and experienced dives. The Red Sea of Egypt offers good visibility, ranging from 10-50 meters, as well as warm temperatures, which are the best characteristics for dive activities. (Wognum, 2005)

In 2005, the dive resorts in the Red Sea and South Sinai regions contained a total of 230 hotels. The occupancy rates of those hotels averaged 75% in 2005. This number is higher than the occupancy rate achieved for the whole of Egypt. Diving is offered as a main activity by the coastal hotels, with courses and excursions for both beginner and experienced divers. The Red Sea area has over 180 registered PADI dive centers, and several global hotel brands are operating in the area. (Haden, 2007)



Map 3: Famous dive destinations of Egypt (Source: Memphis Tours Egypt, 2010)

Many of the dive destinations have developed over a short period of time. The famous dive site Hurghada (Map 3) is an example of uncontrolled tourism development. In Hurghada, where tourism has developed since the 1980s, the impacts of tourist activities have already caused a significant decline in the value of coral reefs (Cesar, Burke, & Pet-Soede, 2003). The lack of proper management of its dive sites combined with a mad rush of tourists to cause a serious degradation of its coral reefs.

A recent study at Hurghada correlated the percentage of coral damage with the number of dives per site. The results show that greater coral damage greater occurs in heavily used dive sites (Figure 9).

Due to the negative environmental impacts and the coral damage, tourism growth in Hurghada has consequently stopped, and tourism there has been declining. There are still dive tourists who come to the destination, but new dive destinations such as

Marsa Alam are growing rapidly (Wognum, 2005). The coral reef at this destination is not yet

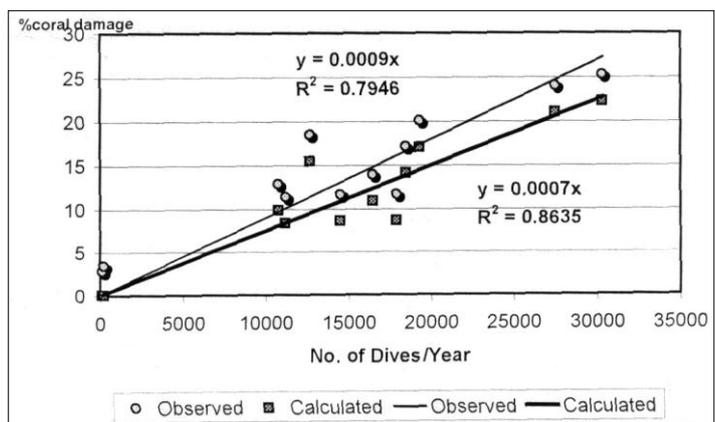


Figure 9: The correlation between the number of dives per year and the observed and calculated percentage of coral damage recorded from the examined sites around Hurghada, Egypt (Source: Cesar et al. 2003)

adversely affected by dive tourism, and according to Wognum (2005), the tourism development in Marsa Alam is being more carefully planned and managed, and sustainable projects have been integrated into the development process. On the website of Marsa Alam there are various cooperative and sustainable projects that seem to demonstrate the area's desire to maintain its diving conditions and environmental health over the long term, and to preserve itself as 'Egypt's best kept secret' as is quoted on the website (Marsa Alam, 2013).

#### 4.3.1 Environmental Impacts

The increasing diving tourism development and diving demand in Egypt has resulted in negative environmental impacts in recent years. The ecological carrying capacity for Egypt's reefs is set between 10,000 and 20,000 divers per site per year (Wognum, 2005). Unfortunately, some very popular dive sites near Hurghada easily receive over 100,000 divers per year. Due to economic reasons as well as the continuously increasing demand, the governments and the dive industry are not willing to restrict the dive capacity. Additionally, after spending several decades building up the infrastructure to the point it is today, and given the structure of the industry in that area and the high numbers and origins of the boats, it would be almost impossible to control the numbers of divers per site.

This heavy demand by dive tourism stresses the coral reefs directly, and, as importantly, also affects it indirectly by anthropogenic impacts. The direct impacts include trampling, coral breakage by divers and snorkelers, and damage from recreational boat anchoring and boat grounding. The most common damage is the coral breakage, especially in crowded reefs, generally caused by the high numbers of inexperienced divers and snorkelers. This uncontrolled development and management of dive sites has resulted in a serious degradation of coral reefs in highly visited areas (Wognum, 2005).

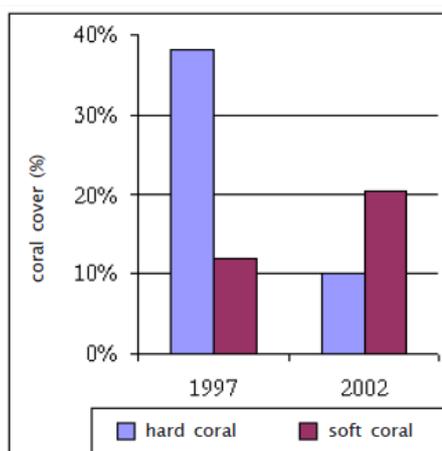


Figure 10: Change over time of hard and soft coral cover (Source: Cesar et al. 2003)

The consequences of the coral damage can be fatal to the reef. According to Hilmi et al. (2012) "coral deterioration disturbs the coastal ecosystem, resulting in coral death, loss of the complex habitat structure and decrease of associated invertebrates as well as fish reduction and an increase in algal growth" (Hilmi, Safa, Reynaud, & Allema, 2012, p. 422).

Figure 10 shows the decrease in live coral cover over the last five years in the highly valued tourist areas in the Sharm-el-Sheikh area of the Egyptian Sinai coast. Live hard coral cover fell from nearly 40% in 1997 to only 10% in 2002 due to mass

tourism expansion. (Cesar, Burke, & Pet-Soede, 2003)

Another direct human impact on the reef is the massive increase in hotel constructions, with Holden (2000) estimating that 73% of the coral along the Egyptian coast has been damaged as a result of that construction (Hilmi, Safa, Reynaud, & Allema, 2012). According to Wognum (2005) and Auendorf (personal communication, February 14, 2013), there are cases of whole hotels and restaurants being built on coral reef areas. Furthermore, there is a lack of proper sewage management, and, consequently untreated sewage and waste ends up in the ocean, which also seriously effects the reef.

### **Problems**

The most common problem in protecting and managing marine areas is the lack of available funds to use for conservation due to inadequate government structures. Visitor fees have proven to be a good way to collect additional revenue, however visitor fees are too low to cover the running costs of marine park management and conservation (Wognum, 2005). Furthermore, there is a lack of understanding and appreciation of the fact that it is necessary to protect the ocean for future tourism development, not to mention as a way of conserving disappearing ocean organisms (Auendorf, personal communication, February 14, 2013).

All dive schools interviewed offer dive holidays to Egypt and thus can confirm the above described situation. According to dive experts, another problem facing Egypt's tourism development are the high numbers of new proprietors entering the market from other countries, and who have no vested interest in maintaining the resource in the long term. According to Berecke-Queisser (personal communication, February 2, 2013), one of the main problem facing Egypt over the last five years is the large increase of newly-rich individuals from Eastern Bloc countries such as Russia and Poland who have taken over some of dive operations. Berecke-Queisser (2013) further stated that *"Im Grunde hat man in Ägypten mittlerweile eine Scheinwelt die total Korrupt ist"*, which means that Egypt basically has an illusory world which is totally corrupt. The new arrivals have bribed the dive schools and teachers and behave in whatever ways they want. In addition, according to other dive experts, apparently this particular market has a radical and aggressive dive behavior and refuses to listen to the instructions of dive guides. There is reportedly a lack of authority, a *show-off* behavior and a high use of alcohol that contribute to the problem. Berecke-Queisser (2013) moves on to say that *"Wenn man mit den Leuten taucht wird einem ganz übel!"*, those divers are extremely disrespectful towards the environment, and their behaviors make it is almost impossible to monitor them successfully underwater. According to Auendorf (personal communication, February 14, 2013), Egypt is a poor

country and depends on the money generated by these new markets, and as a consequence, great importance is given to not increasing customer dissatisfaction.

### **Possible Solutions**

A case study conducted by Marchall (2011) demonstrated that the marine environment of Egypt is in real danger and that diving tourism plays a significant role in the coral reef degradation. Therefore, new management and conservation criteria need to be developed in order to protect the vulnerable environment. The study by Hilmi et al. (2012) includes the recommendation that Egypt should develop *Regional Action Plans* for the conservation of coral reef areas and the general marine environment. The main objectives are:

- ✓ Integrated coastal zone management
- ✓ Education and awareness on the status of coral.
- ✓ Formation of Marine Protected Areas (MPAs).
- ✓ Ecological sustainable reef fisheries.
- ✓ Studies on the impact of shipping and marine pollution
- ✓ Research, monitoring and economic valuation  
(Hilmi, Safa, Reynaud, & Allema, 2012, p. 432)

Furthermore, Wognum (2005) argues that the best way to minimize diver damage to coral reefs is to establish a carrying capacity for each dive spot and restrict the number of divers per site. One existing resort limits the dive participants to a certain number per day with the goal of preserving the coral reefs. Apparently this coral reef is located close to this resort and, for some reason, is less damaged and still in very good condition (Kollschegg, personal communication, February 1, 2013).

### **4.3.2 Stakeholder Involvement**

#### **Government**

The Egyptian government is beginning to take some initiative in guiding future developments along a more sustainable path. Over the last few years, several laws have been established in order to protect its natural environment. The Egyptian government realized that it is necessary to protect the assets of the coast in order to secure the future of diving tourism as a source of income. As one example, the *Egyptian Tourism Development Authority* (TDA) has developed an *Environmental Impact Assessment* (EIA) program in an attempt to ensure sustainable tourism development in the Red Sea resort area (Haden, 2007). Furthermore, a development plan and standards of environmentally sound development practices have been drawn up for the southern Red Sea region (Wognum, 2005).

The *Egyptian Environmental Affairs Agency* (EEAA) is the national authority responsible for strengthening environmental relations between Egypt and other countries and with regional and international organizations. As part of the EEAA, the *Natural Conservation Sector* (NCS) was formed with the major goal of protecting and enhancing the national nature resources. In 1998 the EEAA started to collect diver fees on islands, US\$ 5 for foreigners and 5 Egyptian Pound (EGP) for Egyptians. However, many dive sites are not yet required to collect dive fees. (Wognum, 2005)

The department of *Natural Protectorates*, also known as the National Parks of Egypt, has also developed a program to conserve the coral reef areas in the Red Sea. The program includes dive site management, education and public awareness, the Environmental Impact Assessments, law enforcement, patrolling, monitoring and research, and mooring buoy installation (Wognum, 2005).

Summing up, the willingness of the government to protect and preserve the coral reefs exists. However, there is also the conflicting goal of increasing the visitor numbers and to further develop the tourism infrastructure. The question arises how those two objectives, reef conservation and economic growth, can be achieved in a balanced way. Laws exist, but if there is no law enforcement, those laws will hardly change anything. Furthermore, corruption can hinder the process of sustainable development (Berecke-Queisser, personal communication, February 6, 2013).

#### ***Non Governmental Organizations (NGO'S)***

In 1992, members of the Hurghada diving society established the *Hurghada Environmental Protection and Conservation Agency* (HEPCA), and it was the first recognized NGO (Non Governmental Organization) in the Red Sea. The goal of the NGO is to conserve the coral reefs and coastline of the Red Sea. HEPCA is actively involved in various environmental projects such as the installing of mooring buoys at dive sites in the Red Sea. Those mooring buoys offer a reef-friendly alternative to traditional anchors, as well as providing a means of controlling the boat numbers, and thus the diver numbers. Other projects include beach and reef cleanup campaigns, education of local communities such as schools and local fisherman, production of newsletters and publications, an environmental signs project, and installation of trashcans on the streets of Hurghada along with positive proactive incentives like green hotel competitions (Wognum, 2005; HEPCA, 2013). Other NGO's have developed over the last few years, and share similar goals of conservation and the protection of the marine environment in the Red Sea.

#### ***Dive Operators***

There are various dive operators active in the dive industry in the Red Sea region. PADI alone has more than 180 registered PADI dive centers, and other international dive centers are also present.

Little information is available on how the Egyptian dive operators implement sustainable practices or conservation matters into their businesses operations. The case study from Marshall et al. (2011) analyzed the early impacts on the Red Sea region and tested the environmental awareness of dive tourism operators. According to the study, the majority of dive operators were interested in learning more about the possible negative environmental impacts of climate change on coral reefs. Some even indicated that they would close their business if there was major damage to their dive sites from climate change within the next five years. According to this study, dive operators are concerned and seem to be aware of environmental impacts. However, it is not known how much action dive operators have actually taken to protect the marine environment. (Marshall, et al. 2011)

### **Chapter conclusion**

The environmental impacts of diving tourism that have been discussed previously in chapter three and again in this chapter demonstrated the negative impacts of that activity by looking at a specific dive destination in Egypt. Egypt is the number one dive tourism destination for the European market and there has been a huge development of dive tourism in the last few years. Specific dive sites in Hurghada, for example, have recorded that the increasing numbers of divers has resulted in negative environmental impacts. This heavy demand by dive tourism stresses the coral reefs directly, and statistics show the decrease in live coral cover over the last five years. The problem is, on the one hand, the lack of available funding and effective management, and on the other hand, unaware and uneducated dive behavior, especially from new markets entering the dive sport. Several stakeholders are involved in conserving the marine environment, and also the Egyptian government has begun to implement future developments along a more sustainable path. However, various factors hinder a sustainable diving tourism development, among them corruption, competition, economic growth and a lack of funding and law enforcement. Egypt's government, as well as the stakeholders involved in the dive industry, need to cooperate in order to preserve the marine environment of the Red Sea and maintain its reputation as one of the world's best dive destinations. There is a strong need to develop strict law enforcement, conservation measures and surveillance in order to minimize the negative environmental impacts caused by diving tourism. Furthermore, it is crucial to enhance environmental awareness and education in the entire dive industry to ensure that every stakeholder makes a contribution to the conservation of coral reefs. The situation in Egypt demonstrated that diving tourism can directly damage the coral reef areas and that it is important to discuss this topic and future solutions for a more sustainable dive industry.

## Chapter 5: Certification Policy of PADI

BECOME A  
**PADI PRO**



## Chapter summary

### The following research questions will be answered in this chapter:

- ✓ What are PADI's certification requirements for divers, instructors and dive schools and how are environmental issues included?
- ✓ What are some identified improvements that could be made in the certification policy of PADI that might limit the negative environmental impacts of diving tourism on coral reef systems?

The chapter gives an insight into the world's largest international diving organization, PADI, and how they operate and train their customers worldwide. It outlines the increasing popularity of diving certification based on PADI's statistics, and discusses the certification requirements for divers, instructors and dive schools for becoming a PADI member. The chapter further analyzes the quality and quantity of environmental education in the certification policy of PADI, and discusses the environmental programs Project AWARE and the Green Star Award. The chapter will conclude with a discussion on the responsibility of PADI towards the marine environment. This chapter is based on primary as well as secondary research, and the two above listed main research questions will be answered.

## 5.1 Introduction to PADI

As already mentioned, PADI is the world's largest scuba diving training organization. PADI is a privately held membership organization, offering a wide range of diver education system with various scuba diving courses, including progressively more advanced levels of certification in various dive specialties, with one path leading to the goal of becoming a scuba diver instructor. PADI was founded by two Americans, John Cronin, a scuba equipment salesman, and Ralph Erickson, an educator and swimming instructor. They shared the opinion that dive organizations at that time were unprofessional and made it very difficult for people to enter the sport. In

1966 they decided to change that situation and formed a scuba diving training organization, and the name *Professional Association of Diving Instructors* (PADI) was born shortly after (Figure 11). In the early days PADI grew slowly, but in the late 1970's and early 80's, with its own integrated multi-media student and instructor educational materials for each course, PADI started to grow enormously. By the late 80's, this unique concept made PADI the leading scuba diving training organization in the world (PADI, 2013). Currently, PADI counts 400 employees in corporate offices around the world and has issued millions of scuba certifications worldwide.



Figure 11: PADI's Brand Logo (Source: PADI, 2013)

### 5.1.1 PADI's Mission Statement

PADI wants to maintain its position as the leading dive training organization worldwide, and PADI's Mission Statement is emphasized on the website, as well as its vision, purpose and goals.

Mission:

*"We want to teach the world to scuba dive."* (PADI, 2013)

Vision:

*"PADI intends to be the world leader in the educational development of scuba diving professionals and enthusiasts."* (PADI, 2013)

PADI's purpose is to develop programs that encourage and fulfill the public's interest in recreational scuba diving worldwide. Furthermore, PADI strives to be the world's most respected and successful organization in recreational scuba diving. (PADI, 2013)

### 5.1.2 Facts and Figures

PADI has operated for over 40 years, counts over 136,000 PADI professionals in its ranks and has more than 6,200 dive shops and resorts worldwide (PADI, 2013). The PADI statistics published on their website show the worldwide membership history, the certification history, and certification gender and age. Those numbers show the steady growth of memberships as well as certifications from 1970 to 2004, and show a 67% growth from 1996 to 2012, and a growth of 53% in retail and resort memberships. That same certification history shows that as of 2012, PADI has issued a total of 21,260,000 certifications worldwide. The annual certification growth can be seen in the table in Appendix 7 (PADI, 2011). The statistics do show a small decline in the growth rate from the period of 2005 to 2010, apparently due to the worldwide financial crises. The statistics also illustrate that the scuba diving sport is still male dominated, with 66% of the members being male, leaving only a 34% female participation rate in 2012. That ratio has not significantly changed since 2007, at which time during which the rate was 67% male and 33 % female. The medium age of divers is 29 years old, and that age did not change between 2007 and 2012.

### 5.1.3 PADI Certification Courses

PADI offers a variety of scuba diving courses, with and Figure 12 summarizing all the modules. The educational system of PADI is modeled as a sort of *career ladder*. Novice divers begin with the Open Water Diver course. This course is the world's most popular dive course, and has introduced millions of people to the dive sport. It teaches the basic principles of scuba diving in theory and practice,

including the modules of five theory classes, five dive lessons in a pool and four dives in natural bodies of water. This course certifies the diver as capable of diving anywhere in the world to a maximum dive depth of 18 meters. This course, like all PADI courses, is performance based, meaning that there are no rules over how long the actual certification process should take. However, PADI does recommend 31 hours as a completion time for the Open Water course.

Figure 12 demonstrates the various possibilities for Open Water Diver certificate holders to participate in specialty courses, or to move further along in the *career ladder* with the Advanced Open Water Diver course. The Advanced Open Water Diver course increases the confidence and diver skills underwater, allowing the diver to make more challenging dives under a variety of conditions. The course contains a navigator dive, a deep water dive up to 30 meters and a choice of three other adventure dives, which are listed as Specialties in Figure 12. With this certificate the diver is allowed to go diving anywhere in the world to a maximum depth of 30 meters, and also allows the diver to do wreck and night dives. Divers holding the two certifications can continue with the Rescue Diver course. Those three courses are on a non-professional level. In order to continue with the Master Scuba Diver course, the following preconditions are required: certifications obtained as an Open Water Diver, Advanced Open Water Diver, Rescue Diver, and an additional minimum of five specialty courses and a minimum of 50 logged dives. (PADI, 2013)

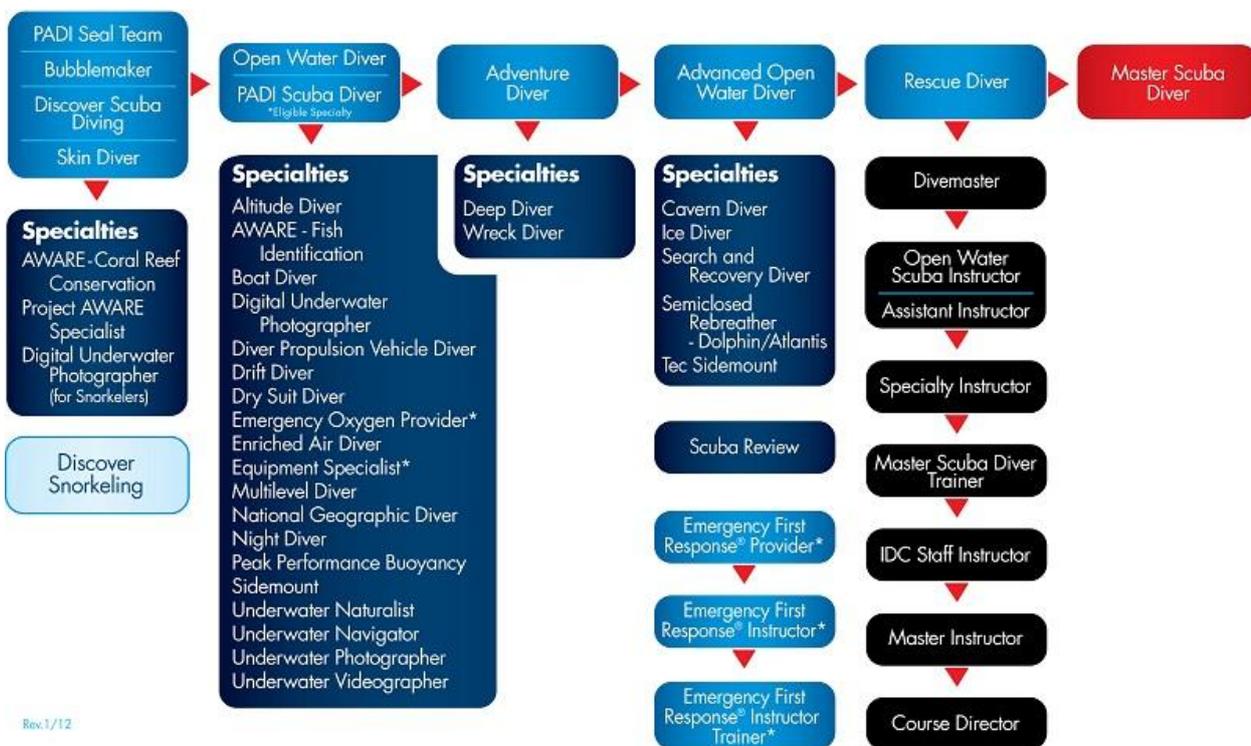


Figure 12: PADI Certification Courses and educational hierarchy (Source PADI, 2013)

The hierarchy continues on the professional level, including the Dive Master and various Dive Instructor level certifications. In order to become a PADI Open Water Scuba Instructor, the diver needs a minimum of 60 logged dives and at least 100 logged dives by the end of the course. Dive instructors are trained by PADI course directors, the highest rank in the PADI hierarchy. For each level of dive education, PADI provides a manual.

#### **5.1.5 PADI's Unique Selling Points**

PADI is the world's largest and most respected scuba diving training organization and therefore profits greatly from its global reputation and popularity. PADI has developed a dive network and quality standards that are accepted worldwide, and all PADI scuba diving certification cards are globally recognized and accepted. Operating in more than 180 countries, translations of PADI materials are available in at least 26 languages. Participants of the focus group also confirmed that PADI was basically the only certification organization present at dive destinations, and some were not even aware of the existence of other scuba diving training organizations. This demonstrates the power of the PADI brand and its worldwide reputation. According to Sanow (personal communication, 28 February 2013), *"for recreational divers, PADI has the best material that is available in the market place"*. Other experts share this opinion.

Another unique selling point for the organization is the PADI Diving Society. Being a PADI member allows the diver to join that "club", an organization made for all dive enthusiasts of all ages and experience levels. This Diving Society keeps the dive members updated about the latest developments in technologies and training in the dive world, and offers members incentives for dive travels, equipment and training. (PADI, 2013)

All PADI programs fall under strict educational standards monitored for worldwide consistency and quality. PADI courses are globally certified as compliant with the *International Organization for Standardization* (ISO) standards for Recreational Diving Services by a pair of independent auditors, the *European Underwater Federation* and the *Austrian Standards Institute*. (PADI, 2013)

#### **5.2 PADI's Certification Requirements for Divers, Instructors and Dive Schools**

PADI has specific certification requirements for divers, instructors and dive schools, and those requirements are the topic of this subchapter. It is interesting to analyze how PADI operates as the leading dive training organization and what rules and regulations are in place to become a PADI member or partner, and how those operations are related to environmental issues. However, it is

important for the overall purpose of this paper to clarify how PADI cooperates with dive schools. The following quote from PADI's website explains the business model of PADI:

*"PADI members are licensed to use various PADI trademarks and to conduct PADI training. Individual, dive center and resort members are not agents, employees or franchisees of PADI. Member business activities are independent, and are neither owned nor operated by PADI. While PADI establishes the standards for PADI diver training programs, it is not responsible for, nor does it have the right to control, the operation of the members' business activities and the day-to-day conduct of PADI programs and supervision of divers by the members or their associated staff."* (PADI, 2013)

Consequently, dive schools receive the license to train and instruct in the name of PADI once they comply with the standards set by PADI (Wantke, personal communication, April 25, 2013). Those standards are explained and documented on their website, but are accessible only to people with PADI memberships, and thus cannot be explained specifically and in detail for the purpose of this paper.

### **5.2.1 Certification Requirements for Divers**

As already demonstrated in section 5.1.3 *PADI's Certification Courses*, there are few requirements to undergo a certificate as an Open Water Diver. Each person who is in a good enough physical condition to dive, is 10 years or older and has the ability to swim can participate in the first course of PADI. Some dive schools require a medical statement of good health from a doctor, but apparently this is not a worldwide requirement regulated by PADI (outcome of the focus group discussion). As already mentioned, the Open Water course consists of five theory modules, five swimming pool sessions as well as four open water dives. If the course participant finishes all of the modules and the final exam, the Open Water Certificate will be approved by the dive instructor and sent to PADI for the final registration. PADI will issue the certificate and send the license to the participant's home address. Divers will only be certified if the student was trained by an approved PADI instructor. For all continuing education courses as seen in Figure 12, the diver needs to possess the Open Water Dive card.

### **5.2.2 Certification Requirements for PADI Instructors**

For entering the professional level of PADI's diver education program, additional requirements are necessary. In order to become a dive instructor, the diver needs to be at least 18 years old, must have earned the certificates leading to the desired level (Figure 12) and needs to have a specific

number of logged dives. Furthermore, PADI Scuba Diver Instructors must complete a development program that sets the industry standards for scuba instructor training. Those standards are integrated into the instructor manual. Before earning the PADI Scuba Instructor license, all candidates are evaluated by a selected group of PADI-employed instructor examiners. According to PADI (2013), this process ensures that the evaluation process is objective, fair and consistent worldwide.

### **5.2.3 Certification Requirements for Dive Schools**

The basic requirement for a person to open a PADI Dive Center or Resort is to have the status of an active PADI Dive Instructor. In addition, the prospective dive schools must meet specific defined criteria that are evaluated in steps by PADI regional managers. The dive school must have access to certain physical settings, such as a pool, a classroom, specific equipment and approved PADI dive instructors. A prospective PADI dive school must then write a business plan that includes the following information: facilities, instructional operations, marketing and public relations, demonstrates an understanding of the local market and its demographics, and contains investment costs and income projections. With this business plan, a dive school can apply for registration with PADI by filling in a registration form (Appendix 8). PADI officials then determine, with the help of regional managers, whether all of the required criteria are met and if the business plan is realistic and feasible (PADI, 2013). PADI provides the dive schools with international resort and retailer association standards, but those standards are only available for PADI's resort and retailer members and thus cannot be further elaborated on. In case of an accident, a dive school that does not operate according to PADI standards is not insured (Sanow, personal communication, February 28, 2013). Therefore, as a dive school, it is crucial to work and operate according to the quality and safety standards of PADI. Once a dive school is registered as a PADI dive school, which costs around 600 Euro, a monthly license fee must be paid, approximately 300 Euros. The amount of the monthly license fee depends on the size of the dive shop, as there are different membership levels that begin with being simply a PADI dive center, and move up to a PADI 5 Star Dive Center or to a PADI Dive Resort (Appendix 8). PADI is by far the most expensive dive training organization (Berecke-Queisser, personal communication, February 2, 2013).

### 5.2.4 PADI's Quality Management

PADI's quality management program offers its customers the possibility to provide feedback about general PADI-related topics and the experiences gained during the certification process. In case of very positive experiences, the diver can send a complimentary report and PADI can then recognize member shops who demonstrate excellent service by a so-called *Quality Recognition Program*. It is also possible to give negative feedback in case the dive instructor training or facilities deviate from well-defined standards. The Quality Management Program (Figure 13) will then try to identify and remediate the problems to avoid future issues. When a PADI office is unable to resolve problems with a member business, that member may be suspended under a temporary status, terminated or expelled.

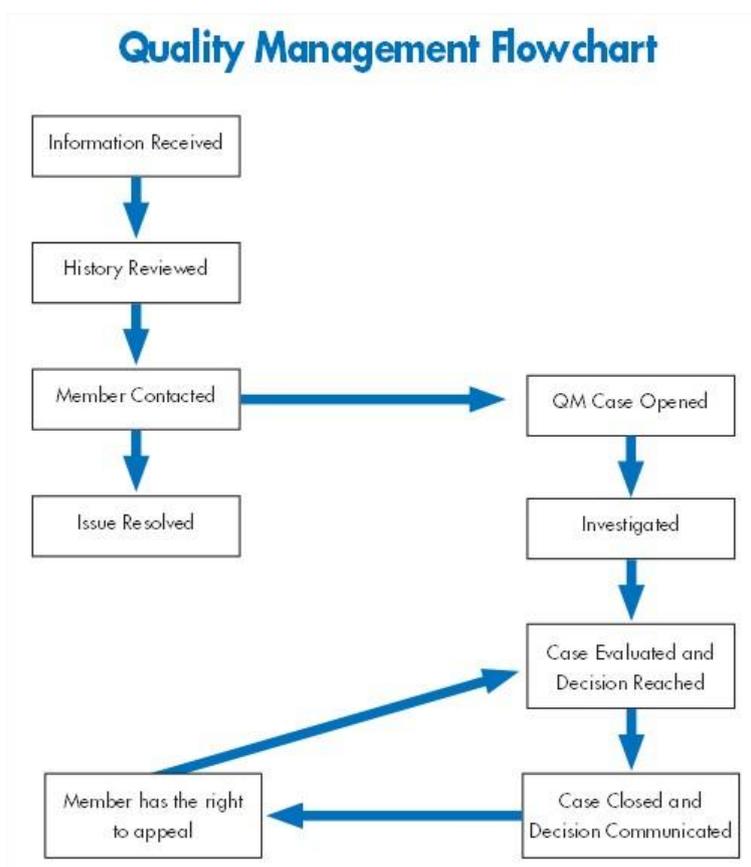


Figure 13: Quality Management Flow chart of PADI (Source: PADI, 2013)

(PADI, 2013)

Furthermore, PADI takes a proactive approach to quality management. In order to control security and education standards, PADI makes use of various tools, such as conducting regular surveys with students. In case of complaints or scarcities, PADI experts will investigate, and if standards were not met, PADI will disbar the license of the person concerned. This process is summarized in a chart from PADI, *Summary of Routine Quality Assurance Inquiry*, found in Appendix 9.

#### Random Surveys

PADI, randomly or in case of complaint, sends out surveys to students upon completion of a PADI course to see if that course met PADI's high standards as well as the divers' expectations. In the survey the student is basically asked to give feedback on the quality of the course. With those answers PADI can see if the course instructor and the dive school worked according to the quality standards of PADI. The survey is not sent to every student who finishes a PADI course because the

cost of doing so, given the huge numbers of students who obtain certification monthly, would use too much of PADI's financial resources. (Wantke, personal communications, April 25, 2013)

The survey does not ask questions about the inclusion of any environmental aspects of diving, such as if the dive instructor behaved appropriately in the underwater environment or if environmental issues were even discussed. According to Wantke (2013), the quality of technical instruction and the maintenance of safety standards are a priority for PADI, and environmental aspects would rather be the focus of Project AWARE which will further be discussed in section 5.3 *Quality and Quantity of Environmental Education*.

### **Customer Alerts**

PADI recommends that its customers be proactive and check credentials when choosing a PADI dive center or resort. Therefore, PADI publishes different types of lists on their website where the customers can find additional information about the names of active dive schools and instructors, and further lists the instructors or dive schools that are not qualified to offer PADI courses anymore. This way, the customer also has the power to ensure if the quality of the dive school/instructor is guaranteed. PADI further lists all PADI members that have been expelled from the organization within the last six years and who are no longer allowed to conduct PADI courses. *"Expulsion results after a PADI Member refuses to implement corrective measures, or when the nature of the complaint is so severe that expulsion is necessary to protect the public or to preserve the reputation of the PADI organization."* (PADI, 2013). Furthermore, PADI provides a list with expelled PADI dive shops and resorts, with the same condition as for the expelled PADI members. (PADI, 2013)

Another way to assure the quality of PADI's education is the *Pro Check* tool. This tool allows anyone to verify the membership status of a PADI professional member. After entering the member number it is possible to see the PADI member's name, highest PADI professional rating, current status and the year that PADI Membership was last renewed. This allows the student, for example, to check whether the dive instructor is an officially registered instructor with PADI. (PADI, 2013)

### 5.3 Quality and Quantity of Environmental Education

This paper discusses, in part, the importance of environmental education in the dive industry. It is therefore important to analyze how PADI integrates environmental education into their certification processes and materials, and how this is communicated to its partners and members.

#### 5.3.1 Project Aware

PADI was the first scuba training organization to establish a nonprofit organization dedicated to preserving the aquatic environment, the Project AWARE Foundation. In 1989, a group of environmental advocates from PADI founded Project AWARE with the stated mission of educating divers about emerging ocean issues and to encourage participation in underwater conservation activities. (Wantke, personal communication, April 25, 2013)



**Figure 14: Brand Logo Project AWARE (Source: Project AWARE, 2013)**

In 1993, the Project AWARE Foundation (Figure 14) became a separate nonprofit organization that raises much of its own funds and drives its own mission and goals. According to Constant (personal communication, April 29, 2013), the reason for becoming a separate foundation was to enable working with organizations other than PADI. However, the foundation still has a relationship with the PADI organization, and that partnership is extremely important. Not only does PADI support the foundation

with in-kind services and connect them with its network of divers and professionals around the world, it also helps Project AWARE to raise funds. As quoted on the AWARE website, *“Project AWARE would not be able to achieve our goals and mission without their support”* (Project AWARE Foundation, 2013). PADI divers can choose to voluntarily donate a certain amount of money to Project AWARE during the payment of any PADI certification course. PADI forwards the donation to the foundation and the dive students receive a special Project AWARE certification card. PADI carries out the necessary administrative efforts as well as production costs (Wantke, personal communication, April 25, 2013). In order to register a new student with PADI, the dive instructor fills out a form which collects specific certain information, including the contact information of the student, the applicable course for which certification is sought and a photo. One of the specifically included elements on the form promotes Project AWARE and includes the possibility of making a donation. However, it is up to the discretion of each dive instructor to mention this point or not, as it is voluntary and not a regulated standard from PADI.

According to Wantke (personal communication, April 25, 2013), the cooperation is very successful since both organizations see the importance of protecting the marine environment. Environmental protection thus gains increasing importance worldwide, while reinforcing PADI's goals and membership, hopefully allowing the cooperation of Project AWARE and PADI to expand. PADI and Project AWARE are working closely together on a day-to-day basis, and Project AWARE feels very lucky to have that relationship (Constant, personal communication, April 29, 2013).

In 2011, Project AWARE decided to update their logo (Figure 14) and website because they realized that they were attempting to cover a huge number of different marine conservation issues. They focused down to two main conservation projects, *Marine Debris* and *Sharks in Peril*. However, they are still developing other environmental education topics such as AWARE specialty courses (Constant, personal communication, April 29, 2013), which will be further discussed in 5.3.2 *Environmental Specialty Courses*. Project AWARE also improved the usage of media as a worldwide distribution channel to spread its conservation objectives. The informational sharing of news, project achievements and regional activities help to increase environmental awareness and conservation participation over the long term (Wantke, personal communication, April 25, 2013). Project AWARE just reached the impressive number of 100.000 *Likes* on their *Facebook* page, demonstrating that they are a worldwide organization with a steady demand and popularity (Constant, personal communication, April 29, 2013). Townsend (2008a) also argues that Project AWARE is an accepted and popular conservation foundation.

*"PADI's Project AWARE program is probably the largest, at least in its geographical coverage. It began in the US and now has programs in the United Kingdom, Australia, Switzerland and Japan. It has developed training and educational materials for divers, encouraged environmental activities and provided funds to groups for conservation projects around the world."*

(Townsend, 2008a, p. 140)

Project AWARE works closely with dive centers in order to promote their conservation campaigns, specialty courses and to receive donations from divers. Due to the fact that the foundation has a small team with a limited budget, it is not possible for them to meet with the dive centers on a regularly basis. As a result, they work closely with PADI's regional managers, who act as representatives for the foundation, by providing them with presentations and materials. The regional managers inform dive centers and instructors about news and current AWARE campaigns which allow the dive schools to pass that information along to their students. In this fashion, Project AWARE can profit from the huge dive network PADI maintains while spreading information and awareness about the foundation. (Constant, personal communication, April 29, 2013)

Project AWARE developed a program for dive schools to become a *100% AWARE* dive school. The idea is to get dive centers around the world to place ocean protection at the heart of their business, and to fund critical conservation initiatives. Their goal is a structure for dive schools where all PADI students also receive a Project AWARE



certification card by fulfilling certain environmentally-oriented criteria, and the dive school pays for the card rather than the student. In return, project AWARE provides the dive schools with valuable resources such as presentations, posters, and videos and helps to promote their environmental status. This is a very good fundraising tool for the foundation, and 100% of the donations go to their conservation projects (Constant, personal communication, April 29, 2013). Currently, Project AWARE counts 150 dive centers as being part of the 100% AWARE program, and those are prominently marked on a world map on their website. (Project AWARE Foundation, 2013)

### 5.3.2 Environmental Specialty Courses

Next to the courses discussed in 5.1.3 *PADI's Certification Courses*, PADI offers specialty courses with a focus on environmental issues within the dive sport. The following five courses mainly focus on the knowledge of the marine environmental and coral reef conservation: AWARE Coral Reef Conservation, Project AWARE Specialist, AWARE Fish Identification, National Geographic Diver, and Underwater Naturalist (Figure 12). It is important, however, to note that those courses are taken on a strictly voluntary basis and are not integrated into one of the mainstream courses such as the Open Water or Advanced Diver course.

The *AWARE Coral Reef Conservation* course can be done without prerequisite certifications and informs the diver about the world's coral reefs with the goal of making them aware of the fragility of coral reefs and how to preserve them. The study material is a 115 page PDF file, *AWARE: Our World, Our Water*, and can be downloaded free of charge from the website of Project AWARE. The course learning goals are (PADI, 2013):

- ✓ How coral reefs function
- ✓ Why they are vitally important
- ✓ Why many reefs are in serious trouble
- ✓ What students can do to prevent further decline

The *Project AWARE Specialist* course can also be done without prerequisite certifications. This course's objective is to teach the student about the most important problems facing vulnerable marine environments, and includes everyday actions the diver can take to help conserve them. The

course material is the same as in the above specialty course, *AWARE Our World, Our Water*. Those two courses are therefore self-study courses but are also offered by some dive schools. The learning goals for this course are summarized below (PADI, 2013):

- ✓ The ocean commons and coastal zone issues
- ✓ Fisheries challenges and sustainability
- ✓ Coral environment overview and inhabitants
- ✓ The role of the scuba diver in protecting aquatic environments

The next specialty course is the *AWARE Fish Identification course*, and the only prerequisite qualification is the Open Water Diver course. This course provides the diver with information on fish identification basics. This course can be counted as one of the specialty courses leading to the Advanced Open Water Diver certification. The learning manual is the same as the two above courses but includes two open water dives and the following learning goals (PADI, 2013):

- ✓ How to identify characteristics of local fish families and species
- ✓ Fish survey techniques and strategies
- ✓ How to practice fish identification dive planning, organization and procedures

The three courses mentioned above are all part of the Project AWARE foundation. The content of the three *AWARE* courses was developed by Project AWARE, and then published after consultation with PADI. They recently launched the *AWARE Shark Conservation Specialty* course, which was a huge success. PADI even offered to donate the instructor fees for the course to the AWARE foundation. Project AWARE is constantly searching for new instructors who are willing to teach the course. Furthermore, their strategic plan for the next few years involves updating all AWARE courses and to develop new courses, such as the *AWARE Manta Ray* or *AWARE Dive Against Debris*. (Constant, personal communication, April 29, 2013)

National Geographic also cooperates with PADI and created the *National Geographic Diver* course in order to expose people to the aquatic environment and to help them gain a better appreciation of the marine environment. The course focuses on improving specific diver skills to enable them to participate in exploration projects for science and discovery. During two open water dives, the diver will learn the theory provided in the learning material for the course, which is called *The National Geographic Diver Crew-Pak*, and which must be purchased in a local PADI dive store or online. (PADI, 2013)

The final environmental PADI course is the *Underwater Naturalist* course, and focuses on not just learning to identify fish and animals, but to also learn how they interact with each other and the environment. During two open water dives, the diver will have practical experiences learning some of

the details about the complexities of aquatic life. The learning material and equipment also need to be purchased in a local PADI store or online. (PADI, 2013)

None of those five courses that focus on environmental issues are listed on the '*most popular specialty courses*' list on PADI's website. *Most popular* specialty courses are, for example, Enriched Air Diver, Dry Suit Diver, Deep Diver, Wreck Diver and several others. One can therefore assume that those environmental courses are not very popular in the dive society. In addition, the specialty courses are not offered at every dive schools. Many dive schools offer only a small number of courses, and those generally include only the above mentioned *most popular* ones and not the environmentally-oriented courses. The choice of which specialty courses to offer depends upon each dive shop's availability to instructors that are willing and qualified to teach those courses, and, of course, on that shop's motivation for adding courses to their offerings.

### **5.3.3 Teaching material**

This subchapter discusses the educational materials distributed by PADI and looks at the amount and quality of the environmental issues that are included. However, this information is based only upon certification manuals dating from 2006 due to available literature reviews and the fact that newer versions of PADI material were not published or available during the research period. Despite their age, especially given the rapidly changing information about the world's oceans, this survey is applicable because that dated material is what current certificate-seekers must use. The Open Water Diver book is currently being revised and thus not available to the public, and it is not known what environmental information PADI plans on integrating into the new version. However, focusing on the currently-used manuals gives some insight into PADI's past emphasis on environmental issues relative to their other topics, and demonstrates that, at least as of 2006 and given the increasing awareness of oceanic issues at that point, they have some important improvements to make. Those areas of potential improvements are discussed in the following paragraphs.

In order to analyze the quality of the environmental education of PADI, the present education structures and teaching materials need to be discussed. According to Musa & Dimmock (2012), environmental education is crucial to the scuba diving industry as a means of ensuring the safety and protection of marine environments. Only limited research has focused on the content of diver certification courses. Therefore, the teaching material as well as quality and quantity of integrated environmental education of the PADI Open Water Diver, PADI Advanced Open Water Diver and PADI Instructor Diver manuals are analyzed in the following.

### ***Open Water Diver Manual***

The 2006 Open Water Diver Manual contains little information on environmental management or appropriate behavior within the marine environment. Project AWARE is mentioned on only two pages. On the first page, no detailed information is provided as to what this organization is about and how to become involved. The second page adds information about the website for Project AWARE, and points out that it is possible to join it as an active participant, but no further information about it is included in any chapter of the manual. As a consequence, the project does not really catch the reader's attention and can simply be perceived as advertisement. Furthermore, the 260 pages of the book include little general information on the fragility of marine life, threats to coral reef or environmentally conscious behaviors while diving. PADI's principles on these topics are restricted to core statements such as "*do not touch, do not disturb, do not interact.*" (Shreeves, 2006; Lindgren et al. 2008). That is a good maxim, but without including the reasoning behind such statements leaves it as unremarkable and unlikely to be remembered or followed.

Johansen & Koster (2012) conducted a study on the environmental content contained in the entry level manuals of three dive agencies, one of them being the PADI Open Water Diver Manual. In the study, the importance of low-impact diving and the significance of the creation of a personal diver's code of conduct is discussed, and the manuals were looked at with those issues in mind. The general literature on low-impact diving can be compiled into a list of 14 principles (Appendix 10). The study analyzed the content of the PADI Open Water Diver Manual according to the criteria of those 14 principles of low-impact diving, along with the current reef and general aquatic environmental knowledge. The results show that the PADI manual briefly lists 13 principles of low-impact diving, but those are mostly



**Figure 15: Divers very close to marine environment (Source: Shreeves, 2006, p. 217)**

found only on the previously-mentioned one advertisement page about Project AWARE (Shreeves, 2006, p. 84). Furthermore, the manual does not contain a diver's code of conduct or a list of responsible dive guidelines. According to Johansen & Koster (2012), this means that novice divers develop in-water behaviors as presented in the manual without learning important underwater ethics. Some elements of the manual specifically run counter to those low-impact principles, among them being contradictory images (diver very close to marine life [Figure 15], kneeling on the bottom, loose gear, etc.) and written messages. Since most divers learn their initial behaviors while obtaining certification and never go on to take further classes, it is important that environmental education is included in the initial manuals as one of the only sources for information for mitigating the impacts of dive tourism activities. If those activities are particularly skills-intensive, as is the case with scuba

diving, environmental education must also include practical skills training targeted to specifically teach a personal environmental code of conduct (Johansen & Koster, 2012).

According to Johansen & Koster (2012), the best opportunity to influence divers' engagement in environmental activities is during novice certification courses. Therefore, certification course material (manuals, videos, and instructor guides) should all include the topic of environment issues. In addition to that, methods for emphasizing environmental material is important due to the fact that the quality and educational experience of divers varies greatly in certification course length, maximum student group size, country and content. Thus the divers' training depends on both the quality of the instructional manual as well as the knowledge of the individual dive instructor and his or her emphasis on environmental aspects. Johansen & Koster (2012) argue that it is crucial to train participants in the principles and skills of low-impact diving, especially including the dive instructors. Emphasizing low-impact diving skills in all certification materials provides both novice and experienced divers with the ability to form personal scuba diver environmental codes of conduct.

#### ***Advanced Open Water Diver Manual***

The Advanced Open Water Diver certificate is a specialized certification as already discussed in 5.1.3 *PADI Certification Courses*, and contains a deep dive, a navigation dive and the completion of three specialty courses. In the context of environmental knowledge and appropriate underwater behavior, the following courses are relevant: AWARE Fish Identification, National Geographic Diver and Underwater Naturalist. The Advanced Open Water Diver manual contains chapters on these topics, and theoretically the student can choose all three courses, one or two, or none of these. Consequently, the level of environmental knowledge gained will depend on individual choices (Lindgren, Palmlund, Wate, & Goessling, 2008).

#### ***Instructor Manual Open Water Diver***

According to Lindgren et al. (2008), the theoretical section of the PADI Instructor manual from 2003 includes only one paragraph on environmental management, advising instructors to:

- ✓ Emphasize the need for each student to be especially cautious when diving over bottoms inhabited by organisms, for personal safety and to protect the aquatic organisms. [...]
- ✓ Emphasize that nearly all aquatic animals are non-aggressive and harmless, and to not chase, tease or threaten underwater creatures.

(Lindgren, et al. 2008, p. 124)

Apart from that, the manual provides information on course standards, which includes the Project AWARE courses, and what educational aspects should be included in those courses. Furthermore, the

instructor's manual gives information about a PADI initiative to reward environmental activities by individual dive centers. Dive centers have the opportunity to receive environmental awards if they have achieved the following goals within the past 12 months (Lindgren et al. 2008, p. 126):

1. Displayed information supporting the Project AWARE philosophy
2. Produced and distributed a quarterly communication piece (newsletter, flyer, postcard, email or publication) that includes information regarding environmental awareness and conservation
3. Conducted or sponsored one of the following:
  - ✓ A cleanup day at a local beach, lake etc.
  - ✓ A mooring buoy installation and/or monitoring projects
  - ✓ A research project that generated information about the aquatic environment
  - ✓ An event that benefited an environmental organization
4. Sponsored or conducted at least one of the courses: AWARE Fish Identification, National Geographic Diver or Underwater Naturalist

The environmental aspects mentioned above were cited from the 2004 version of the PADI Instructor manual. It is not known when a newer version will be available, or whether those versions might differ from current materials.

Most of the dive instructors interviewed did not remember having any environmental education included in their certification courses. However, it is important to note that all of the instructors were certified as a PADI Instructor more than 10 years ago, and that, since then, some of PADI's materials have changed, with some environmental aspects being added. The question still arises if those aspects mentioned are enough to create a greater environmental awareness in divers.

#### **5.3.4 PADI Green Star Award**

PADI recently introduced a program, the PADI Green Star Award. This program assists PADI dive centers and resorts in quantifying their environmental footprint and offers them a range of actions they can take to lower any negative effects. PADI developed a list of certain criteria a dive school needs to integrate into their business operations to receive the Green Star Award (PADI, 2013):

- ✓ Water conservation
- ✓ Energy conservation
- ✓ "Environmentally friendly" transportation practices

- ✓ Optimized waste management
- ✓ Use of sustainable materials
- ✓ Conservation leadership
- ✓ Paperless interactions with their PADI Regional Headquarters
- ✓ Donation to Project AWARE



PADI's regional managers check the operations with a point system and if dive schools act in accordance with the criteria, they receive the Green Star Award and can promote that fact to their customers. On PADI's general access website, which is available to everyone, only limited information is available about the award, and more information can only be received on the limited-access PADI membership website (PADI, 2013).

According to Wantke (personal communication, April 25, 2013), this award was successful at its inception, but further development and promotion is crucial. The PADI regional managers are tasked with trying to find potential dive schools to integrate this program. One obstacle is the fact that some dive schools only operate seasonally, thus integrating sustainable standards might not be beneficial for the short term of their operations. Furthermore, general environmental education is necessary because the priority of integrating sustainable business practices is not likely to be the same in every country.

### 5.3.5 PADI's Perspective on Environmental Education

An in-depth interview with one representative of PADI Europe was an interesting way to receive an insight into PADI's perspective on environmental education. With the implementation of the Green Star Award and the cooperation with Project AWARE, PADI acknowledges its responsibility towards the marine environment and tries to integrate those initiatives into their certification policy. However, as previously identified, environmental issues are not part of the survey sent out to students, and is not really integrated into the training manuals. According to Wantke (personal communication, April 25, 2013), the quality of technical instruction and the maintenance of safety standards are a priority for PADI, and environmental aspects would rather be the focus of Project AWARE. They want it to be clear that they are two separate organizations with different objectives, and this is also needs to be communicated in the material. Thus Wantke (2013) argues that environmental education and awareness creation is the task for Project AWARE, while PADI concentrates on safety standards to avoid an overlap of information. Discussing the fact that Project AWARE is not promoted in every dive school worldwide and that many students do not know about this foundation, Wantke (2013) pointed out that it is the responsibility of each dive school to

integrate environmental aspects into their training and to also teach that to the students. The work of Project AWARE is to create greater awareness and to teach how to best protect the environment. This is obviously an ongoing and challenging task given the large number of PADI dive schools around the world. In promoting the opportunity to donate to Project AWARE, PADI includes a space on the form used by dive instructors to register students. However, this is done only on a voluntary basis and depends on the personal interest of the dive school or instructor. According to Wantke (2013), one of their main challenges is to receive support from the dive schools as they have the direct contact with the customers and can share the function as a role model.

Consequently, it seems that PADI hands some of its responsibility over to Project AWARE and dive schools by saying that environmental education is the foundation's main task and that it is the responsibility of dive schools to promote it, while doing very little themselves. In fact, the experts and participants of the focus group discussion argue that this responsibility should be shared equally. Considering the market and influence power of PADI, the question arises as to why the promotion of Project AWARE is not a set regulated standard PADI sets for its dive schools, rather than being completely voluntary. By embracing environmental education more directly, PADI could integrate the importance of environmental protection and mainstream sustainability into their core business activities.

### **5.3.5 Customers Perspective on Environmental Education**

The discussion with the focus group of certified divers was a very interesting research tool for understanding the customer perspective on the issue, and for gaining insight into the perceptions of divers towards the dive industry. The focus group discussion was held in March of 2013 in St. Gallen, Switzerland, and six recreational divers discussed the topic of environmental education in the dive industry. All participants are holiday divers, and on average travel once or twice a year to specific destinations to integrate diving activities into their holiday. Out of the six participants, five were holding a PADI certificate and were completely unaware of the existence of the other certification organizations. The sixth diver has also completed an Open Water Dive course, but from a lesser known dive organization due to this being the only possibility at the destination. Results from the focus group discussion showed that environmental education was an insignificant component of their certification courses. It is also important to note that all participants obtained their certification within the last couple of years. All participants agreed on the fact that the topic of environmental issues was not really discussed during the course, except for the single statement to not touch anything underwater. One participant relayed that his dive instructor had said: *don't touch anything*, but then proceeded to touch a blowfish, soon after getting into the water, in order get it to inflate for

the students. This behavior confirms the points made in chapter 3.3.1 *Direct Impacts*, concerning the role of unconcerned/uneducated dive instructors in modeling appropriate behavior. The other participants were astonished by this story and agreed upon the fact that environmental education is crucial in the certification process and that it should be included and emphasized in the training material. One of PADI's only environmentally-oriented principles communicated in their manuals is to not touch any fish or coral, but there is not further explanation as to why this behavior is crucially important. In this particular example, touching is a dangerous stress for the blow fish. Consequently, the participants agreed that it is important to have at least one chapter on environmental issues included in the Open Water Diver manual in order to educate and train the divers in their initial and important diving careers. One participant emphasized that this is a very important topic and that the new edition would be a good opportunity for PADI to include such material into their educational manual. The other group members agreed and are convinced that PADI, being the largest dive training organization, is responsible for integrating this topic in the manuals.

When discussion moved to the foundation Project AWARE, only one participant had noticed its presence in Indonesia and Malaysia, and knew that it was possible to donate a small portion of their expenditures for diving to the organization. Everyone agreed upon the fact that this is a great way, as a diver, to engage in environmental conservation projects, and that paying a slightly higher amount of money is not an obstacle for getting involved. The major obstacle to that occurring, however, was the fact that the other five participants, with dive experiences in Australia, Ecuador, Columbia, Greece, Egypt, etc., were not made aware of the existence of this foundation and consequently had no opportunity to donate to it.

### **5.3.6 Expert's Perspective on Environmental Education**

Interviews with dive instructors, dive school owners, biologists and conservation managers resulted in an interesting and diverse perspective on the quality of environmental education from PADI. All PADI dive instructors agreed upon the fact that PADI has comprehensible standard guidelines for each member worldwide paired with up-to-date teaching materials. However, PADI has such a big market share and certifies such high numbers of students each month that it is difficult to ensure that those guidelines are implemented around the world in a uniform manner. According to Wagner (personal communication, February 19, 2013), there are always *black sheep*, meaning that there are always dive schools not operating according to the guidelines of PADI. PADI has consequently, and to their credit, implemented a Quality Management Program, as presented earlier in this paper, in order to find and stop the dive schools that are not operating according to PADI standards.

One interesting result was the opinion of conservation managers and biologists versus the opinion of PADI instructors in regards to environmental education. The conservation managers and biologists share the opinion that environmental education is of enormous importance in the dive sport and that dive organizations and dive instructors should have this integrated into their training schemes. Vasques (personal communication, April 17, 2013), for instance, shared the following opinion:

*"I think all of the diving certification agencies could do a better job of including the importance of the environment and basic environmental protection principles in their core Open Water dive courses."*

He states that this could be done in terms of a model or a chapter integrated into the course material. Wagner (personal communication, February 19, 2013), however, argues that much of the theory learned during the dive courses is lost over time, and that it is also essential for the students to be exposed to appropriate role models behaving correctly in the marine environment. Nevertheless, some of the PADI dive instructors interviewed felt that due to the limited time and the tight budget available during certification courses, it is difficult to also focus on other topics such as environmental awareness, and they thought that their priority was teaching safe dive skills. However, Sanow (personal communication, February 28, 2013) argues that a dive instructor has the responsibility to teach safe dive skills and also good diving practices:

*"I have to say as a dive instructor it is not my job to teach environmental awareness. The principle concern is to teach someone to be a safe diver but I also want to teach good diving practices and that's where reef conservation and appropriate behavior does come into play."*

Despite the disagreement between scientists and dive instructors, or because of it, it is obvious that if the world values the reef systems, dive training organizations and dive instructors are responsible for creating environmental awareness. After all, no one else interacts with divers personally, and organizations are also the ones profiting most directly from diving in intact coral reefs.

#### **5.4 Responsibilities of PADI towards the Marine Environment**

As already briefly discussed in the previous chapter, PADI as well as dive schools and instructors share the responsibility towards the marine environment because they make their money from it and their training is directly responsible for the vast majority of divers impacting the reefs. All stakeholders involved in the diving industry have the responsibility to protect their own source of income, which is the environment. Within the last few years, many stakeholders of the diving

industry have recognized their responsibility for an interest in environmental conservation, but this awareness has, in large part, not filtered down to the people in the shops and water.

### ***Corporate Social Responsibility***

The term *Corporate Social Responsibility* (CSR) has been adapted in different forms and to various levels by many companies, and is particularly pertinent in this discussion of PADI. According to Blowfield & Murray (2008), "*Corporate Social Responsibility begins where the law ends*".

The following components are relevant for a successful CSR strategy: it should mainstream social responsibility in the organization, it should focus on all stakeholder relations as well as on ethics and transparency, the company should take responsibility for its own impacts and the CSR strategy should be implemented on a voluntary basis (Buijtendijk, 2012). The motivation to implement a CSR strategy is to secure the company's *license to operate*. According to Blowfield and Murray, the license to operate is "*the public's acceptance of a company's impact on wider society*" (p. 45). In a rapidly changing business environment, businesses need to be innovative in order to maintain the license to operate and keep a competitive position in the market place (Blowfield & Murray, 2008). One way that they can be innovative is to take the steps to embrace CSR. One relevant goal of the *license to operate* is to ensure successful future business, and due to the fact that dive business takes place in the marine environment, it is crucial for PADI and all other stakeholders involved to protect and conserve that environment.

PADI, together with other stakeholder benefitting from dive tourism, has corporate responsibility towards the environment and they want to secure the license to operate in order to secure its position as a market leader. PADI's current main responsibility, as they see it, is to teach safe dive skills and to provide the dive industry with safe and coherent teaching material. PADI's goal is to teach recreational divers how to have a unique, safe and easily accessible experience with teaching materials of high safety and educational standards (Wantke, personal communication, April, 25, 2013). This is also the main message they communicate in their mission and vision statements presented in *5.1.1 PADI's Mission Statement*. With their cooperation with Project AWARE, PADI seems to signal that they care about protecting the marine environment. However, a counter-message is sent by the fact that the caring is not integrated into their mission statement. Interviews, experts as well as the participants of the focus group discussion share the opinion that anybody engaging in the marine environment has a responsibility to also conserve that environment. One participant made a comparison with the certification process involved in obtaining a driver's license. During the course the priority is to learn how to drive safely, but also other important skills are included, like how to be lenient towards the traffic environment, and how to develop energy-saving

motor skills. Thus the student does not learn to drive safely in isolation, but also learns to be aware of the transportation environment as a whole. Thus, PADI has the societal responsibility to not only teach safe dive skills, but to also integrate information on responsible diving skills and communicate the importance of marine conservation. A way to do this would be to integrate responsible diving guidelines into their certification manuals. The online tour operator *Responsible Travel*, for example, developed guidelines for appropriate diver behavior (Appendix 11) (Garrod & Gössling, 2008). The participants of the focus group discussion agreed upon the fact that PADI would demonstrate their acceptance of responsibility towards the environment if they integrated those guidelines and further information on the topic of the marine environment into their certification manuals, especially in the Open Water manual, as the majority of divers do not move beyond this certification. However, at this point it needs to be mentioned again that a recent version of the Open Water PADI manual is not yet available and it is not known which environmental elements the new version contains.

***Discussion: Who is Responsible at Dive Destinations?***

It is crucial to also define responsibilities that fall on businesses at dive destinations, especially in highly visited sites such as Hurghada, Egypt, as discussed in *Chapter 4: Case Study: Diving Tourism in Egypt*. Looking at the results it is obvious that the reef is overrun by the many unregulated dive tourists who visit it, and that there is a lack of management structures available to limit those dive numbers. Those mass diving activities have resulted in tremendous degradation of its coral reef. It is therefore interesting to discuss who is responsible for reducing the negative environmental impacts at such dive destinations.

Dive experts and the participants of the focus group agree upon the fact that the responsibility needs to be shared with the stakeholders involved and benefitting from diving tourism. Certainly, each destination is subject to different power structures, which makes it incredibly difficult to issue a “one size fits all” rule. There are, for example, destinations where the local community owns the marine environment and thus is powerful in the decision making processes that affect it. At other sites, the local governments and communities have no control of their reefs, and all decisions affecting them are made at the national level. The different power and government structures found at destinations make the discussion on responsibility even more complex, consequently making generalizations in this regard very difficult. In the context of the Western European culture, for example, it is the duty and power of the local government to control and regulate dive business activities. They could frame the conditions under which local businesses operate, like setting a maximum number of dive businesses for a certain region, and/or limiting the dive numbers at certain sites. In other parts of the world, there can exist either no unifying structure for enforcing overall standards, or that structure can be so remotely located from the dive site that actual management is extremely unlikely.

Dive schools and resorts have a huge responsibility because they directly benefit from the marine environment. They have the direct contact with the clients, they take the tourists to dive sites and they train divers. Therefore, they have a huge impact on the happenings at the destinations. A dive resort, for example, has the power to limit its dive numbers at a specific dive site, and thus can greatly contribute to the protection of that reef. Dive schools can become *100% Aware* or receive the *Green Star Award*, as presented in *Chapter 5.3 Quality and Quantity of Environmental Education*, and thus have the power to communicate the importance of sustainable dive operations and marine conservation ethics directly to its customers.

Also on the local level, PADI's regional managers consult and support dive schools and resorts. According to Wantke (personal communications, April 25, 2013), PADI's regional managers do not only control and monitor whether or not dive schools operate according to the set standards of PADI, but also take on the role of consultants. They might say, for example, that at popular dive sites it does not make sense to open a new dive shop because the demand does not exist. In this case, opening new dive shops might result in an unsuccessful business performance, which is also not a desirable situation for PADI. However, obviously, PADI is a for-profit business and works towards the expansion of memberships and dive shops around the world. Wantke (2013) explained that PADI, as the largest training organization, has a huge influence on dive schools, and that it is also PADI's goal that dive schools are successful. This demonstrates that PADI could take on the responsibility of leading dive schools towards sustainable business operations by promoting, for example, Project AWARE or the Green Star Award, or by refusing to certify any new shops as PADI-approved in crowded areas. However, advising some destinations to stop opening dive centers might conflict with the business objectives of PADI and make that a difficult goal to achieve.

The above discussion points out that all stakeholders in the diving industry have critical roles in teaching divers the knowledge and skills required to behave responsibly in the marine environment. At each destination, the government, local dive shops and resorts, but also PADI regional members, need to share the goal of working towards more sustainable dive operations in order to secure future dive operations. Sharply (2009) argues that one path towards sustainability may lie in the *Concept of Destination Capital*. With this concept, each area would understand that they possess a variety of capitals, such as environmental capital, human capital, socio-cultural capital, economic capital and political capital. Those capitals would be exploited by each area in the way that meets the local objectives and the need for environmental sustainability. The idea is that destination-based stakeholders should take the initiative, as they have the intrinsic motivation to preserve the destination. The concept places the focus on each individual destination needing to work on development and environmentally sustainable objectives, as each destination has a different set of

resources, stakeholders and power structures. Thus, individual destinations concentrate on their own local resources and possible solutions, rather than being subject to the implementation of global concepts that might not be appropriate for that destination (Sharpley, 2009). Jason Vasques from the *Coral Reef Alliance*, confirms the fact that each destination has an own set of resources, and for effective marine conservation it is crucial to analyze the destination structures and then develop suitable projects. However, this concept focuses on the stakeholders at a certain destination and leaves out other stakeholders of the dive industry, such as PADI. PADI, as being a for-profit business operating worldwide does not share the same motivations as destination-based stakeholders, and thus might see its responsibility towards marine conservation at destinations from a different perspective. That fact could be one of the main obstacles for destination managers as they might not get the support from PADI in conservation issues.

### **Chapter conclusion**

The chapter gave an insight into the largest dive training organization, PADI, and outlined the way PADI operates in the global dive industry. After analyzing the certification requirements that PADI has for its members, it can be concluded that is relatively easy to become a PADI member by following their rather straightforward guidelines. PADI has quality and safety standards which are globally accepted, and offers a variety of certification courses that range from recreational diving to difficult professional diving. PADI has a quality management program in place to ensure that every professional member acts according to their set standards, and communicates this in a very transparent manner on their website. After analyzing the quality and quantity of environmental education found in PADI materials, interesting results are found. Overall, PADI puts some emphasis on the collaboration and promotion of the foundation Project AWARE, and is proud to have this cooperation. They offer environmental specialty courses, as well as recently launching a Green Star Award for dive schools. However, literature review and experts feel that it is not really integrated into their business operations and that PADI, as the largest training organization, could do much more to create greater environmental awareness. PADI, as well as dive schools and instructors, share responsibility towards the marine environment because they are the huge monetary benefactors of the reef, their very existence relies on at least somewhat healthy reefs and they are the people training and overseeing the reef visitors. There is great potential here for PADI to improve its environmental education and awareness, particularly in the PADI course manuals, which will thus help it maintain its competitive advantage in the dive industry.



## Chapter 6: Conclusion and Recommendations



## Chapter summary

The previous chapters outlined the characteristics of diving tourism and how the dive sport can harm coral reef areas. Intense research about the environmental impacts of diving tourism on coral reef areas showed that the dive sport industry needs to manage and conserve those fragile areas. This chapter gives answers to all research questions, outlines the main findings of the work as well as develops identified recommendations for PADI on improving their certification policy and environmental education in order to limit the negative environmental impacts of diving tourism.

## 6.1 Conclusion

### *Diving Tourism*

In order to answer the first research questions: *What are the characteristics of diving tourism in coral reef areas*, intense secondary as well as primary research was conducted. The research showed that scuba diving has been a recreational activity over many years and that the growth of international dive training organizations, such as PADI, made access and certifications possible for the mainstream market. It is currently one of the fastest growing recreational sport activities and is particularly popular as a holiday activity, especially at tropical destinations where coral reef occurs. Research has shown that this growth is going to continue. Along with an increase in education and wealth levels worldwide, the ability to learn to dive at almost any location in the world, to become qualified in a relatively short period of time and in favorable conditions have contributed to this rapid growth. As one consequence, the economic value of dive tourism has risen sharply, and more and more countries, especially developing countries, have recognized the economic importance of the diving tourism market. However, compared to the global tourism industry, it still remains a niche tourism market for most of the more developed countries.

When analyzing trends and developments of diving tourism, some interesting conclusions can be reached. One important and resilient trend in the diving industry is the low number of divers who do not move beyond the beginner Open Water Dive course. According to the consulted dive shop owners, around 70% of primary certificate holders do not continue with further certifications and might only practice their dive skills once or twice a year, thus probably never achieving high levels of routine underwater skills mastery. Another trend shows that there is an increasing tendency to certify divers in a short amount of time while on holiday, and thus the course might lack important educational and safety components. The research found that irresponsible behavior is often due to

inadequately trained and environmentally unaware participants, and that the focus of the Open Water Course is on safety rather than on environmental aspects.

### ***Environmental Impacts of Diving Tourism***

With the help of literature and expert consultation it was possible to outline an impact study of diving tourism on coral reef areas in order to answer the second research question: *What are the environmental impacts of diving tourism on coral reef areas*. Coral reefs are under enormous global threats from over-fishing, pollution, increasing ocean temperatures and coastal development, including tourism and ocean acidification. The scientific literature makes it clear that high numbers of coral reefs are under a serious threat of disappearing in the next 20 years. Along with the global threats, many coral reef areas also have to cope with the direct impacts of tourism activities such as diving, snorkeling and boat anchoring. In Egypt, dive tourism is seen as one of the major direct causes of reef degradation, and scientific studies confirm that negative impacts and its cause, especially at crowded dive sites. Along with the direct negative environmental impacts such as direct human contact with coral, harassment of wildlife and boat anchoring, there are also indirect impacts, notably the coastal tourism development infrastructure with its demands on food from the ocean and poorly regulated sewage treatment. Increasing dive industry competition has multiplied these effects. Most of the direct negative human impact is the result of the lack of environmental education during the certification process, the absence of necessary dive skills, and/or the simple ignorance or thoughtlessness of the individual.

In a discussion of environmental impacts on the reef, the potential positive impacts are also important to mention. The most obvious positive impact is the increase of economic income and employment in the surrounding communities. Furthermore, dive tourism can provide incentives for reef conservation, as the reefs themselves are the source of that tourism income. This has manifested itself in such ways as charging dive fees for reef conservation projects, increased environmental education and awareness and governments and communities changing their management structures. An important group for a change in conservation ethics is the diver him or herself, who can be actively involved in protecting the environment they so appreciate. It is essential to concentrate on those people who are interested in the topic and who are willing and able to make a difference due to the fact that change from the outside will almost certainly not occur.

### ***Environmental Education***

Research has demonstrated that there is a lack of environmental education in the dive sport industry that most divers do not know the consequences of inappropriate behavior on coral reefs and have little knowledge concerning the biology of coral reef areas and marine environments. The main

evidence of this is the fact that the PADI introductory level Open Water courses focus almost entirely on teaching safety skills rather than on environmentally-friendly dive behaviors. Due to the fact that the majority of divers never continue their diver education beyond the most basic level, it can be concluded that virtually all divers have little knowledge about environmentally sound behaviors while participating in their sport. A further compounding fact is that most divers do not dive on a regularly basis and consequently do not practice their dive skills enough to retain what little environmental education they initially received, and their lack of practice also leads to common mistakes that damage the reef. Experts agreed that it is extremely important to create environmental awareness in this group, but that it is also the most challenging group to reach as they do not dive regularly. These facts make it essential to prioritize this topic in the beginner courses, and experts agreed upon the fact that if a diver understands and appreciates the marine environment, he or she will be much more concerned about protecting it. Therefore, environmental education at the early levels is tremendously important in the dive sport, and studies have confirmed that divers respond positively to the communication of ethical environmental behaviors, which would then hopefully lead to changes in underwater behavior. However, it is not only important to emphasize the environmental education for beginner divers, but also for dive instructors. The research showed that dive students tend to copy the behavior of their dive instructors, and so dive instructors should also have a grounding in environmental awareness and behaviors that will be passed on to their students.

Consequently, environmental education is accepted as one of the best practices for mitigating the impacts of diving tourism on coral reefs, and all stakeholders involved and benefiting from diving tourism should have environmental education placed prominently on their agenda. However, due to the fact that environmental education and awareness is not globally available, the weight of this responsibility falls on the only organization with which the majority of divers interact - PADI.

### ***Environmental Education of PADI***

Having discussed the negative environmental impacts of diving tourism on coral reef areas and the lack of environmental education and awareness, it was interesting to analyze how the largest international dive training organization, PADI, integrates the issue of environmental education into their certification policies and study material. With this research, it was possible to answer the third research question: *What are PADI's certification requirements for divers, instructors and dive schools and how are environmental issues included.* The available but dated literature did critically analyze the teaching manuals of PADI, and concluded that very little environmentally-oriented material is included in them, particularly in the 2006 version of the beginner-level Open Water manual. There is not a separate model or chapter concentrating on issues such as the threats to coral reef, the

consequences of diving tourism or how the diver can minimize those impacts with the help of responsible diving guidelines. The Open Water manual focuses on teaching safe dive skills, and only briefly mentions appropriate underwater behavior and protection as a side topic. There is room for hope on this issue because the Open Water manual is currently under revision, but it is not known how much environmental education is going to be included.

After much research and personal communication, it was possible to draw some tentative conclusions that differ a bit from the findings outlined in the literature, in that PADI has initiated and cooperated with some programs that do emphasize environmentally sound behaviors. With their cooperation with Project AWARE and the recent implementation of the Green Star Award, PADI has signaled a growing awareness of its responsibility as the market leader and a desire to strive for a more sustainable path within the dive industry. Even though not a direct part of PADI, that organization does work closely with the Project AWARE foundation and is making headway in promoting it with its members. Project AWARE is integrated into the promotional material of PADI, as well as on some forms which must be filled in by associated dive schools. Furthermore, PADI offers AWARE specialty courses that do emphasize environmental topics. However, according to experts, there are still many dive schools around the world that do not offer Project AWARE, and many divers are unaware of the foundation. It appears that both organizations are trying to remedy this situation by a more consistent promotion of the foundation in order to increase its impact and to receive donations for conservation projects. The Green Star Award was recently implemented and is awarded to dive schools if they operate according with more sustainable criteria that PADI has set out. This may prove effective in that PADI has a transparent quality management program that controls all PADI members' work and training according to the worldwide accepted quality and safety standards.

The research showed that PADI does recognize, at least in part, its responsibility as the largest diver training organization, and has developed, particularly in the recent years, some important programs to create greater environmental awareness. However, those programs are not currently directly integrated into the core activities of PADI, and therefore some recommendations are formulated below on how PADI could improve this situation.

## 6.2 Recommendations for PADI

The following recommendations are relevant and specifically designed for the international training organization PADI, and will answer the fourth research question: *What are some identified improvements that could be made in the certification policy of PADI that might limit the negative environmental impacts of diving tourism on coral reef systems.* The extensive research resulted in a number of feasible recommendations on how PADI could improve their certification policies in order to create greater environmental awareness and educational levels, with the hoped-for outcome of reducing the negative environmental impacts of the diving tourism they are so successful at promoting. The following recommendations for the training organization PADI have been identified:

### ➤ Environmental Questions Integrated into the Survey

Given the fragile nature of the reef environment, it would seem wise to include some environmentally-oriented questions that are based on information from the PADI Open Water manual in the survey PADI randomly sends out to students after their completion of a PADI course. Experts as well as representatives from PADI and Project AWARE agreed upon the fact that this would be a very interesting, feasible and low-cost method of introducing and reinforcing new environmental ideas into their certification policy. By sending out the survey, PADI receives insights into whether the dive instructor and/or dive school worked and trained the participant according to the quality and safety standards of PADI. The instructors know what the content of the survey concerns, and consequently attempt to meet those standards. Currently the survey does not include questions related to environmental issues. If PADI were to add two or three questions on environmental education, the dive instructor would be much more likely to integrate that material into their training program, and PADI would also be modeling the idea that environmentally sound behaviors are one of their priorities. Furthermore, PADI as well as Project AWARE can collect the data from the surveys and directly interact with schools that are under-performing in this area, as they do on the safety standards they issue.

The following recommended questions could be included in the survey:

- ✓ Did your dive instructor demonstrate appropriate underwater behavior by never touching or harassing aquatic life during the course?
- ✓ Did the dive instructor emphasize and explain the importance of protecting the marine environment, and describe how to behave as a *guest* underwater?
- ✓ Did you learn about the importance of best practice dive skills for minimizing negative environmental impacts during a dive?

- ✓ Did the dive school promote Project AWARE and mention the possibility of donating to it as a way of maintaining the health of the reefs that you hope to visit?

Integrating those kind of questions into the survey would not take much effort, cost or time, but could have a huge impact. Obviously, dive guides and schools want to offer high quality education in order for them to continue being a part of PADI, and the questions would therefore motivate them to integrate environmental aspects into their trainings.

#### ➤ **Improved Environmental Education in Certification Manuals**

The research, as well as the opinion of the consulted experts, agreed upon the fact that the certification manuals of PADI, especially the Open Water Diver manual, include little information on environmental education. In an effort to reduce damage to coral reefs, it is therefore advisable to add one chapter on environmental education in all manuals. The chapter could be designed with the help of the Project AWARE foundation as they already have the *AWARE: Our World, Our Water* report with relevant information on the marine environment. The information of this report could be used to compose a new chapter, which, along with other things, should include the following information:

- ✓ the importance and general threats to coral reefs
- ✓ the environmental impacts of diving tourism on coral reefs
- ✓ the most common mistakes made by divers and what consequences this could have on the marine environment
- ✓ possible conservation programs a diver can become a member of or actively involved with, such as Project AWARE
- ✓ best diving practice guidelines, as presented in Appendix 11
- ✓ contact information for divers to report inappropriate behavior by dive guides/schools
- ✓ information and recommendations on how to identify environmentally sustainable dive schools, such as 100% AWARE or Green Star Award dive schools
- ✓ guidelines for sustainable dive holidays, such as reducing water usage, choice of dive school, not eating marine organisms that are threatened in that area, etc

Integrating such a chapter into the certification manuals would create and communicate a greater environmental awareness. Most of the information, for example, on the foundation Project AWARE or the Green Star Award are located on the website of PADI, but a member needs to actively search for that information. This recommended chapter would make all the relevant environmental information easily accessible to the student. In the end, the student

would have the choice on whether to read the chapter or not, but PADI, as the leading training organization, would have at least increased its emphasis on this important aspect of its work. This might create a higher environmental awareness and possibly reduce negative impacts by divers. By also including questions on that material during the certification process, PADI could, in one fell swoop, have a much larger positive impact. Virtually all new certificate recipients in the world of diving would be exposed to at least a minimum of environmentally sound diving practices. In offering high environmental standards, PADI could also maintain or even improve its competitive advantage in the dive industry.

Furthermore, it is recommended that additional information be included in the PADI dive instructor manual, next to the environmental chapter. It is crucial to integrate environmental standards for dive instructors as they are the ones directly interacting with the students, and, as such, have a very important role in creating environmental awareness. The following recommendations should be integrated into the Dive Instructor certification manual:

- ✓ dive training should only be done in sandy areas to reduce impacts on corals
- ✓ dive instructors should intervene in the case of a student disregarding the environmental code of conduct
- ✓ an environmental briefing should be done before each dive to discuss the ecological importance of the dive site
- ✓ not exceed the maximum number of individuals in dive groups in order to supervise behavior adequately
- ✓ the instructors should model appropriate environmentally sound behaviors and explain why they act in that way
- ✓ instructor should briefly mention the Project AWARE foundation and the possibility to donate

➤ **Cooperation with other Conservation Organizations**

Currently, PADI cooperates with two organizations focusing on environmental aspects, the Project AWARE foundation and the National Geographic organization. Another recommendation for PADI would be to reinforce that network and also work with other conservation groups. The research identified, for example, two interesting organizations that offer programs directed at divers which would enhance the material in PADI's courses.

*The World Federation for Coral Reef Conservation* developed a program, as presented earlier in this work, named the *Long Term Diver Participation Program*, which is a coral reef

conservation program directed specifically at divers. The diver has the possibility to collect valuable data during dives and enter that collected data into a globally-accessible database. This way, important information about the status of coral reefs can be collected and shared worldwide, and effective conservation measurements could then be designed. This program could be linked to the PADI National Geographic Diver specialty course, as the idea behind it is to explore the underwater world in a manner similar to those who dive for science and discovery. By participating in those dive programs, the diver would gain a better appreciation of the marine environment and could actively participate in protecting the environment. Furthermore, important data on the marine environment would be collected and shared with other stakeholders.

Another conservation organization, the *Coral Reef Alliance*, developed the *Coral Reef Sustainable Destination Model (CRSD)*. This program was designed to be implemented at dive tourism destinations, with the fundamental principle of making reef conservation relevant to local communities and to manage tourism development. The model combines marine protected area (MPA) management and sustainable business operations for community benefit. The model establishes six broad indicators to measure the sustainability of the destination, and they work directly with the stakeholder at the destination to reduce impacts and threats to coral reefs. It is therefore recommended that PADI cooperate with this organization by having its regional managers promote this model at destinations where they see the need for more sustainable business operations. The model can be integrated into PADI's Green Star Award, as both programs focus on the integration of sustainable business practices to reduce negative environmental impacts.

Furthermore, it is recommended that PADI also cooperates with global conservation agencies such as the World Wildlife Fund (WWF) or Greenpeace, as they have a good reputation and tens of thousands of members worldwide. Both organizations also have campaigns related to ocean topics, such as the problem of over-fishing and the establishment of marine reserves. Thus the sharing of available resources and cooperation could be interesting for PADI and its members and enhance all of their positive impacts on the environment.

➤ **Regulated Environmental Standards**

Currently, the certification policy of PADI contains certain standards involving environmental issues, such as not touching marine life. It was identified that the environmental programs such as the Green Star Award or the promotion of Project AWARE are participated in on a voluntary basis and that participation is not regulated by PADI. Therefore, it is recommended

that PADI sets certain regulated environmental standards, next to the safety standards, that each dive school need to implement and thus foster environmental education. One regulation could be that each dive shop has project AWARE material available for the students and actively promotes it, for example, with the following methods:

- ✓ hanging up posters of Project AWARE
- ✓ mention the foundation and its projects during the training courses
- ✓ show the promotional video of Project AWARE
- ✓ give information on the possibility for donations
- ✓ promote AWARE Specialty courses

If each PADI dive shop worldwide would integrate the promotion of Project AWARE into their certification courses, the importance of environmental protection and awareness creation would greatly be communicated to all divers. Project AWARE can, in this way communicate its messages of environmental protection to a larger network of divers with the hope of greater support for future projects. With this approach, PADI would integrate the importance of environmental protection and mainstreaming sustainability into their core business activities.

Another way for PADI to mainstream sustainability into their core business activities is by greater promotion of the Green Star Award to dive schools. As this program is relatively new, PADI can still improve the program in order to achieve a larger participation rate. It is recommended that PADI provide lucrative incentive for dive schools to receive the Green Star Award. PADI could offer, for example, the reduction of the monthly license fee for one year or a special promotion if a dive shop successfully implements the Green Star standards. That might give dive schools worldwide a greater inducement to implement sustainable business practices and PADI would make a huge contribution towards more sustainable dive business operations. It is furthermore recommended to also promote this award system to PADI's divers as they also have the decision power to opt for a Green Star Award dive school. Currently, it is difficult to find information on the Green Star Award on the official website. It is also crucial to create the awareness among students that in choosing and supporting Green Star dive schools, they can have a huge impact. Thus it is recommended to make the award system more visible on the website, empowering students and recreational divers as a powerful group in supporting those responsible operating dive schools.

➤ **Reinvest Membership Fees**

Coral reef areas at dive tourism destinations are often exposed to negative environmental impacts due to a lack of availability for the funding of marine conservation projects. All stakeholders benefitting from the dive tourism industry share the responsibility in conserving the fragile environment. Therefore, it is recommended that PADI use part of the monthly membership fees from dive schools to reinvest it in conservation projects at specific destinations. A number of dive sites in Egypt, for example, have clearly sustained significant damage to the coral reefs due to their massive diving tourism numbers and usually those dive sites lack necessary funding for conservation projects. As the availability and accessibility of healthy natural reefs are considered to be essential prerequisites for the dive sport, it is also in the interest of PADI to secure a healthy coral reef status for its future business. There are various new alternatives in which PADI could incorporate economic interests and at the same time reduce diving pressure on the reefs, such as investing in alternative artificial underwater parks. This concept of artificial underwater scenery is argued to be capable of meeting the demand of recreational divers, and such installations could also serve as facilities for other purposes, such as environmental education, reef rehabilitation or as dive training. Those artificial parks could secure, especially in already degraded coral reef areas, a successful long-term dive industry, which is also the objective of PADI.

➤ **Recommendations for Further Research**

The research period was limited to 20 weeks, and within the scope of this work it was not possible to do further research on other dive training organizations and how they integrate environmental topics. It is recommended that research be done on how those other dive training organizations integrate environmental topics into their material, and how successful those programs are, if they exist. It would also be interesting to further research the effects of environmental education on dive tourism impacts. It is further recommended that PADI's newest manual be analyzed upon its release to see how they integrate environmental issues in their most up-to-date materials. Further research should be done on how dive destinations and their stakeholders might best cooperate to secure a sustainable dive tourism industry and what kind of alternatives conservation methods are feasible.

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# Appendices



## Appendices

Appendix 1: Overview of Expert Interviews and topic list .....	97
Appendix 2: Participation- and Topic List of Focus Group discussion .....	100
Appendix 3: Comparison of coral reef areas and dive hotspots worldwide .....	102
Appendix 4: Possible continuums of diving tourists.....	103
Appendix 5: Reef at risk Global 2011 and 2050 .....	104
Appendix 6: Tourism Figures of Egypt.....	106
Appendix 7: PADI World Certification history per year.....	107
Appendix 8: Membership Requirements and Application to open a PADI dive shop.....	108
Appendix 9: Summary of Routine Quality Assurance Inquiry .....	112
Appendix 10: 14 Principles of Low-Impact Diving .....	113
Appendix 11: Guidelines for Appropriate Diver Behavior .....	114
 <b>On the attached CD on the backside of this work:</b>	
Appendix 12: Transcription of the Interviews .....	115
Appendix 13: Transcription Focus Group Discussion .....	151

## Appendix 1: Overview of Expert Interviews and topic list

### 1. List of Expert Interviews

Nr.	Interviewee, (Nationality)	Profession	Dive Education	Dive Experience	Place and Date	Interviewer & Type of Interview
1	<b>Uschi Noack, (German)</b>	Freelancer	PADI Instructor, Cave Diving, VDST	More than 2000 international dives	Hamburg, 18.01.2013	A. Glückstadt, Face to face interview
2	<b>Felix Kollschegg, (German)</b>	Dive Instructor and Dive Shop owner in Hamburg	SSI and PADI Instructor	More than 2000 international dives	Hamburg, 01.02.2013	A. Glückstadt, Face to face interview
3	<b>Dagmar Krüger, (German)</b>	Hamburger Tauchsport Verbund VDST (German dive-sport alliance): Biologist in Department Environment & Sciences	Research diving certificate and trainer from VDST	More than 1000 international dives and scientific dives	Hamburg, 04.02.2013	A. Glückstadt, Face to face interview
4	<b>Bihari Berecke- Queisser, (German)</b>	Dive Instructors and Dive Shop owner in Hamburg	PADI Instructor	More than 2000 international dives	Hamburg, 06.02.2013	A. Glückstadt, Face to face interview
5	<b>Wulf Westphal, (German)</b>	Dive Instructor	PADI Instructor	More than 2000 international dives	Hamburg, 06.02.2013	A. Glückstadt, Face to face interview
6	<b>Alice Auendorf, (German)</b>	Master Student Oceonography & Biology	PADI Dive Master and research diver	More than 300 dives and research dives	St. Gallen 14.02.2013	A. Glückstadt, Skype Interview
7	<b>Eduard Wagner, (German)</b>	Dive Instructor	PADI Instructor, SSI Instructor	More than 900 dives and international work experience	St. Gallen 19.02.2013	A. Glückstadt, Face to face interview
8	<b>Jeffery Sanow, (American)</b>	Dive shop Owner in Indonesia, Dive Instructor and Conservation Manager	PADI Instructor and HAS (Handicap Scuba Association) Instructor	More than 1000 dives and manager of conservation projects	Indonesia 01.03.2013	A. Glückstadt, Skype Interview

Nr.	Interviewee, (Nationality)	Profession	Dive Education	Dive Experience	Place and Date	Interviewer & Type of Interview
9	<b>Vic Ferguson, (American)</b>	President/Founder of 'The World Federation for Coral Reef Conservation' (NGO)	YMCA (Young Men's Christian Association) dive license	More than 2000 dives and manager of coral reef conservation projects	Houston, Texas, USA 13.03.2013	A. Glückstadt, Skype Interview
10	<b>Jason Vasques, (American)</b>	Assistant Director of Conservation Programs with the 'Coral Reef Alliance'	PADI Master Diver certification	More than 2000 dives and international conservation experiences	San Francisco, USA 17.04.2013	A. Glückstadt, Skype Interview
11	<b>Paula Wantke, (German)</b>	Marketing Manager of PADI Europe	Not known	Not known	St. Gallen 25.04.2013	A. Glückstadt, Skype Interview and document s
12	<b>Jennifer Constant, (British)</b>	Associate Director Fundraising for Europe, Middle East, Africa of Project AWARE	Not known	Not known	St. Gallen 29.04.2013	A. Glückstadt, Skype Interview

The transcriptions of all above listed interviews can be found on the attached CD on the backside of the work in Appendix 12.

## 2. Topic List for dive schools and instructors:

### Certification Process

1. What level of dive education and experience do you have?
2. Which dive organization is your cooperation partner in case you have a dive school? What are the advantages and disadvantages of this dive organization?
3. How does the cooperation with a dive organization work? How is the certification process/procedure (during the dive trainings but also to e.g. open a dive school) with for PADI?
  - a) Could you identify improvements during the certification process?
4. In order to cooperate with PADI, what kind of requirements does a dive school need to fulfill?
  - a) Does PADI control certain requirements also related to environmental issues? Is there a code of conduct?
5. Is there an increased demand for dive certifications over the last years? And how many are doing further courses after the Open Water? Are there statistics?
6. What is your opinion about the dive industry in Thailand/Egypt?

### Environmental Education

1. What are in your opinion the most common **mistakes of divers**?
  - a) Is there a significant difference of novice and experienced divers?

- b) Could you identify reasons for that?
  - c) Which environmental impacts on coral reef can that provoke?
  - d) Have you made personal experiences with negative behavior towards the marine environment?
2. What do you think in general about the **environmental education** on the dive sport industry?
    - a) Is it an important issue or is it gaining more importance?
  3. How important is a briefing before diving? Do you include environmental aspects in your briefings?
  4. In case you see a diver underwater touching or breaking off coral, what would you do?
  5. What is your opinion about the **environmental education** in the study material **of PADI**?
    - a) The Open Water Book of PADI has one page of environmental impacts of divers, do you think that this information is enough to discuss the environmental impacts of dive sport?
    - b) During the education to become a PADI Dive Instructor, how much importance is set on environmental issues?
    - c) Could you identify improvements of environmental education? What should be done in your opinion?
    - d) What would be an appropriate duration to certify as an Open Water diver? Why? Is there a mandated minimum length?
    - e) If there is a lack of environmental education, what do you think is the reason for that?
    - f) What is your personal opinion about the importance of environmental education during the certification process?
  6. What would be in your opinion **responsibilities PADI** has in the dive industry?
    - a) Do you think that due to the degradation of coral reef and the increasing environmental pollution, the dive industry needs to change something in relation to environmental education?
  7. What would you identify as **future trends** in the dive industry?

Note:

This topic list focuses on the Interview with dive schools and instructors. For the interviews with conservation managers or PADI, other Interview questions were used. Those can be found in the transcriptions in Appendix 12.

## Appendix 2: Participation- and Topic List of Focus Group discussion

### 1. List and background Information of Participants

Participation Name	Profession	Dive certification level	Dive Experiences	Nationality/Age	Place/ Date
1. <b>Andre Pfister</b>	Food Engineer	WASI (World Association of Scuba Instructor) Open Water	15 dives	Swiss/ 34 years old	St. Gallen/ 5 <sup>th</sup> April, 2013
2. <b>Roman Reichmuth</b>	Civil Engineer	PADI Open Water	10-15 dives	Swiss/ 35 years old	St. Gallen/ 5 <sup>th</sup> April, 2013
3. <b>Nicole Frey</b>	Teacher	PADI Open Water	15-20 dives	Swiss/ 34 years old	St. Gallen/ 5 <sup>th</sup> April, 2013
4. <b>Stefan Anhorn</b>	IT-Consultant	PADI Open Water	15-20 dives	Swiss/ 36 years old	St. Gallen/ 5 <sup>th</sup> April, 2013
5. <b>Thomas Kurer</b>	School Director	PADI Open Water, PADI Advanced and Nitrox Dive	over 150 dives	Swiss/ 36 years old	St. Gallen/ 5 <sup>th</sup> April, 2013
6. <b>Karin Auer</b>	Teacher	PADI Open Water, PADI Advanced and Nitrox Dive	over 50 dives	Swiss/ 32 years old	St. Gallen/ 5 <sup>th</sup> April, 2013

**Duration: 1.20 hour; Moderator: Alina Glückstadt; Assistant: Denise Facci**

### 2. Topic list:

#### a) Dive certification level and dive organization

- How many dives and where?
- Why the dive organization?
- Satisfaction of dive organization? Improvements?
- possible planned new dive certifications?

#### b) Location of certification and duration

- sufficient duration?

#### c) Satisfaction of Certification and education

- environmental aspects were discussed?
- good education?
- Security standards, quality?

#### d) Analysis of teaching material

- coherent teaching material?
- environmental topics were discussed?

- how is the dive sport promoted?
- main conclusions of the book/films?
- Project Aware?

**e) Analysis of dive instructors**

- quality of instructor?
- environmental conscious? Discussion of environmental topics?
- Underwater guidance, interaction?

**f) International dive experiences**

- observations e.g. handling of boats, animals, corals?
- difference of countries?
- difference in quality and security?

**g) Experiences with environmental issues during diving**

- negative/positive experiences e.g. breakage of coral
- how often is the topic addressed? e.g. in briefings?
- promotion of conservation projects and donations?

**h) Responsibility of PADI or other dive organizations vs. the responsibility of the destination**

- easy to open a PADI dive shop -> many dive shops at one destination -> high competition -> price cutting
- > who is responsible, PADI or destination itself (government intervention)

**i) Discussion about new dive programs e.g. Divers Participation Program**

- interesting? seasonable?

**j) Discussion on main findings of research**

**k) Future of diving tourism**

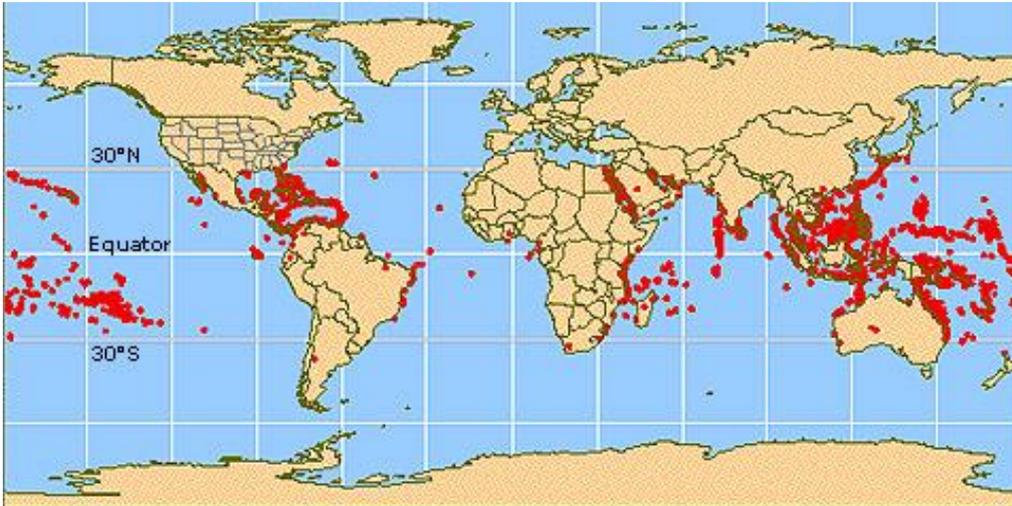
- importance of environmental protection/conservation?

Note:

The transcription of the focus group discussion can be found on the attached CD on the backside of the work in Appendix 13.

### Appendix 3: Comparison of coral reef areas and dive hotspots worldwide

Map 1: Location of major stone coral reef of the world



Source: NOAA Ocean Service Education (2008)

Map 2: World map of dive locations



Source: Liveabroad Dive Boat (n.d)

## Appendix 4: Possible continuums of diving tourists

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### *Continuums of diving tourists*

*Mainliners–Sideliners*, i.e. those for whom the travel motivation is primarily diving vs. those for whom tourism is the main motivation

*Fanatics–Dabblers*, i.e. those for whom diving is central to their lifestyle vs. those for whom it is peripheral

*Experienced–Novices*, i.e. those who have made many dives vs. those who are new to diving

*Highly qualified–‘Try’ divers*, i.e. those who are highly trained vs. those who are completely untrained

*Specialists–Generalists*, i.e. those who specialise in one diving activity, e.g. underwater photography vs. those who like to participate across the full range of diving specialities

*Mariners–Socialisers*, i.e. those primarily interested in marine encounters and experiences vs. those putting a high value on social contacts and interaction

*Independents–Group divers*, i.e. those diving by themselves or with a partner vs. those preferring to dive in organised groups

*Learners–Enjoyers*, i.e. those trying to expand their knowledge of marine environments vs. those who are primarily interested in the dive experience itself

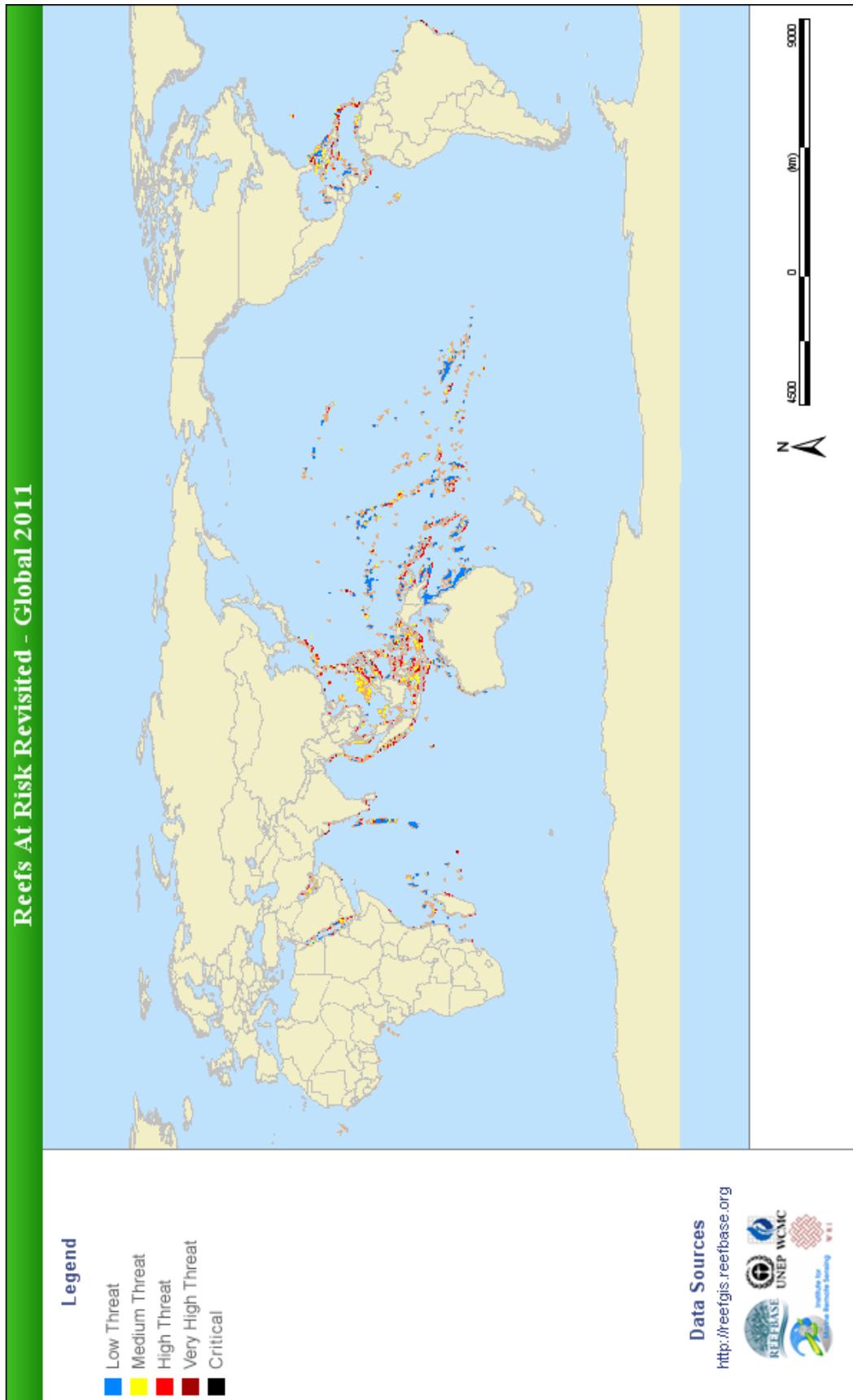
*Homies–Remoties*, i.e. those regularly and mostly diving at home vs. those diving abroad, often in remote locations

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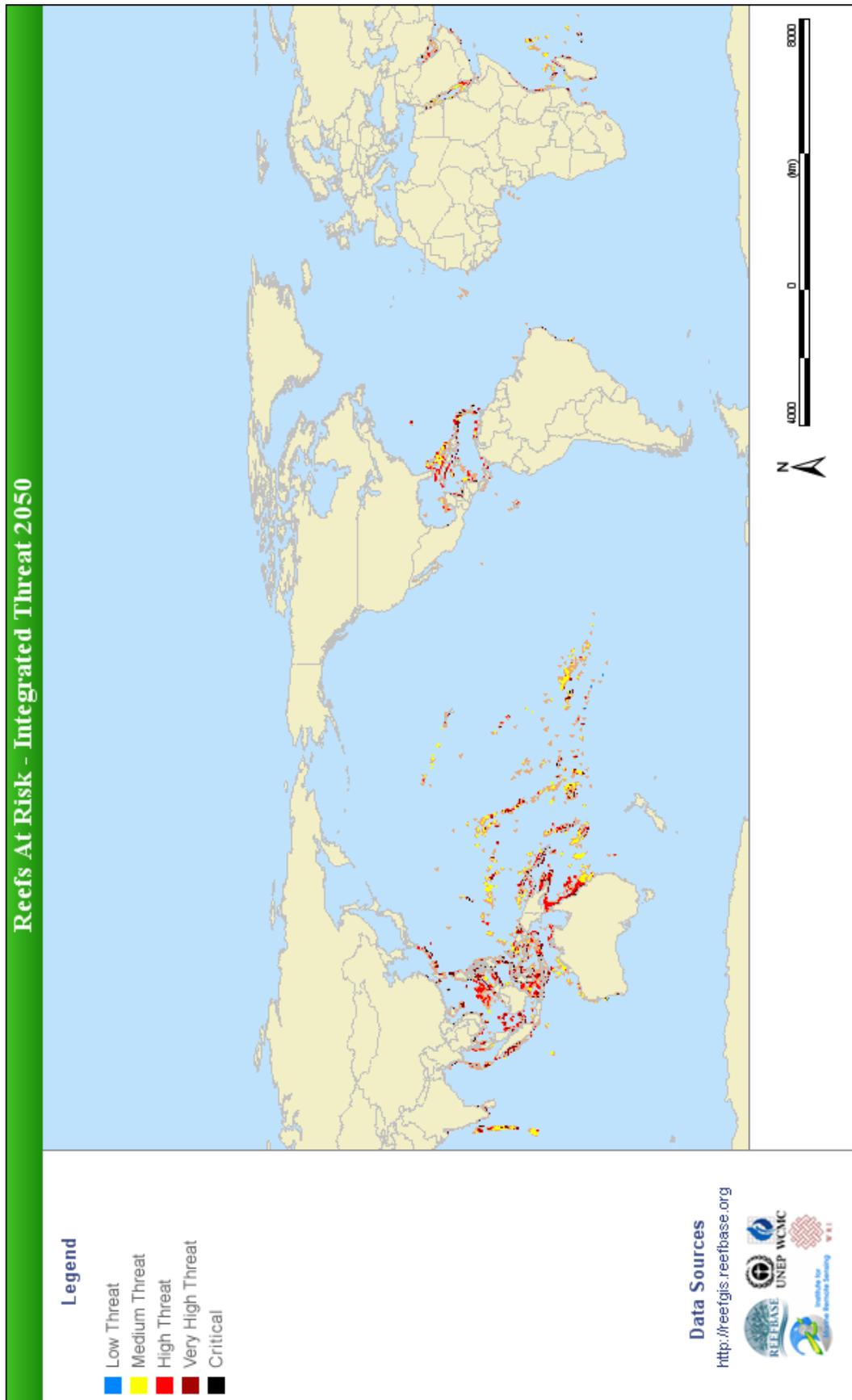
Source: Garrod & Gössling, p. 20 (2008)

## Appendix 5: Reef at risk Global 2011 and 2050

Map 1: Reef at risk Global 2011, Source: ReefBase (2012)



Map 2: Reefs at risk Global 2050, Source: ReefBase (2012)



## Appendix 6: Tourism Figures of Egypt

Figure 1: Tourism receipts and GDP in Egypt, 2007-10

Travel and Tourism - Egypt - February 2011 - Tourism and the Economy					
	2007	2008	2009	2010*	% change
Tourism receipts US\$ million	9,303	10,985	10,755	11,500	23.6
% change	-	18.1	-2	6.5	
GDP (US\$ bn)	418	448	468.7	n/a	12.1
% change	-	7.2	4.6		
* year ending June 2010 n/a = not available GDP = gross domestic product					

Source: Shore (2011)

Figure 2: International arrivals to Egypt, 2003-09

Travel and Tourism - Egypt - February 2011 - Arrivals							
	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	% change
	mn	mn	mn	mn	mn	mn	2003-09
	7.5	8.6	8.6	9.8	12.9	12.2	62.7
% change	-	14.7	-	14	31.6	-5.4	

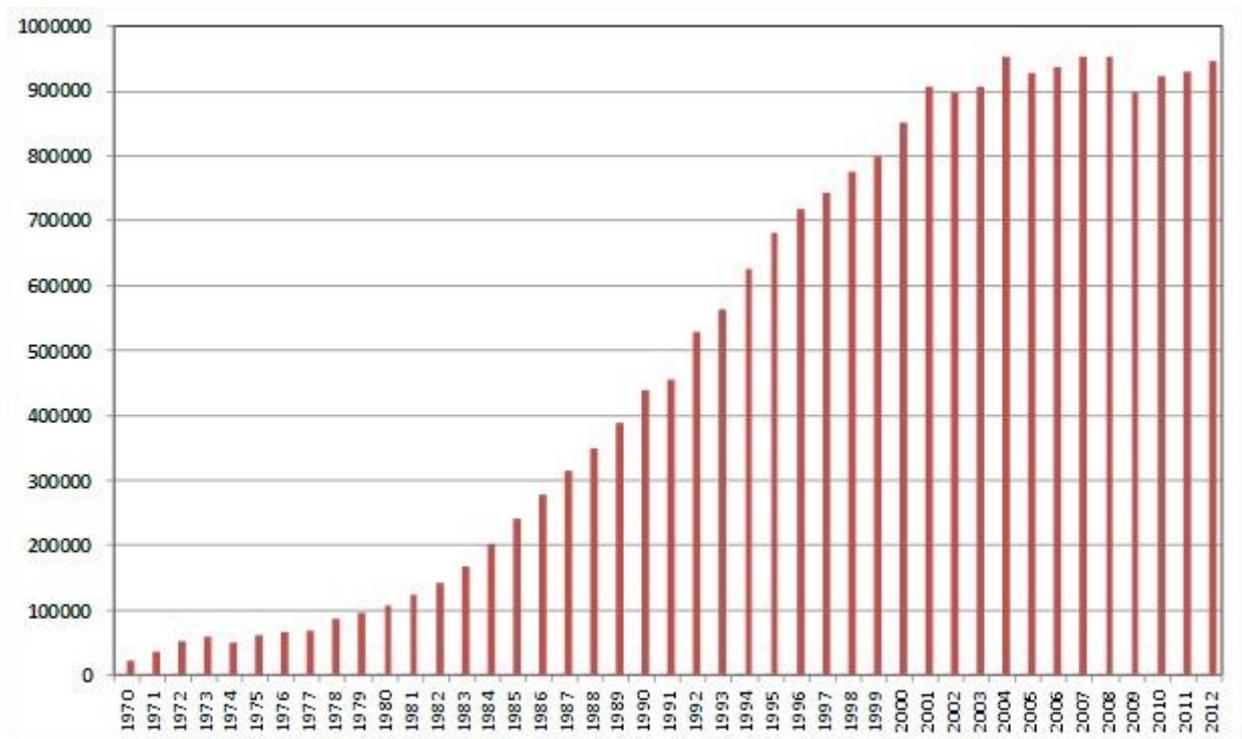
Source: Shore (2011)

Figure 3: Top ten source markets for international tourist arrivals, 2008-09

Travel and Tourism - Egypt - February 2011 – Arrivals		
	2008-09	% share
Russia	1,516,000	12.3
Germany	1,080,000	8.8
England	1,050,000	8.5
Italy	983,000	8
France	464,000	3.8
Libya	439,000	3.6
Saudi Arabia	412,000	3.4
Ukraine	385,000	3.1
Poland	335,000	2.7
America	272,000	2.2
Other	5,347,154	43.5
Total	#####	100

Source: Shore (2011)

## Appendix 7: PADI World Certification history per year



Represents total entry level and continuing education diving certifications for all PADI Offices combined. Divers may have multiple certifications.

Source: PADI (2011)

## Appendix 8: Membership Requirements and Application to open a PADI dive shop

German Version

Source: Wantke (personal communications, April 25, 2013)



**Membership Requirements and Applications**

German Edition



## PADI INTERNATIONAL RESORT & RETAILER ASSOCIATIONS (IRRA) Mitgliedschafts-Antrag

### BEANTRAGTE MITGLIEDSCHAFTS-STUFE

- |  |  |
|--|--|
| <input type="checkbox"/> PADI Dive Center                                | <input type="checkbox"/> PADI Dive Resort                                      |
| <input type="checkbox"/> PADI 5 Star Dive Center                         | <input type="checkbox"/> PADI 5 Star Dive Resort                               |
| <input type="checkbox"/> PADI 5 Star Instructor Development Center (IDC) | <input type="checkbox"/> PADI 5 Star Instructor Development Dive Resort        |
| <input type="checkbox"/> PADI 5 Star Career Development Center (CDC)     | <input type="checkbox"/> PADI Recreational Facility (Freizeitcenter Betreiber) |
| <input type="checkbox"/> PADI Dive Boat (Tauchboot Betreiber)            |  |

Ist dieses Unternehmen zur Zeit ein IRRA Mitglied?  Ja  Nein

Falls Ja: Mitglieds-Nr. S- \_\_\_\_\_

Ist dieses Unternehmen einem gegenwärtigen IRRA Mitglied geschäftlich angeschlossen?  Ja  Nein

Falls Ja: IRRA Mitglieds-Nr. des Hauptunternehmens S- \_\_\_\_\_

### DEM ANTRAG BEIZUFÜGENDE FOTOS

- Geschäft von aussen (Schaufenster): Gross- und Nahaufnahmen
- Geschäft innen (Panoramabild): Verkaufsbereich (nicht für Resorts)
- Geschäft innen: Empfangsbereich
- Mietausrüstung (kompl. Ausrüstungssets inkl. Oktopus und Finimeter müssen ersichtlich sein)
- Unterrichtsraum (VHS/DVD, TV, Beamer, Tafel/Whiteboard, Tische, Stühle)
- Erste Hilfe und Sauerstoff
- Kompressor
- Reparatur-/Wartungsbereich / Werkstatt

### BITTE MIT DRUCKSCHRIFT ODER SCHREIBMASCHINE AUSFÜLLEN.

Firmenname _____	Andere Adresse für: <input type="checkbox"/> Lieferungen <input type="checkbox"/> Rechnungen <input type="checkbox"/> allg. Zusendungen
Name Kontaktperson _____	Name / Firma _____
Strasse / Nr. _____	Strasse / Nr. _____
PLZ/ Stadt _____	PLZ / Stadt _____
Land _____	Land _____
Tel. _____	Tel. _____
Fax _____	Fax _____
E-Mail _____	Bevorzugte Sprache _____
Steuernummer _____	USt-IdNr. (Kopie beifügen) _____

### INFORMATIONEN ZUM UNTERNEHMEN

Wann wurde dieses Unternehmen eröffnet? \_\_\_\_\_ Webseite \_\_\_\_\_

Wie lange sind Sie Eigentümer dieses Unternehmens? (Tag/Monat/Jahr) \_\_\_\_\_

Geschäftszellen (Tag/Uhrzeiten) \_\_\_\_\_

Unternehmensform:  Kapitalgesellschaft  Personengesellschaft  Einzelunternehmen

Auch angeschlossen an:  SSI  NAUI  YMCA  NASDS  BSAC  ACUC  SSI / TDI  CMAS  Andere \_\_\_\_\_

Namen der Eigentümer \_\_\_\_\_

## INSTRUCTOR LISTE

Liste aller beschäftigten PADI Instructors – Änderungen sind PADI mitzuteilen.

PADI Nr.	Name PADI Instructor	PADI Nr.	Name PADI Instructor
1 _____	_____	3 _____	_____
2 _____	_____	4 _____	_____

## TAUCHBOOT / SCHNORCHELBOOT INFORMATIONEN – FÜR ALLE Anträge

\_\_\_\_ Anzahl der eigenen Boote      \_\_\_\_ Anzahl gecharterter Boote      \_\_\_\_ Anzahl geleaster Boote

Erforderliche Angaben zu eigenen, gecharterten oder geleasteten Tauchbooten / Schnorchelbooten:

Name des Bootes	Länge	Passagiere (max.)	Serien- / Registrierungs-Nr. (ggf.)
1 _____	_____	_____	_____
2 _____	_____	_____	_____
3 _____	_____	_____	_____
4 _____	_____	_____	_____

## STAATLICHE GENEHMIGUNG ZUR BERUFSAUSÜBUNG – NUR FÜR PADI 5 STAR IDC und PADI 5 Star CDC ANTRÄGE

(Bitte lesen und die Erklärung unterschreiben, falls für Ihr Land zutreffend)

„Ich verfüge über die erforderliche Genehmigung zur Berufsausübung des Staates bzw. Landes, in dem sich mein Dive Center / Dive Resort befindet. Mir ist bewusst, dass ich keine PADI Instructor-Programme durchführen darf, wenn diese Genehmigung nicht aktuell erteilt ist.“

\_\_\_\_\_  
Eigentümer / Geschäftsführer (Name und Unterschrift) Datum \_\_\_\_\_  
Tag/Monat/Jahr

## PADI COURSE DIRECTOR BESTÄTIGUNG:

Ich bestätige, dass ich für das oben genannte Dive Center / Dive Resort PADI Instructor-Programme durchführe.

\_\_\_\_\_  
PADI Course Director (Name und Unterschrift) CD # \_\_\_\_\_ Datum \_\_\_\_\_  
Tag/Monat/Jahr

\_\_\_\_\_  
PADI Course Director (Name und Unterschrift) CD # \_\_\_\_\_ Datum \_\_\_\_\_  
Tag/Monat/Jahr

## UNTERSCHRIFT – FÜR ALLE ANTRÄGE ERFORDERLICH

### PADI Mitgliedschafts- und Lizenzvereinbarung

„Ich habe die PADI IRRA Mitgliedschaftsvereinbarung und die Lizenzvereinbarung für PADI Mitglieder gelesen und bestätige, dass ich gegenwärtig alle darin genannten Anforderungen erfülle. Ich erkläre hiermit, dass ich sämtlichen Bedingungen zustimme und damit einverstanden bin. Ich habe auch die Anforderungen und Bedingungen für die von mir beantragte Mitgliedschaft in PADI's International Resort & Retailer Association gelesen, so wie sie in den PADI International Resort Association (PIRA) Standards und den PADI Retailer Association (PRA) Standards niedergelegt sind. Ich bin damit vertraut und bestätige, dass ich gegenwärtig alle dort genannten Anforderungen erfülle. Mir ist bewusst, dass falsche Angaben in diesem Antrag zur Beantragung meiner Mitgliedschaft in PADI's International Resort & Retailer Association führen können.“

\_\_\_\_\_  
Eigentümer / Geschäftsführer (Unterschrift) Datum \_\_\_\_\_  
Tag/Monat/Jahr

\_\_\_\_\_  
Eigentümer / Geschäftsführer (Name in DRUCKSCHRIFT) Juristischer Eigentümer \_\_\_\_\_ (Name in DRUCKSCHRIFT)

Tel. \_\_\_\_\_ Fax \_\_\_\_\_

Name 1. Leitender Mitarbeiter \_\_\_\_\_ Name 2. Leitender Mitarbeiter \_\_\_\_\_

**Dieser Antrag stellt seitens PADI kein Angebot für eine Mitgliedschaft dar.  
Die Mitgliedschaft wird nur nach Prüfung und Bestätigung des Antrags wirksam.**

---

PADI Dive Center / PADI Dive Resort Name: \_\_\_\_\_

## ABSCHLIESSENDE CHECKLISTE

### PADI Dive Center / Dive Resort / Freizeitzentrum / Dive Boat

- Antrag vollständig ausgefüllt
- Namensliste Instructors und Eigentümer des Unternehmens
- Alle verlangten Fotos und Unterlagen beigelegt
- Kreditkarte angegeben
- Antrag unterschrieben
- PADI Instructor im „Lehrstatus“ als Staff

### PADI 5 Star Dive Center / PADI 5 Star Dive Resort

- Antrag vollständig ausgefüllt
- Namensliste Instructors und Eigentümer des Unternehmens
- Alle verlangten Fotos und Unterlagen beigelegt
- Kreditkarte angegeben
- Antrag unterschrieben
- Mindestzahl brevetierter Taucher erreicht

### PADI 5 Star IDC Center / PADI 5 Star IDC Resort

- Antrag vollständig ausgefüllt
- Antrag vom Course Director unterschrieben
- Mind. 1 PADI Course Director im „Lehrstatus“
- Namensliste Instructors und Eigentümer des Unternehmens
- Alle verlangten Fotos und Unterlagen beigelegt
- Kreditkarte angegeben
- Antrag unterschrieben
- Mindest-Wartezeit 6 Monate (für andere Möglichkeiten kontaktiere dein PADI Office)

### PADI 5 Star CDC Center / PADI 5 Star CDC Center

- Antrag vollständig ausgefüllt
- Antrag von Course Directors unterschrieben
- Mind. 2 PADI Course Directors im „Lehrstatus“, 1 davon Vollzeit, örtlich verfügbar und nur für dieses CDC tätig
- Namensliste Instructors und Eigentümer des Unternehmens
- Alle verlangten Fotos und Unterlagen beigelegt
- Kreditkarte angegeben
- Antrag unterschrieben

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## ZAHLUNGSART

(Preise siehe aktuelle PADI-Preisliste für das Land deines Wohnortes)

- Bankverbindung: Credit Suisse, CH-8402 Winterthur,  
Clearing Nr. 4835, BIC/SWIFT CRESCHZ284A, PADI Europe AG  
CHF 803252-41 IBAN: CH02 0483 5080 3252 4100 0  
Euro IBAN: CH11 0483 5080 3252 4200 2

- AMERICAN EXPRESS  DINERS  EUROCARD  VISA

Karten Nr. \_\_\_\_\_

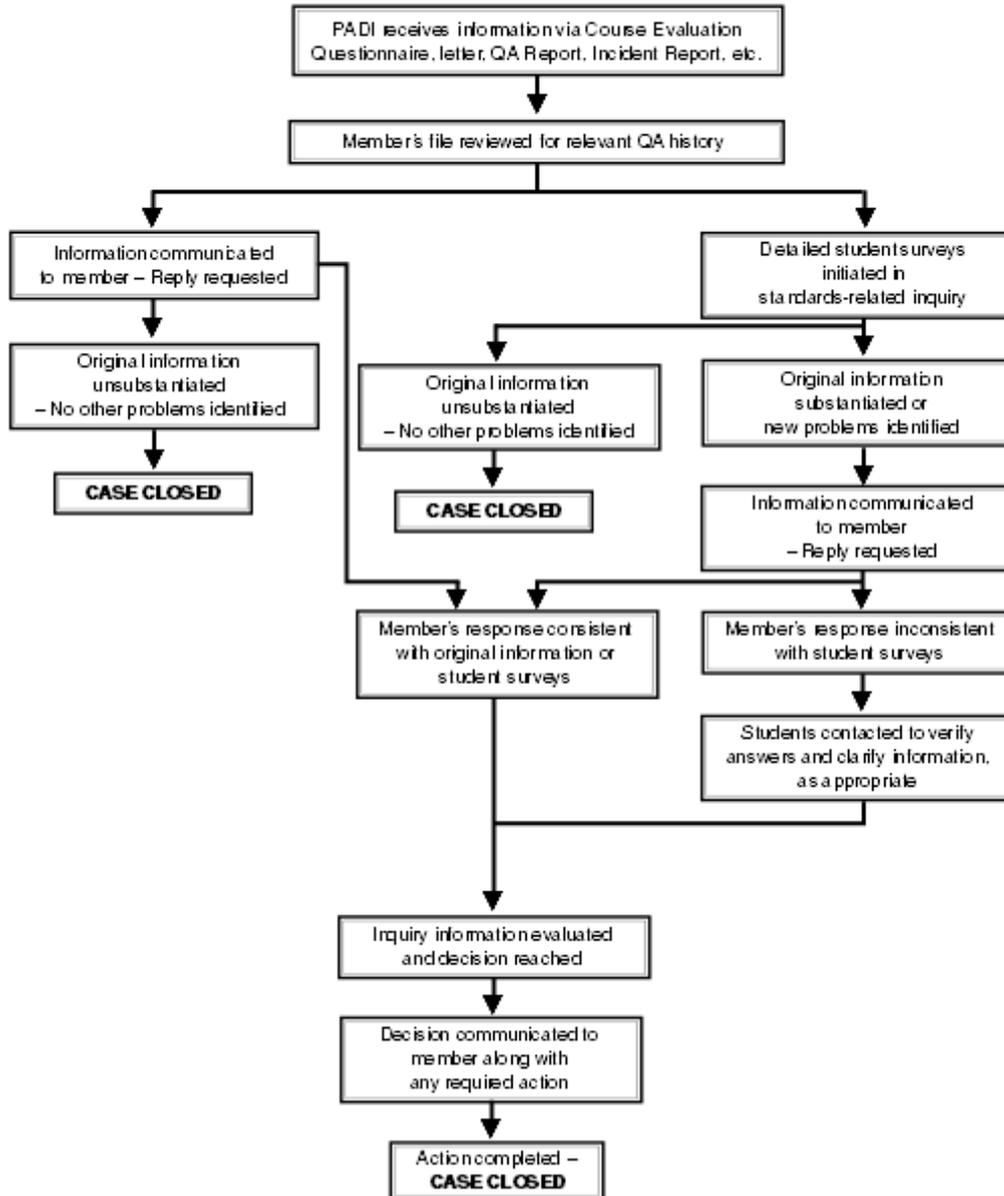
Gültig bis \_\_\_\_\_

Name Karteninhaber (bitte Druckschrift) \_\_\_\_\_

Unterschrift Karteninhaber \_\_\_\_\_

## Appendix 9: Summary of Routine Quality Assurance Inquiry

### Summary of Routine Quality Assurance Inquiry



Source: PADI (2013)

## Appendix 10: 14 Principles of Low-Impact Diving

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1. Using appropriate finning techniques;
  2. Attaining/maintaining neutral buoyancy;
  3. Securing loose dive gear to avoid damage;
  4. Avoiding the negative impacts of collecting marine life, specimens, or artifacts;
  5. Avoiding harassing marine wildlife or interrupting their normal behaviors (mating, feeding or resting, etc.) by crowding them;
  6. Avoiding touching living underwater plants or animals, including corals;
  7. Avoiding the negative impacts associated with interacting with marine wildlife;
  8. Acknowledging the negative impacts recreational divers, and dive tourism, can have on marine environments;
  9. Possessing knowledge of the nature of Marine Protected Areas (MPAs);
  10. Possessing knowledge of the factors that govern diver in-water behavior (regulations, bylaws, etc.);
  11. Possessing knowledge of key ecological concepts related to coral and marine environment biodiversity (coral is alive and can be damaged, etc.);
  12. Diving as a guest;
  13. Following either a personal low-impact diving ethic or the one espoused by a training agency or dive operator;
  14. Undertaking continuing education/specialty training to build and maintain diving skills, proficiency, and knowledge.
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Source: Johansen & Koster (2012)

## Appendix 11: Guidelines for Appropriate Diver Behavior

<b>1. No touchy feely</b>	Always be aware of the coral around you when you're in the water – it's alive! Touching coral or walking on reefs can damage coral colonies and make them more susceptible to infections. A good diver is neutrally buoyant! If you must, use only your fingertips to steady yourself, and if you must walk over a reef stick to a well-used pathway!
<b>2. Take only pictures</b>	Although they look pretty, removing organisms from the seabed or shoreline and buying shells and other marine products may support unsustainable harvesting and is never environmentally wise. Take home a photo of a healthy living reef instead!
<b>3. Bin it!</b>	Put your rubbish in the bin and let the reef life 'breathe easy' - turtles and fish mistake rubbish and plastic bags for food, and can suffocate on it! Do your bit and put your rubbish in the bin, never throw it overboard or on the floor!
<b>4. Be choosy!</b>	Use your purchasing power to guide the market in the right direction - choose a tour operator that is environmentally aware and behaves as such. If you see a company behaving irresponsibly, let them know it! Good dive guide will always give you a pre-dive brief including reef etiquette.
<b>5. Chemical Abuse</b>	Sunscreens and batteries produce toxins that pollute the oceans and can poison marine life – use eco-friendly sunscreens and cleaning products and dispose of batteries appropriately.
<b>6. Bitter sweet taste</b>	Do not feed reef fish – feeding fish may disrupt their natural behaviour causing habituation and dependence and may encourage aggression. Fish that are fed may not graze reefs as much, which could lead to algal overgrowth. Observing their natural behaviour is much more rewarding, giving you a true insight into their nature.
<b>7. Sound anchoring</b>	Anchors and groundings can severely damage coral reefs - boats should always use allocated mooring buoys or anchor in sandy areas, well away from darker coloured reef patches.
<b>8. Be alert!</b>	Destructive fishing practices - such as using explosives and cyanide - can destroy whole areas of reef habitat. If you suspect anyone of doing this report it to the local authority or tourist board; your actions could save that reef from further destruction.
<b>9. Keep your eyes peeled</b>	Follow Marine Park Regulations - they are there to promote reef health and diversity. If fishing is permitted then adopt the catch and release method and do not discard any fishing gear, which may harm marine organisms.
<b>10. Spread the word!</b>	Pass on these tips to friends, loved ones and anyone else you think is unaware. Encourage people to be responsible for themselves and do all they can to help coral reefs survive!

Source: Responsibletravel.com (2012)