AN INTEGRATED APPROACH TO SUSTAINABLE MANAGEMENT
OF REEF-BASED SCUBA DIVE TOURISM:
A CASE STUDY OF KOH TAO, THAILAND

Panwad Wongthong

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Discipline of Geography, Environment and Population
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Table of Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table of Contents</td>
<td>I</td>
</tr>
<tr>
<td>List of Figures</td>
<td>V</td>
</tr>
<tr>
<td>List of Tables</td>
<td>VII</td>
</tr>
<tr>
<td>Abstract</td>
<td>VIII</td>
</tr>
<tr>
<td>Declaration</td>
<td>IX</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>X</td>
</tr>
<tr>
<td>Abbreviations</td>
<td>XI</td>
</tr>
</tbody>
</table>

## CHAPTER 1 INTRODUCTION

1.1 Introduction                                                                 | 1    |
1.2 Rationale for the Research                                                   | 2    |
1.3 Research Aims                                                                | 3    |
1.4 Literature Review and Conceptual Framework                                   | 4    |
1.4.1 Coral Reefs: Valuable but Vulnerable                                       | 5    |
1.4.2 SCUBA Dive Tourism                                                         | 6    |
1.4.3 The Main Impacts and Challenges                                           | 8    |
1.4.4 Sustainable Tourism Development (STD)                                       | 9    |
1.4.5 Integrated Coastal Management (ICM)                                        | 11   |
1.4.6 Stakeholder Participation and Involvement in the Tourism System            | 13   |
1.5 Justification for the Selection of Study Site                                | 14   |
1.6 The Island of Koh Tao, Thailand                                              | 16   |
1.6.1 Background                                                                 | 17   |
1.6.2 The Characteristics of Koh Tao                                             | 19   |
1.6.3 SCUBA Diving Opportunities on Koh Tao                                       | 22   |
1.7 Research Originality                                                          | 24   |
1.8 Thesis Structure                                                              | 25   |

## CHAPTER 2 METHODOLOGY

2.1 Research Foundations                                                          | 28   |
2.2 Ideology Development                                                           | 31   |
2.3 Data Collection Approaches                                                     | 32   |
2.3.1 Surveys                                                                      | 33   |
2.3.2 Interviews                                                                  | 36   |
2.3.3 Participant Observation                                                      | 38   |
2.3.4 Ethical Issues Involving Research Participants                              | 39   |
2.4 Data Processing and Analysis                                                  | 40   |
2.4.1 Quantitative data analysis                                                  | 40   |
2.4.1.1 Dealing with Data - coding, entering and cleaning data                    | 40   |
2.4.1.2 Computer-assisted Quantitative Analysis: using SPSS                       | 41   |
2.4.2 Qualitative data analysis                                                   | 41   |
2.4.2.1 Thematic Analysis                                                         | 42   |
2.4.2.2 Content analysis                                                          | 42   |
TABLE OF CONTENTS

2.4.3 Data presentation ........................................................................................................ 43
2.5 CHAPTER SUMMARY .................................................................................................... 44

CHAPTER 3 SURVEY RESULTS: RESIDENTS’ PERCEPTION OF SCUBA DIVE TOURISM ..... 45
3.1 CHAPTER OVERVIEW ................................................................................................... 45
3.2 OBJECTIVES OF THE STUDY ....................................................................................... 45
3.3 LITERATURE REVIEW ................................................................................................. 46
  3.3.1 Growing Pressure from the Dive Tourism Development ........................................ 46
  3.3.2 Host Community Attitude towards Tourism .......................................................... 50
3.4 METHODS .................................................................................................................... 52
  3.4.1 Questionnaire Design and Content ........................................................................ 52
  3.4.2 Sample Size and Sampling Techniques ................................................................ 54
3.5 RESULTS AND ANALYSIS ......................................................................................... 54
  3.5.1 Demographics ....................................................................................................... 54
  3.5.2 Residents’ Involvement in Dive Tourism Industry ............................................... 56
  3.5.3 Residents’ Perceptions of Dive Tourism Impacts ................................................. 57
  3.5.4 Residents’ Attitudes towards Dive Tourism Development .................................. 62
3.6 CHAPTER SUMMARY .................................................................................................. 65

CHAPTER 4 SURVEY RESULTS: DIVE OPERATORS’ AND THEIR SUSTAINABLE PRACTICES ................................................................................................................................. 66
4.1 CHAPTER OVERVIEW ................................................................................................... 66
4.2 OBJECTIVES OF THE STUDY ....................................................................................... 66
4.3 LITERATURE REVIEW ................................................................................................. 67
  4.3.1 The Dive Operator ................................................................................................ 67
  4.3.2 Potential Impacts from Diving Operations ............................................................ 68
  4.3.3 Environmentally Sustainable Considerations for Dive Tourism Providers ........... 69
4.4 METHODS .................................................................................................................... 70
  4.4.1 Questionnaire Design and Content .................................................................... 70
  4.4.2 Sample Size and Sampling Techniques ............................................................... 72
4.5 RESULTS AND ANALYSIS ......................................................................................... 73
  4.5.1 Dive Operating Business Information ................................................................. 73
  4.5.2 The Performance Standards of Dive Operators .................................................. 74
  4.5.3 Factors Influencing the Adoption of Good Practices ........................................... 77
  4.5.4 Dive Operators’ Attitudes towards Dive Tourism Development ......................... 78
4.6 CHAPTER SUMMARY .................................................................................................. 79

CHAPTER 5 SURVEY RESULTS: SCUBA DIVERS AND THEIR ROLES IN DIVE TOURISM ..... 81
5.1 CHAPTER OVERVIEW ................................................................................................... 81
5.2 OBJECTIVES OF THE STUDY ....................................................................................... 81
5.3 LITERATURE REVIEW ................................................................................................. 82
  5.3.1 The SCUBA Diver ............................................................................................... 82
  5.3.2 Potential Impacts from SCUBA Divers ................................................................. 84
  5.3.3 Divers Satisfaction and the Dive Consumption Experience ................................ 85
5.4 METHODS .................................................................................................................... 85
  5.4.1 Questionnaire Design and Content .................................................................... 85
  5.4.2 Sample Size and Sampling Techniques ............................................................... 87
5.5 RESULTS AND ANALYSIS ......................................................................................... 88
TABLE OF CONTENTS

5.5.1 Demographics ........................................................................................................... 88
5.5.2 Previous SCUBA Diving History ............................................................................. 90
5.5.3 Level of Participation in SCUBA Diving ................................................................. 91
5.5.4 Divers Behaviour in Coral Reef Environments ..................................................... 92
5.5.5 Diving Experience and Satisfaction ....................................................................... 93
5.5.6 Divers’ Perception of Impacts and Options for Management .............................. 96
5.6 CHAPTER SUMMARY ................................................................................................. 97

CHAPTER 6 SURVEY RESULTS: CURRENT MANAGEMENT PRACTICES ................................ 99
6.1 CHAPTER OVERVIEW ............................................................................................... 99
6.2 OBJECTIVES OF THE STUDY .................................................................................. 99
6.3 AN INTRODUCTION TO LOCAL INITIATIVES AND COOPERATIVE COASTAL MANAGEMENT ................................................................. 99
6.4 METHODS .................................................................................................................. 102
  6.4.1 In-depth Interviews ............................................................................................. 102
  6.4.2 Identification of Key Informants ......................................................................... 103
  6.4.3 Structure of the Interview ................................................................................... 104
6.5 CURRENT MANAGEMENT ARRANGEMENTS ......................................................... 104
  6.5.1 Reducing Marine-based Damage on Coral Reefs .............................................. 105
    6.5.1.1 Mooring Buoy Project ................................................................................. 105
    6.5.1.2 Buoyancy World ......................................................................................... 108
    6.5.1.3 Shipwrecks ............................................................................................... 110
  6.5.2 Coral Reef Conservation and Restoration ......................................................... 110
    6.5.2.1 Ecological Monitoring Program (EMP) ..................................................... 110
    6.5.2.2 Hin Fai BioRock ....................................................................................... 111
    6.5.2.3 Adopt-A-Reef Program ............................................................................ 113
  6.5.3 Marine Life Conservation ..................................................................................... 113
    6.5.3.1 Giant Clam Nursery ................................................................................... 113
    6.5.3.2 Sea Turtle Head-start/Release .................................................................... 114
    6.5.3.3 Underwater Life Sightings Database ......................................................... 116
  6.5.4 Rubbish and Waste Management ......................................................................... 117
    6.5.4.1 Underwater and Beach Clean-ups .............................................................. 117
    6.5.4.2 Say ‘NO’ to Plastic and Foam Campaign ................................................. 117
    6.5.4.3 Effective Microorganisms (EM) ................................................................. 119
  6.5.5 Environmental Education and Awareness ............................................................ 120
    6.5.5.1 Marine Resource Management (MRM) .................................................... 120
    6.5.5.2 Young Environmentalist Program ............................................................. 121
    6.5.5.3 The Community Communication Channel ............................................. 121
    6.5.5.4 Festivals and Dissemination Materials ...................................................... 124
6.6 COMMUNITY PERCEPTION TOWARDS THE LOCAL PARTNERSHIP ...................... 126
6.7 CHAPTER SUMMARY ................................................................................................. 134

CHAPTER 7 PATHWAYS TOWARD SUSTAINABLE DIVE TOURISM .................................. 136
7.1 IMPORTANCE OF THE DIVE TOURISM INDUSTRY TO KOH TAO .......................... 136
7.2 NEGATIVE IMPACTS OF DIVE TOURISM ................................................................. 137
  7.2.1 Physical-ecological Impacts ............................................................................... 137
  7.2.2 Economic Impacts ............................................................................................. 139
  7.2.3 Socio-demographic Impacts ............................................................................... 139
7.3 COMPLIANCE OF DIVE OPERATORS TO ENVIRONMENTALLY SUSTAINABLE
PRACTICES ........................................................................................................ 139
  7.3.1 Issues of Concern ........................................................................................ 140
  7.3.2 Influential Factors to the Adoption of Good Practices ......................... 142
7.4 SCUBA DIVERS’ ROLE IN THE ECONOMIC AND ECOLOGICAL SUSTAINABILITY OF
CORAL REEFS AND THEIR SATISFACTION IN SCUBA DIVING ........................ 143
  7.4.1 Underwater Behaviour of SCUBA Divers ................................................ 143
  7.4.2 Experience and Satisfaction in SCUBA Diving .......................................... 145
7.5 THE MANAGEMENT OF DIVE TOURISM IMPACTS ..................................... 146
  7.5.1 Multi-stakeholder Partnerships and Collaboration .............................. 147
  7.5.2 Self-regulation ......................................................................................... 148
  7.5.3 Education and Awareness ..................................................................... 149
  7.5.4 Good Governance and Accountability ................................................... 151
7.6 CHAPTER SUMMARY ..................................................................................... 151

CHAPTER 8 A MANAGEMENT FRAMEWORK FOR REEF-BASED SCUBA DIVE TOURISM .... 152
  8.1 A HOLISTIC UNDERSTANDING OF REEF-BASED SCUBA DIVE TOURISM SYSTEM ...... 152
  8.2 A MANAGEMENT FRAMEWORK FOR REEF-BASED SCUBA DIVE TOURISM ............. 154
  8.3 LIMITATIONS OF THE STUDY ...................................................................... 157
  8.4 RECOMMENDATIONS FOR FUTURE RESEARCH .............................................. 158
  8.5 CONCLUSION ............................................................................................... 159

APPENDICES ........................................................................................................ 161
APPENDIX I: QUESTIONNAIRE FOR RESIDENTS .............................................. 162
APPENDIX II: QUESTIONNAIRE FOR DIVE OPERATORS ................................... 167
APPENDIX III: QUESTIONNAIRE FOR DIVE TOURISTS ..................................... 172
APPENDIX IV: SEMI-STRUCTURED INTERVIEW GUIDE ................................. 177

BIBLIOGRAPHY .................................................................................................. 181
LIST OF FIGURES

Figure 1.1 The conceptual framework for the study of reef-based SCUBA dive tourism. ................. 4
Figure 1.2 Impacts of reef-based SCUBA dive tourism in selected diving destinations across the regions. ......................................................................................... 10
Figure 1.3 Tourism Development’s Magic Pentagon Pyramid. ......................................................... 11
Figure 1.4 A reef-based SCUBA dive tourism system based on the Broker-Local-Tourist (BLT) model of Miller and Auyong (1991). .................................................................................................................. 15
Figure 1.5 Map of Koh Tao, demonstrating the location of study area and the surrounding dive sites. ................................................................................................................................. 18
Figure 1.6 The biophysical attributes of dive sites at Green Rock, White Rock, South West Pinnacle, and Chumphon Pinnacle. .................................................................................... 23
Figure 1.7 The underwater photographs of corals and marine life at dive sites surrounding Koh Tao: Chumphon Pinnacle (top left); Green Rock and Shark Island (top centre); Wreck dive (top right), White Rock (bottom left); Manta rays and Whale sharks (bottom right). ........................................ 24
Figure 2.1 The foundations of research, demonstrating the study design, data collection procedures and research process of this study. .................................................................................. 29
Figure 2.2 The fundamental steps in conducting surveys. ............................................................... 35
Figure 2.3 Examples of question types within the structured questionnaires (selected from each of the three sets of questionnaires) .............................................................. 37
Figure 3.1 Tourist accommodation and rooms constructed between 1983 and 2000. ......................... 46
Figure 3.2 The number of populations on Koh Tao between 1992 and 2009. ............................... 47
Figure 3.3 Three Land-use classifications based on remote sensing data 1975, 1994, 2001, and 2005. ................................................................................................................................. 48
Figure 3.4 Categories and levels of threats to coral reefs on Koh Tao, showing high level of threats from tourism and recreation activities and natural impact. .................................................. 49
Figure 3.5 Distribution of occupations of Thai and foreign respondents ....................................... 57
Figure 3.6 Examples of tourism impacts, illustrating unregulated construction; rubbish overload; uncontrolled development; wastewater discharge; disordered water pipes; overhead electrical wires; incompatible and compatible architectural design. .............................................. 61
Figure 3.7 Residents’ attitudes towards dive tourism development according to three categories ... 62
Figure 4.1 Response rates of dive operators in various locations islandwide. .............................. 73
Figure 4.2 Self-assessed practices of dive operation according to the environmental codes of conduct for marine tourism sector ................................................................. 75
Figure 4.3 Dive operators’ performance, as observed by onboard SCUBA divers. ................. 77
Figure 4.4 Dive operators’ attitude towards dive tourism development according to three categories ................................................................................................................................. 79
Figure 5.1 Total entry level and continuing education diving certifications for all PADI offices combined ................................................................................................................................. 83
Figure 5.2 Factors influencing SCUBA divers’ decisions on the selection of dive operators. ....... 89
Figure 5.3 SCUBA divers’ engagement in diving activities. ......................................................... 92
Figure 5.4 SCUBA divers behaviour in coral reef environments ............................................... 93
Figure 5.5 Most frequently visited dive sites surrounding Koh Tao (left) and map of Koh Tao showing the locations of popular dive sites (right) ........................................................................ 94
Figure 5.6 Post-trip satisfaction score evaluated by SCUBA divers ........................................... 95
Figure 5.7 Divers’ perceptions of negative impacts as a consequence of the dive tourism development ............................................................................................................................. 96
Figure 6.1 Projects and activities developed through the Save Koh Tao Conservation Group ....... 101
Figure 6.2 The 2011 year-round event calendar of the Save Koh Tao Conservation Group. ....... 102
Figure 6.3 Mooring buoys installation with the support from the DMCR and the Royal Thai Navy. 107
Figure 6.4 Locations of mooring line installation in 1998 and 2011, responsible dive operators, anchor lines, mooring balls, pick up lines, date and bottom depth. 108
Figure 6.5 Preparation of various sculptures in the Buoyancy World Project (top) and the use of the dive site by SCUBA divers underwater (bottom). 109
Figure 6.6 Coral reef survey as a part of Ecological Monitoring Program: coral nursery monitoring (top left); coral bleaching survey (top right); coral reef transect (bottom left); and water quality monitoring (bottom right). 111
Figure 6.7 Preparation of BioRock (top left); the deployment of BioRock (bottom left) and the BioRock underwater (right). 112
Figure 6.8 A dead sea turtle running aground (left) and an autopsy of the sea turtle showing the stomach contents of plastic, rope and fishing net (right). 114
Figure 6.9 Sea turtle hatching (left); sea turtle nursery (centre) and sea turtle release (right). 115
Figure 6.10 Turtle sightings during 2009 – 2011 by location (left) and by species (right). 116
Figure 6.11 Land clean-ups with the cooperation of Thai residents, tourists, and local school children (top left, top centre and top right, respectively); underwater clean-up (bottom left); and rubbish collected from underwater (bottom right). 118
Figure 6.12 Campaign posters gathered from various dive operators and tourist accommodations regarding ‘Say No to Plastic Campaign’ on Koh Tao. 119
Figure 6.13 An outdoor lecture on environmental conservation (left); Children participating in the swimming class in the Young Environmentalist Program (top centre and top right); Activities for children (bottom centre); Volunteers meeting (bottom right). 122
Figure 6.14 An example of Koh Tao Post, showing the content of the newspaper in English and Thai. 123
Figure 6.15 A few examples of posts on the Save Koh Tao and the Save Koh Tao Marine Conservation Facebook Pages, showing shared information, incident report, and upcoming event update. 124
Figure 6.16 The Say No to Plastic Campaign parade (top left); Education booth (top right); Live concert (bottom left); Recycled-material Beauty Contest (bottom centre); and Save Koh Tao merchandise booth (bottom right). 125
Figure 6.17 Community involvement in the mooring buoys installation workshop (top left); Preparation for the Festival (top right); Participation in the Global Warming Adaptation Workshop (bottom left); and Planting grass for erosion control (bottom right). 131
Figure 6.18 The account reports between March 2008 and January 2009 in the local newspaper (left); The income report from the 2012 Koh Tao Underwater World Festival on Facebook Page (right). 133
Figure 8.1 A holistic picture of the reef-based SCUBA dive tourism system. 153
Figure 8.2 A continuum of sustainability showing a paradigm for the management of reef-based SCUBA dive tourism. 156
LIST OF TABLES

Table 1.1 Goods and ecological services provided by coral reef ecosystems. ........................................... 5
Table 3.1 The number of tourism associated businesses on Koh Tao in 2009. ............................................. 49
Table 3.2 Selected literature on residents’ attitudes towards tourism development. .................................... 51
Table 3.3 Local census, sample size, questionnaire returned, response rate and percentage of responses from Sairee, Mae Hadd and Chalok Baan Kao .......................................................... 54
Table 3.4 The demographics of respondents including age, gender, marital status, highest level of education and time of resident on Koh Tao .................................................................................. 55
Table 3.5 Negative impacts associated with SCUBA dive tourism activities and development, as perceived by Koh Tao residents ..................................................................................................... 58
Table 3.6 Comparison of residents’ perceptions of the dive tourism impacts in accordance with their selected characteristics .................................................................................................................. 59
Table 3.7 Comparison of respondents’ attitudes towards dive tourism development according to their characteristics ......................................................................................................................... 63
Table 3.8 Residents’ perceptions of management control required for sustainable dive tourism .............. 64
Table 4.1 The environmentally sustainable considerations for dive tourism providers .................................... 71
Table 5.1 SCUBA divers’ demographics ........................................................................................................ 88
Table 5.2 Previous dive history of SCUBA divers visiting Koh Tao dive sites .................................................. 90
Table 6.1 Key informants in in-depth interviews conducted on Koh Tao between November 2010 and February 2011 ...................................................................................................................... 103
Table 6.2 Local conservation projects, categorized by issues facing the Koh Tao dive tourism ..................... 105
Table 7.1 Issues perceived as drivers and facilitators (or barriers) to the adoption of environmentally responsible practices. .................................................................................................................. 142
ABSTRACT

SCUBA dive tourism in coral reef environments has become a highly significant component of the international tourism market. The tourism industry can play an important and positive role in the socio-economic development of coastal areas as well as the conservation of species and natural habitats in destination countries. However, in the absence of proper controls and enforcement, unplanned tourism growth can cause environmental degradation and social and cultural conflicts which undermine the long-term sustainability of the dive tourism industry.

Given the significance of dive tourism in terms of its contribution to the global and local economies and its potential to create impacts on the coast around the world, the need to implement sustainable tourism practices has become important. There has been a growing body of research concentrating on physical impacts caused by dive tourism but there has been a lack of studies concerning the socio-economic factors related to dive tourism. In response to the research gaps, this study investigated the complexity of social interactions within dive tourism alongside the physical impacts in order to provide a holistic view of key issues confronting the management of reef-based SCUBA dive tourism. The study employed social survey techniques and selected a small and remote island of Koh Tao in Thailand as a case study. This is due to the unique characteristics of the island including the dominance of tourism over other land-based and marine-based activities, a lack of government control and the high dependence on imports and skilled expatriates. Importantly, Koh Tao accounts for the second highest number of annual dive certifications worldwide - only second to the Great Barrier Reef, Australia.

This study proposes a way forward for sustainable dive tourism based on management planning and governance frameworks drawn from the principles of integrated coastal management and sustainable tourism development. However, the study demonstrates that these two internationally accepted management frameworks are not always applicable to every dive tourism destination because each destination has its own uniqueness and limitations. The complexity of social interactions within the dive tourism industry is significant to the contribution to tourism impacts and practices, and therefore can facilitate or impede the sustainability. The study concludes that the management of dive tourism requires a greater focus on the social dimension, the collaboration of multi-stakeholders, the implementation of self-regulations, the enhancement of education and awareness, and good governance in order to achieve an effective incorporation of tourism as a component of coastal management.
DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, the thesis contains no material previously published or written by another person, except where due reference has been made in the text.

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14 February 2013
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Abbreviations

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>BLT</td>
<td>Broker-Local-Tourist</td>
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<td>BSAC</td>
<td>British Sub Aqua Club</td>
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<tr>
<td>CESA</td>
<td>Controlled Emergency Swimming Ascent</td>
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<tr>
<td>CITES</td>
<td>Convention on International Trade in Endangered Species of Wild Fauna and Flora</td>
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<tr>
<td>CMAS</td>
<td>Confédération Mondiale des Activités Subaquatiques/The World Underwater Federation</td>
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<td>CORAL</td>
<td>Coral Reef Alliance</td>
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<td>CPAD</td>
<td>Coastal Preservation and Development Foundation</td>
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<td>CU</td>
<td>University of Colorado</td>
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<td>DASTA</td>
<td>Designated Areas for Sustainable Tourism Administration</td>
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<td>DCI</td>
<td>Decompression Illnesses</td>
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<td>DMCR</td>
<td>Department of Marine and Coastal Resources</td>
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<td>DOF</td>
<td>Department of Fisheries</td>
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<td>EAS</td>
<td>East Asian Seas Congress</td>
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<td>EM</td>
<td>Effective Microorganisms</td>
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<td>EMP</td>
<td>Environmental Monitoring Program</td>
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<tr>
<td>GBR</td>
<td>Great Barrier Reef</td>
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<td>GBRMPA</td>
<td>Great Barrier Reef Marine Park Authority</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>IANTD</td>
<td>International Association of Nitrox and Technical Divers</td>
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<td>ICM</td>
<td>Integrated Coastal Management</td>
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<td>ICRAN</td>
<td>International Coral Reef Action Network</td>
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<td>IDC</td>
<td>Instructor Development Course</td>
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<td>IUCN</td>
<td>International Union for Conservation of Nature</td>
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<td>MRM</td>
<td>Marine Resource Management Course</td>
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<td>MU</td>
<td>Mahidol University</td>
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<td>NAUI</td>
<td>National Association of Underwater Instructor</td>
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<td>NGOs</td>
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<td>PADI</td>
<td>Professional Association of Diving Instructors</td>
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<td>PATA</td>
<td>Pacific Asia Travel Association</td>
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<td>Abbreviation</td>
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<td>Project AWARE</td>
<td>PADI Aquatic World Awareness, Responsibility and Education</td>
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<td>Prince of Songkla University</td>
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<td>REEF</td>
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<td>REO</td>
<td>Regional Environmental Office</td>
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<td>REST</td>
<td>Responsible and Ecological Social Tour Project</td>
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<td>Ramkamhaeng University</td>
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<td>SCUBA</td>
<td>Self Contained Underwater Breathing Apparatus</td>
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<td>Save Koh Tao Conservation Group</td>
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<td>UNCED</td>
<td>United Nations Council on Environment and Development</td>
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<td>UNEP</td>
<td>United Nations Environment Programme</td>
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<td>UNESCO</td>
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<td>UNWTO</td>
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<td>USD</td>
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CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

Tourism is the most rapidly growing industry on a global scale (UN Atlas of the Oceans, 2004), with the coast being a major tourist destination (Hall, 2001). The concept of coastal tourism embraces the full range of tourism, leisure and recreational activities that take place in the coast and offshore coastal waters. These include the development of accommodation, restaurants, food industry, second homes, as well as tourism activities such as recreational boating, coast- and marine-based ecotourism, cruises, swimming, recreational fishing, snorkeling and SCUBA (Self Contained Underwater Breathing Apparatus) diving (Hall & Page, 2006). As a result of an increased interest in nature and environmental appreciation (Burke, Reyтар, Spalding, & Perry, 2011; Oram, 1999), together with technological advances (Kenchington, 1993) and the accessibility to remote coral reef areas (Davis & Tisdell, 1995; Harriott, Davis, & Banks, 1997), SCUBA diving in coral environments has become a highly significant component of the international tourism market (Dimmock, 2007; Garrod & Gössling, 2008). According to Townsend (2008), the attraction of SCUBA diving destinations is almost exclusively related to its dive qualities rather than any other factor.

Coral reef tourism plays a growing role in the economies of many tropical maritime countries and territories (Andersson, 2007; Gössling & Hall, 2006). It brings economic benefits, fosters community pride, allows cultural exchange, and improves quality of life at the destination. However, as tourism develops, substantial socio-economic and environmental costs become more explicit (Davenport & Davenport, 2006; Dodds, 2012). The impact of continued degradation of coral reefs has led to a global concern over the future of reef-based tourism (Andersson, 2007). As coral reefs are the major attraction for SCUBA divers (Tratalosa & Austin, 2001; Worachananant, Carter, Hockings, & Reopanichkul, 2008), the degradation of coral reefs can potentially lead to the dissatisfaction of tourists (Craig-Smith, Tapper, & Font, 2006) and subsequently pose negative impacts on local tourism businesses (Marshall & Schuttenberg, 2006).

Given the significance of reef-based tourism to global and local economies, and the relationship between dive tourism and the natural and social environments (Burke & Maidens, 2004), the need to implement sustainable tourism practices has become important (Graci & Dodds, 2010). The United Nations World Tourism Organization (UNWTO) proposed sustainable tourism development guidelines and management practices for all forms of tourism in all types of destinations. For a viable
and sustainable future of the tourism industry, it is necessary for destinations to understand the impacts that tourism can have on the biophysical and social environments, and plan and manage tourism accordingly (Graci & Dodds, 2010).

1.2 RATIONALE FOR THE RESEARCH

With regards to the ongoing sustainability of the SCUBA diving industry, the concepts of integrated coastal management (ICM) and sustainable tourism development (STD) have recently gained research momentum (Caffyn & Jobbins, 2003). These two conceptual frameworks have been influenced by the principles of sustainable development formulated in Agenda 21, at the Rio Earth Summit in 1992 (UNEP & UNWTO, 2005). They have been proposed as the way forward in dealing with the increasing constraints in coastal zones and accommodating growing pressures from tourism development (Auyong, 1995; Kanji, 2006; Murray, 2007; Phillips & Jones, 2006; Westmacott, 2002). Both of the concepts emphasize the need for integrated approaches, good communication and participation in decision-making and resource management processes (Carter, Baxter, & Hockings, 2001). Often, ICM and STD are seen as two parallel, complementary and strongly interlinked processes (Bramwell, Henry, Jackson, & Van der Straaten, 1998; UNEP-DTIE, 2009). However, these two frameworks have not been addressed in a holistic and multidisciplinary way. In most of the studies, the coastal management literature and the sustainable tourism literature are treated separately rather than in an integrated manner (Bramwell et al., 1998; Caffyn & Jobbins, 2003).

In addition to the management dilemma of ICM and STD, there has been a lack of integration between the natural and social science components of tourism management. There is a growing number of research studies on coastal tourism, its impacts, planning and management in the past few decades (Hall, 2001). However, the majority of these studies concentrate on physical impacts on coral reefs (e.g. Barker & Roberts, 2004; Garrod & Gössling, 2008; Hawkins et al., 1999; Rouphael & Inglis, 2001; Rouphael & Hanafy, 2007; Tratalosa & Austin, 2001; Worachananant et al., 2008; Zakai & Chadwick-Furman, 2002); or impacts of wildlife tourism on species conservation (e.g. Davis et al., 1997; Preen, 2001; Tisdell & Wilson, 2001) while ignoring the human settings or the social, economic and cultural factors of tourism destinations (Daldeniz & Hampton, 2012; Hardy & Beeton, 2001).

Although the literature shows that the biophysical setting of a tourism destination contributes to its popularity and is important to enable the reef-based SCUBA dive tourism industry to cope with increasing global change (Ioannides, 1995), it does not mean that a healthy biophysical environment alone is sufficient protection against often unpredictable disturbances. Sustainability in tourism destinations can be motivated or impeded by tourism stakeholders (Ioannides & Petersen, 2003)
including tourists/SCUBA divers, tourism enterprises (e.g. dive operators, boat operators, accommodations, restaurants, transportation), and community in which the industry operates (Williams & Lawson, 2001). These people have multiple interests and interact with each other with heterogeneous attitudes and perspectives (Haddock-Fraser & Hampton, 2010). Therefore, to move the sustainability agenda of tourism forward, both the physical impacts of tourism and the social environment need to be considered. In other words, the dive tourism must be seen as a socio-ecological system - not as separate natural and social science components.

To address the primary research gaps, this study proposes to provide a holistic view of key issues confronting the management of reef-based SCUBA dive tourism by incorporating the complexity of socio-economic factors and social interactions of the tourism industry into the management of physical impacts, and to recommend a sustainable approach to dive tourism based on management planning and governance frameworks of ICM and STD. This study adopts an integrative approach to the coastal system, the human system, and coastal management and tourism management. The ICM and STD frameworks were analysed for their applicability to reef-based SCUBA dive tourism. It is expected that the findings from this study will allow for a better understanding of the dive tourism system and lead to an incorporation of tourism significance as a component of coastal management for the long-term sustainability of the reef-based tourism industry.

1.3 RESEARCH AIMS

1. To investigate the key issues confronting the management of reef-based SCUBA dive tourism from a holistic view including physical and socio-economic aspects.

2. To analyse the management mechanisms that best fit the specific needs of a reef-based SCUBA dive tourism destination based on the conceptual frameworks of integrated coastal management and sustainable tourism development.

In order to achieve these aims, a number of objectives will be addressed:

1) To conduct a literature review, develop conceptual frameworks, and provide an understanding of ICM and STD.

2) To select a case study where SCUBA dive tourism is significant to the national and local economy and is relevant in a global context.

3) To conduct surveys and interviews with residents, dive operators, dive tourists, and local coastal management partnerships.
CHAPTER 1

1.4 LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

The dive tourism industry is a socio-ecological system which depends on a natural setting, managerial setting and human setting of the destination as its goods and services. To manage the impacts of dive tourism, all of these factors need to be incorporated. In order to understand the context of this study, this section provides background information on coral reef ecosystems, the global, national and local significance of SCUBA dive tourism and major impacts of tourism development and its activities. A theoretical framework draws on literature of coastal management, sustainable tourism and community participation and involvement. Figure 1.1 illustrates the conceptual framework adopted by this study to manage impacts of dive tourism.

Figure 1.1 The conceptual framework for the study of reef-based SCUBA dive tourism.

Source: Author
1.4.1 Coral Reefs: Valuable but Vulnerable

Coral reefs are among the world’s most valuable ecosystems in terms of the biological diversity and the variety of goods and services (Table 1.1) (Burke et al., 2011). Worldwide, approximately 850 million people live within 100 km of reefs, many of whom are likely to derive some benefits from the ecosystem services coral reefs provide. They are an important source of food and income, serve as nurseries for commercial fish species, generate sand, protect shorelines from wave and storm damage, and attract tourists from around the world (Chua, 2006; Harvey & Caton, 2003; Moberg & Folke, 1999; White, Hale, Renard, & Cortesi, 1994). For developing countries, reef-based tourism has become one of the major sources of income. Many of them have recently turned to tourism as an economic saviour and necessity (Aiello & Hungerford, 2005).

Table 1.1 Goods and ecological services provided by coral reef ecosystems.

NOTE:
This figure/table/image has been removed to comply with copyright regulations. It is included in the print copy of the thesis held by the University of Adelaide Library.
However, recent literature shows that coral reefs are among the most threatened ecosystems on the planet (Burke et al., 2011), and in serious decline (Hoegh-Guldberg, 2011). Of the world’s 617,000 km\(^2\) of coral reefs, 10% are extinct, 30% are critical (predicted to die off in less than 20 years), 30% are in danger/threatened (predicted to die off in 20-40 years), and 30% are stable (Aiello & Hungerford, 2005). According to Kenchington (1990, p.119), coral reefs are “striking examples of beautiful and fascinating natural environments vulnerable to misuse and abuse by humans”. This is particularly true for coral reefs in embayments and near shallow shelves in densely populated areas (Roberts, 1995). Over 6,000 published studies indicate that both global and local factors were responsible for this continual loss. Global factors, such as global warming and acidification, figured strongly in the rapid decline of reef health in remote areas where local impacts were minimal or non-existent (Bruno & Selig, 2007). At the local level, coral reefs are being affected by over-exploitation of marine species, destructive fishing, pollution (Hughes et al., 2003), coral harvesting, as well as tourism and recreation (Bryant, Burke, McManus, & Spalding, 1998). A combination of these natural and anthropogenic impacts necessitates urgent reassessment of current management practices (Bellwood, Hughes, Folke, & Nyström, 2004).

1.4.2 SCUBA Dive Tourism

Recreational diving on coral reefs has increased greatly during the past few decades due partly to large numbers of divers being trained and increased interest in and access to remote coral reef areas (Davis & Tisdell, 1995; Harriott et al., 1997). The growth in the industry is confirmed by a range of data on diver training and retail membership from the major dive training organizations, including the Professional Association of Dive Instructors (PADI) and the National Association of Underwater Instructors (NAUI), the Scuba Schools International (SSI), the (International Association of Nitrox and Technical Divers (IANTD), the Confédération Mondiale des Activités Subaquatiques/The World Underwater Federation (CMAS), and the British Sub Aqua Club (BSAC). The total entry level and continuing education diving certifications for PADI, the world’s largest dive training organization, increased from 23,836 in 1969 to 20,313,807 in 2011. At the same time, the number of retail and resort membership grew from 4,036 in 1996 to 6,063 in 2011. From PADI alone, over 900,000 new certifications per year have been added to active divers worldwide since 2001 (www.padi.com/scuba/about-padi/padi-statistics/). This form of tourism combines elements of nature with adventure, attracting those tourists seeking excitement and intimacy with remote and pristine environments and wildlife (Shackley, 1998). Once certified, divers may travel extensively across the continents, and focus on coral reefs, wildlife, shipwrecks, walls, and caves (Tabata, 1992).
Although the Earth is covered with a vast expanse of ocean surface, only 0.3% provides a suitable marine environment for SCUBA diving (Oram, 1999; UNWTO, 2001). The critical importance of setting conditions for dive tourism has been brought up recently by various scholars such as Burke, Selig and Spalding (2002), Garrod and Wilson (2004), Roman, Dearden and Rollins (2007), and Yunis (2001). Biophysical settings include water clarity, underwater rock formations, and the quality and diversity of coral and fish communities (Dearden, Bennett, & Rollins, 2007; Pendleton, 1994; Shafer & Inglis, 2000). Human settings refer to cultural and historical values, technological and infrastructural environments, numbers of people at the destination, behaviour of others, as well as the types of activities undertaken at a site (Inglis, Johnson, & Ponte, 1999; Shafer & Inglis, 2000). Managerial settings are linked to quantity and quality of visitor safety programs, and management infrastructure (e.g. pontoons, buoys) (Oram, 1999).

Popular reef-based diving destinations include Australia's Great Barrier Reef (GBR), the Red Sea, East Africa, the Bahamas and the Caribbean, Hawaii, Maldives, and Southeast Asia, where the development began late but at a faster rate than elsewhere (Chua, 2006; Cope, 2003; Gormsen, 1997; Hall, 2001; Wilkinson, 1996; Wong, 1990, 1998). As a result of the high rate of participation in coral reef locations around the world, SCUBA diving tourism is considered one of the economic activities that is of importance to reef-based economies (Dixon, Scura, & Van't Hof, 1993; Fenton, Young, & Johnson, 1998; Tratalosa & Austin, 2001). The recent study by Burke et al. (2011) reported that reef tourism accounts for more than 15% of gross domestic product (GDP) in at least 23 countries and territories. A recent summary of 29 published studies reported a very wide range in economic values of reef-associated tourism, from about 2 USD per hectare per year to 1 million USD per hectare per year. Most values however fall within the range of 50 USD per hectare per year to 1,000 USD per hectare per year. This variation of values is strongly related to differences in the accessibility of places and the intensity of tourism development. For these reasons, it is not possible to undertake simple extrapolations of specific studies to entire reef tracts where demand and access may be very different (Burke et al., 2011).

If managed properly, the tourism industry can play an important and positive role in the socio-economic and political development in destination countries (UNCSD NGO, 1999). It also has the potential to reduce over-exploitation by creating alternative uses of resources, thus acting as a tool for the conservation of species and natural habitats (Manning, 2003). According to Burke and Maidens (2004), SCUBA divers typically spend 60%-80% more money for their holidays than other types of tourists. Not only do the divers spend money on diving, they also spend on non-diving goods and services including accommodation, dining and various forms of entertainment such as shopping and visiting cultural
attractions (Tabata, 1992). In turn, spending by tourists can directly contribute to the management cost of the tourism destination through visitor user fees (Burke et al., 2011). These benefits only occur under the adequate management at the destination. On the other hand, in the absence of proper controls and enforcement, unplanned tourism growth can cause environmental degradation, destruction of fragile ecosystems, and social and cultural conflict, undermining the long-term sustainability of the tourism industry (Cesar, 2003; Miller, Auyong, & Hadley, 1999).

1.4.3 The Main Impacts and Challenges

In the early stages, tourism has been thought of as a low-impact option for coral reef use (Baker & Crompton, 2000). Compared with worldwide threats from overharvesting, commercial fishing, pollution, disease and global climate change, the negative impacts from recreational SCUBA diving on coral reefs may seem negligible (Baker & Crompton, 2000; Hall, 1996; Jameson et al., 1999; Sorice, Oh, & Ditton, 2007; Tratalosa & Austin, 2001; Wong, 1993). However, a significant number of studies (e.g. Barker & Roberts, 2004; Daldeniz & Hampton, 2012; Dearden et al., 2007; Rouphael & Inglis, 2001; Walters & Samways, 2001; Worachananant et al., 2008; Zakai & Chadwick-Furman, 2002) have confirmed that coral reefs around the world have been negatively affected by intensive recreational diving pressure, particularly where dive tourism is allowed to develop in an unregulated manner (Bryant et al., 1998; Burke et al., 2011; Graci & Dodds, 2010; Hawkins & Roberts, 1992). In many developing countries the governments have had far greater priorities (e.g. economic development, health, welfare and education) for their limited financial resources than environmental protection and resource management (Hall, 2001). In this case, short-term economic gain often outweighs the long-term sustainability of the tourism industry (Hall, 1996; Smith, 1994). This problem is prominent in island destinations where the dynamic system and geographical limitations makes the intensity and severity of tourism development and the negative environmental impacts greater (Kokkrankanikal, McLellan, & Baum, 2003; Wong et al., 2005).

Impacts of tourism can be short or long-term; positive or negative; local, regional, national or global; direct, indirect, or interrelated (Cicin-Sain & Knecht, 1998; Goodwin, 1996; Hunter & Green, 1995). Much of the direct damage is the result of boat anchors and groundings, pollutants from vessels, and recreational misuse such as kicking and breaking coral or harvesting them for souvenirs. Indirect effects of diving include coastal erosion and sedimentation from construction, sewage and erosion runoff (Hall, 2001; Harriott, 2003; Shackley, 1998; Wong, 1998). These negative impacts are exacerbated as tourist numbers rise and destinations become more popular (Davenport & Davenport, 2006; Hawkins & Roberts, 1992). SCUBA divers can directly impact coral reefs in a number of ways such as hitting by fins, touching corals, stirring sediments and reef walking (Hall, 2001). As shown in
Figure 1.2, the pressure of diver numbers has created measurable damage to coral reefs throughout the world but impacts can be various in different regions.

As referred to by the United Nations Environment Programme (UNEP), the relationship between tourism and the environment is a relation of mutual dependence (UNEP-DTIE, 2009). This means that the growth or viability of tourism is dependent upon environmental quality, and at the same time, the environment is vulnerable to tourism development and its impacts (Wong, 1993). For this reason, it is crucial to ensure that tourism is planned, developed and operated within the context of sustainable development principles (Bramwell & Lane, 1993; UNESCAP, 2001). To satisfy both visitors and host communities, tourism development should aim for making optimal use of environmental resources; upgrading the quality of the tourism experience and services; respecting the socio-cultural values of host communities; and providing viable and long-term socio-economic benefits to all stakeholders (UNWTO, 2004). However, the implementation of sustainable tourism practices is highly dependent on the willingness and ability of those in the tourism industry to want to move in this direction (Bramwell & Lane, 1993; Gössling & Hall, 2006).

1.4.4 Sustainable Tourism Development (STD)

In an effort to incorporate sustainable concepts into tourism development, over 200 different definitions of sustainable tourism development have been identified or described by many authors (Hardy & Beeton, 2001; Ioannides, 1995; UNWTO, 1998), but there is no widely internationally accepted definition (Collins, 1999; Johnston & Tyrrell, 2005). Generally, this concept has become broader and more applied over time, from tourist-centric and economically focused perspective to a more eco-centric and multi-sectoral approach (Hunter, 2002). STD is commonly described as tourism that incorporates the principles of sustainable development, which are environmentally sound development and operation, economic viability and community integration, as a guiding philosophy (Butler, 1998; Logar, 2009; Shaw & Williams, 2002). According to the opening editorial of the first volume of the Journal of Sustainable Tourism (1993), sustainable tourism is “a positive approach intended to reduce the tensions and frictions created by the complex interactions between the tourism industry, visitors, the environment and communities”.

The following are two frequently cited definitions of sustainable tourism development:

Tourism which is developed and maintained in an area (community, environment) in such a manner and such a scale that it remains viable over an indefinite period and does not degrade or alter the environment (human and physical) in which it exists to such a degree that it prohibits successful development and well-being of other activities and programs (Butler, 1993, p.29).
Figure 1.2 Impacts of reef-based SCUBA dive tourism in selected diving destinations across the regions.
Source: Aiello & Hungerford (2005); Day (2008); Hasler & Ott (2008); Reopanichkul et al. (2010); Tibirica, Birtles, Valentine, & Miller (2011); Uyarra, Watkinson, & Côté (2009); Zulfa & Carlsen (2011)
Development that meets the needs of present tourists and host regions while protecting and enhancing opportunities for the future. It is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity and life support systems (UNWTO, 1998, p.21).

Many critiques note that this definition is an ambiguous and idealistic concept (Collins, 1999; Johnston & Tyrrell, 2005; Miller & Twining-Ward, 2005) which needs precision in order for it to be operational (Bramwell, 2004). In response to this the WTO in 2005 proposed that in order for sustainable tourism to be successful it must include the participation of all stakeholders and political leadership. As it is a continuous process, constant monitoring and measurement are required (Graci & Dodds, 2010). In combining the descriptions from various sources, the target of sustainable tourism is to maintain an appropriate balance between tourism, environmental conservation, economic development, and satisfying the needs and desires of tourists and local residents (Hunter, 2002). This is similar to the “Tourism Development's Magic Pentagon Pyramid” previously developed by Müller in 1994 (Figure 1.3).

![Figure 1.3 Tourism Development's Magic Pentagon Pyramid.](image)

*Source: Adapted from Müller (1994)*

### 1.4.5 Integrated Coastal Management (ICM)

ICM has been recognized lately by many tourism operators and decision-makers as a path to follow towards the sustainable development of coastal tourism (UNEP-DTIE, 2009). The ICM approach offers a good framework within which the principles of sustainable tourism development can be applied along with those other sectors such as water, soil, energy, fishing, and transportation.
(Gibson, McField, & Wells, 1998). It is an adaptive, multi-sectoral governance approach, which strives to a balanced development, use and protection of coastal environments (Olsen, Tobey, & Hale, 1998). Importantly, it acknowledges the interrelationships that exist among coastal and ocean uses and the environments they potentially affect, in both public and private sectors, according to an agreed upon set or resource management policies and practices (Christie & White, 2007; Cicin-Sain & Knecht, 1998). In the tourism context, ICM can help solve the conflicts between coastal tourism and other marine and terrestrial sectors; resolve overlapping responsibilities of involved agencies; and increase the cooperation between coastal tourism and other coastal sectors (UNEP-DTIE, 2009).

There has been debate over the use of related terminologies such as Integrated Coastal Zone Management (ICZM), Integrated Coastal Area Management (ICAM), Integrated Coastal and Marine Area Management (ICMAM), and Integrated Marine and Coastal Area Management (IMCAM) (Thia-Eng, 2006). Cicin-Sain and Knecht (1998) argued that there has been a shift emphasis away from ‘zone’ or ‘area’ management to ‘integrated’ management. Thus, ICM, as noted in Burbridge (1999) and Harvey (2004), is a more accepted term today (cited in Harvey, 2006).

The following are two frequently cited definitions of ICM:

A process that unites government and the community, science and management, sectoral and public interests in preparing and implementing an integrated plan for the protection and development of coastal ecosystems and resources (GESAMP, 1996, p 2).

A continuous and dynamic process by which decisions are made for the sustainable use, development, and protection of coastal and marine areas and resources. The process is designed to overcome the fragmentation inherent in single-sector management approaches (fishing operations, oil and gas development, etc.), in the splits in jurisdiction among different levels of government, and in the land-water interface (Cicin-Sain & Knecht, 1998, p 1).

The key elements of ‘integration’ in coastal management have been defined by various scholars (Cicin-Sain & Knecht, 1998; Harvey, 2006; Sorensen, 1997) as follows:

- **Intersectoral (horizontal) integration:** integration among different coastal and marine sectors (e.g. oil and gas development, fisheries, coastal tourism, marine mammal protection, port development), and integration between coastal and marine sectors and land-based sectors that affect the coastal and ocean environment, such as agriculture, forestry, and mining;

- **Intergovernmental (vertical) integration:** integration of all levels (national, state/province/region, local) of government and non-governmental organizations;
• **Spatial integration**: integration between the land, ocean and coast;

• **Science-management integration**: integration among the different disciplines important in coastal and ocean management (the natural sciences, the social sciences, and engineering) and the management entities;

• **International integration**: Integration among nations is needed when nations border enclosed or semi-enclosed seas or there are international disputes.

Given the scale of tourism in the world’s coastal zones, one of the greatest challenges faced by coastal managers is giving tourism development a proper place within integrated coastal management (Cicin-Sain & Knecht, 1998). Based on Cicin-Sain and Knecht (1998), ICM is not a “one size fits all” concept that can be applied in a wholesale fashion to all situations. As such, there is a need to develop suitable coastal management mechanisms or models to suit local conditions in which tourism growth can bring benefits to local communities (Wong, 1998). The key criteria for the successful implementation of ICM are 1) coordinated legislation, 2) efficient institutional organisation and 3) a high degree of public participation (Kay & Alder, 2005). To achieve effective outcomes, ICM requires time as it proceeds along a cyclical approach (GESAMP, 1996; Olsen, 2003) which are 1) issue identification and assessment, 2) program preparation, 3) formal adopting and funding, 4) implementing and 5) evaluation. Each stage consists of a number of essential steps that must be undertaken before moving into the next stage (Olsen, 2003).

### 1.4.6 Stakeholder Participation and Involvement in the Tourism System

The concept of stakeholder participation was raised in the environmental management literature in 1984 when Freeman wrote ‘Strategic management: A stakeholder approach’. A stakeholder was defined as:

> Any group or individual who can affect or is affected by the achievement of the organizations objectives (Freeman, 1984, p.46).

Based on this definition, the reef-based SCUBA dive tourism stakeholders include visitors/SCUBA divers, local and foreign investors and developers, local community, government and non-government organizations, coastal tourism labour force, and those involved in non-tourism coastal sectors (Björk, 2000; Kay & Alder, 2005). Since dive tourism, as well as other types of tourism, is a multifaceted and fragmented industry which depends on multiple other sectors, there is a need to integrate the interests of all stakeholders in order to maximize tourism benefits and minimize duplicated effort and conflicts (Bramwell & Lane, 2002; Greer, 2002). A number of scholars identify
stakeholder participation as an essential element to achieve sustainable tourism (e.g. Garrod & Gössling, 2008; Haddock-Fraser & Hampton, 2010; Sealey-Baker, 2011; Sheldon, 2005).

One of the most frequently cited conceptual frameworks concerning the relationships between major tourism stakeholders and between the stakeholders and the destination is the Broker-Local-Tourist (BLT) model of coastal tourism system by Miller and Auyong (1991). The BLT model is a sociology tool which, on the one hand, identifies the power dynamics of tourism which are dependent on three categories of players (B, L and T), and, on the other hand, facilitates the identification of their relationships in and with tourism destinations. According to Miller and Auyong (1991), tourists (T) are the individuals who travel for relatively short periods of time for business, recreation, and educational purposes before returning home. The locals (L) are the individuals who live at the place where the tourism goods and services are consumed. Tourism brokers (B) consist of persons who in one way or another pay professional attention to tourism. Main subcategories include 1) ‘private sector brokers’ who provide tourists with goods and services, 2) ‘public sector brokers’ who regulate the supply of those services in the public interest through design, economic development, transportation and other regulatory policies, and 3) ‘social movement brokers’ in non-governmental, non-profit, and environmental organizations who address tourism issues. Tourism brokers do not necessarily agree on the kind of tourism that is “best” for coastal tourism systems. In fact, broker-broker conflict is as common as cooperation (Miller, 1993). Figure 1.4 demonstrates the dynamics of dive tourism in particular, and the interconnection among stakeholders and between stakeholders and the social and natural environments.

As tourism destinations go through the phases of development, the size and character of tourism as well as the number and proportion of tourists, locals, and brokers might change. Individuals might modify their commitment to tourism; for example, some tourists stay and become locals, or some locals become private or public brokers (Dyson, 2010; Miller & Auyong, 1991; Miller et al., 1999). For this reason, an understanding of people-place and people-people interactions over time would be very beneficial (Miller & Auyong, 1991).

1.5 JUSTIFICATION FOR THE SELECTION OF STUDY SITE

As discussed in Kokkranikal et al. (2003) and Wong (1993), many islands have complex characteristics (i.e. geographical diversity, cultural sensitivity, political structure, levels of economic development, environmental fragility, remoteness, level of dependence on the mainland and limited
experience in tourism management) which contribute to a multitude of resource management and governance issues, especially relating to the potential success of sustainable tourism (Douglas, 2006). This is of specific concern for island environments that depend on the pristine quality of surrounding coastal and marine environments as a key tourism product. This study highlighted reef island tourism destinations where the diving industry is significant to the local and national economy. In reviewing the literature, the small and remote island of Koh Tao in the Gulf of Thailand was selected as a case study due to the following reasons:

- The significance of the island tourism to the global SCUBA dive tourism market;
- A wide range of diving opportunities available in the coral reef settings;

Figure 1.4 A reef-based SCUBA dive tourism system based on the Broker-Local-Tourist (BLT) model of Miller and Auyong (1991).
• The value of the diving industry to the local and national economy;
• The dramatic increase in tourist arrival and tourism facility development; and
• The characteristic complexities of the island and issues facing the diving tourism sustainability.

As the researcher is a Thai national, this would also facilitate research at this study site. Although this study addressed tourism and coastal management issues in the local scale, the contextual framework is not only specific to Thailand and its socio-cultural environments. Rather, it could be applied to any destination where SCUBA dive tourism is a major generator of economic activities in a rapidly growing region.

1.6 THE ISLAND OF KOH TAO, THAILAND

According to the Tourism Authority of Thailand (TAT, 2009), Koh Tao is a primary diving destination in Thailand and well-known as the busiest SCUBA diving centre in Southeast Asia. It accounts for one-third of the annual entry of PADI certifications worldwide (EAS, 2009). Natural resources and a variety of dive courses available on the island have attracted a large number of tourists from across the continents. Between 1993 and 2002, the number of tourists increased rapidly by 346%. In particular, there has been a substantial increase in foreign tourist numbers (470%). The total annual tourism revenue for Koh Tao was estimated at 500 million Thai Baht (THB) (16.2 million USD) in 2002; 400 million THB (13 million USD) from foreign tourists, and 100 million THB (3.2 million USD) from Thai tourists (Koh Tao Tambon Administratrive Organization, 2003). However, as visitor numbers increase, impacts tend to become more prevalent (Ankasirisap, 2000; Flumerfelt, 2000; Srisaowalak, 2011; Weterings, 2009) and the management controls of tourism impacts seem to be current issues confronting Koh Tao (Churugsa, McIntosh, & Simmons, 2007; Kornsitasaranukul, 2001; Sedthachatanan, 2009; Sutthacheep, Yeemin, & Tangjaitrong, 2006; TISTR, 1994). Like similar expanding dive industries elsewhere (Musa, 2002), sustainability is an ongoing concern (Bennett, Dearden, & Rollins, 2003).

Rapid tourism growth brings positive economic benefits to the local community and attracts immigrants from across the regions. However, it has led to difficulty in planning and regulating the industry development. The dramatic increase in tourism on Koh Tao itself, through careless tourists and unregulated construction, as well as irresponsible operation of tourism-related facilities has unfortunately caused damage to the reefs and other resources. Inadequate and/or ineffective legal and institutional arrangements multiply adverse consequences to coastal and marine environment.
1.6.1 Background

The island of Koh Tao covers an area of 21 km². It is located in the Gulf of Thailand, approximately 700 km from Bangkok or 70 km from the southern peninsula (Figure 1.5). This small and remote island was inhabited occasionally by fishermen as shelter from storm or as a stopover for the long fishing trips. Due to the isolation and distance from the mainland, it was utilized as a political prison for nearly fifteen years (1933-1947). After all prisoners were transferred to the mainland, Koh Tao was abandoned for a few years. The first settlers on Koh Tao, as documented in various sources, were originally from Koh Phangan, the nearby island, which is 45 km away. During those times, people lived a very simple life harvesting coconuts, fishing and growing vegetables, which were traded with the islanders on Koh Phangan (Sabai Jai, 2009, 2010).

In the early 1980s, a group of backpackers staying on a nearby island had discovered Koh Tao. At that time, there were approximately 400 people on the island. The increased visitors to Koh Tao led to the establishment of the first bungalow. The primitive huts were constructed with wood and bamboo in the traditional Thai thatched roof style (Jamulitrat, 1999). Word of mouth amongst the backpacker network accounted for an increase in visitors to Koh Tao in a short period of time. In the mid-1980s, recreational SCUBA divers participating on day trips from Koh Samui (64 km away) began to explore coral reefs around Koh Tao. Long-tail or fishing boats and buffalo carts were used as the main transportation. In 1987, the first relatively basic dive centre with limited equipment was opened on the island. Despite the small dive tourism industry, the reputation of Koh Tao had attracted several other entrepreneurs from across the regions. A few years later, bigger, faster, and safer boats were introduced to allow easier access to this isolated island (TAT, 2009).

Within a decade, the style of accommodation had become more up market, ranging from budget to high standard luxurious accommodation with landscaped gardens, swimming pools and spa. Over a thousand rooms were built; a significant number of which are in close proximity to the coast (Jamulitrat, 1999; Kornitsaranukul, 2001). As of 2009, there were 128 tourist accommodations, 115 restaurants and bars, and 43 dive centres on the island. The majority of dive operating businesses are owned by Thai residents, partnered with international skilled expatriates who work as dive masters, dive instructors and underwater photographers.
Figure 1.5 Map of Koh Tao, demonstrating the location of study area and the surrounding dive sites.

Source: After tourist brochures and pamphlets

Koh Tao not only is a primary diving destination in Thailand, but also the busiest SCUBA diving training hub in Southeast Asia, with approximately one million foreign and Thai tourists visiting annually (Szuster, Chen, & Borger, 2011). Koh Tao accounts for the second highest number of annual dive certifications worldwide (only second to Cairns, Australia) and is responsible for one-
third of the annual registrations of PADI globally (EAS, 2009). As of 2011, over 60,000 SCUBA dive certifications (PADI and SSI) were certified on this island (ScubaBoard, 2011). For this reason, the island can be recognized as a perfect diving destination regardless of whether recreation or a future underwater career is the primary purpose of visiting.

Similar to other dive training hubs worldwide, PADI and SSI are the market leaders and certify the majority of divers on Koh Tao. The quality of dive operation is monitored regularly by SSI and PADI representatives to keep all their members informed about changes within the industry (Szuster et al., 2011). Additionally, the recreational SCUBA diving industry on Koh Tao has registered under the World Recreational SCUBA Training Council (WRSTC) since 1999. The WRSTC is dedicated to the worldwide safety of the recreational diving public and is the mechanism for worldwide cooperation in reaching international consistency in minimum course training standards. Koh Tao has to adhere to the same standards with other countries. Therefore, there are virtually no differences in the training programs, making Koh Tao an internationally accepted diving destination (SCUBA Junction, 2012).

1.6.2 The Characteristics of Koh Tao

The information regarding the characteristics of Koh Tao was obtained from various sources including websites of tourism agencies and dive operators on the island, tourism magazines and brochures, along with limited previous studies on Koh Tao (i.e. Ratanamanee (2004), Srisaowalak (2011), Kornitsaranukul (2001), and the Department of Marine and Coastal Resources (2010)).

Demographics: Koh Tao community comprises a total population of 1,796 (as of 2009) who migrated from nearby islands and other parts of the country. The island population consists of a mixture of Thais (from across the country), westerners (European, American, and Australian/New Zealander) and other Asians (a large number of Burmese, a small proportion of Korean and a growing number of Japanese). Most of the Burmese residents temporarily work on manual labour jobs such as construction and boat work. Although there is no statistic record estimating the total number of each nationality, it is undeniable that this multicultural expatriate society makes Koh Tao population unique and complex as compared to other tourism destinations in the country.

Geography: Approximately 93% of the island is mountainous, along a north to south axis. The highest peak is about 374 m above sea level. The eastern part of the island is mainly sea cliffs while the western and southern part is flat and suitable for residential area development.

Climate: The area is characterized by two seasons – a dry summer (February to April) and rainy (May to January). During the rainy season the mean rainfall reaches 1,919.3 mm. The heaviest
rainfall is usually observed in the month of November. The average temperature throughout the year is between 26.3 °C and 29.2 °C.

Natural resources:

Water - Due to the geological structure of the mountainous and narrow plain area of the island, drought is a significant issue in the dry summer. The major sources of freshwater are from rain water and ground water.

Forests – Forests cover approximately 30% of the island space. The forest resources are classified into: dry evergreen forest, dry deciduous forest, and beach forest. Dry evergreen forests and dry deciduous forests can be found in the mountainous area on the eastern side of the island, while beach forests occur along the sandy coastal plains especially in the western side. As the forests on Koh Tao are not characterized by dense trees and undergrowth, there are limited amount of wild animals.

Corals - Coral reefs are found around the island approximately 28 km from seashore and range from 1 to 40 m depth. Since Koh Tao is located in the western part of the Gulf of Thailand and is influenced by the northeast monsoon (October-February), coral reefs are mainly found on the western and southern coasts. There is a high diversity of coral species and growth forms across the island; much higher than found in the nearby islands of Koh Samui, Koh Phangan, or Ang Thong Marine Park. Types of corals surrounding Koh Tao include massive coral, encrusting coral, tabulate coral, branching coral, mushroom coral. The predominant species are Acropora spp., Montipora spp., Pavona spp., Diplostrea spp., Favia spp., Favites spp., Ctennactis spp., Fungia spp., Pocillopora spp., Gonipora spp., Porites spp., Goneastrea spp. Echinopora spp. Platygyra spp. Lobophyllia spp., and Symphyllia spp.

Fish - According to the study by Scaps (2006), there are 365 reef-associated fish found in the Gulf of Thailand, of which 203 species were observed from Koh Tao (56%). Examples of marine life spotted by divers such as yellow boxfish (Ostracion cubicus), banner fish (Heniochus sp.), scorpion fish (Scorpeniopsis sp.), parrot fish (Scarus spp.) butterfly fish (Chaetodon sp.), sweet lip (Plectorhinus unicolor), grouper (Epinephelus sp.), barracuda (Sphyraena sp.), sea turtle, octopus, white-eye moray eel (Siderea thyrosidea), Leopard shark (Stegostoma fasciatum), Blacktip reef shark (Carcharhinus melanopterus), Bluespotted ribbontail ray (Taeniura lymma), Manta ray (Manta alfredi), whale shark (Rhincodon typus), Minke Whales (Balaenoptera acutorostrata), and Short-finned Pilot whale (Globicephala macrorhynchus).
**Land Ownership:** Koh Tao is under the legal responsibility of the Treasury Department (the Ministry of Finance). In practice, the pioneer generation of the current population has been on the island for more than fifty years, and have illegally established boundaries which are formally recognized by members of the community. The local land owners had requested legal documentation from the government to prove their rights to the land, but this was refused by the government, reasoning that the land was never relinquished after the political prison was abandoned. According to the government, the locals do not have legal title to the land unless they are registered with the Treasury Department and pay annual tax. A few locals have accepted this arrangement and now pay an annual fee to the government. However, the majority of the community members inherited the land from their ancestors who claimed their rights over the land tenure and thus refused the offer from the government and have continued to occupy the land until present.

**Transportation:** The only one direct mode of transportation between Koh Tao and the mainland is water transport, which includes night boat, speed catamaran, express boat, and speed boat. There are five routes to access the island from the mainland. Nevertheless, some travellers prefer to travel by airplane from Bangkok to Koh Samui (64 km away) and connect to speed catamaran from Koh Samui to Koh Tao. There are a few good paved roads on Koh Tao, with the main road connecting from the northern to the southern parts of the island. However, due to the rough terrain in the interior of the island, many roads are unpaved and impassable during monsoon season. Most locals own passenger vehicles with a cargo tray in the rear for the benefit of their businesses; some own 4WD for the rough road condition; and a number of them own motorcycles for their convenience. Tourists often hire motorcycles from the ‘bike for rent’ businesses which can be found around the island. Otherwise, taxi cars and taxi boats are available.

**Infrastructure:** Koh Tao has only one main electrical supply supported by the government but it cannot meet the growing demand of the tourism industry. Thus, each business or building has access to a private generator. The telephones are reliable except during the monsoon season when the connection is weak. There is one post office on the island that sends and receives mail daily provided that the boats are running. Internet can be accessed via several internet cafés islandwide. In terms of medical services, health care centres are available in the major tourist spots, especially in Mae Haad village where most of the tourism providers and the wharfs for catamarans, night boats and express boats are situated. With regards to education for children, there is a local nursery and a school up to grade 6.

**Waste disposal:** Koh Tao has an organized waste disposal service on the top of the hill, but some businesses and households provide their own means of disposal. Three incinerators were supported
by the government; however, only one is in a working condition. The capacity of the incinerator to deal with large amount of waste generated daily has become a great challenge. In terms of wastewater, septic tanks are commonly used. As the residential and commercial areas are located along the beach, it means that the tanks have to be placed near the beach and the sewage can potentially settle into the ground, eventually seeping into the groundwater.

Administration: Koh Tao is a subdistrict, so called Tambon in Thai language, of Koh Phangan District, Surat Thani Province. The island has three villages which are Mae Haad, Sairee, and Chalok Bankao. Mae Haad is the tourism centre of Koh Tao, with the main wharfs, government office, health centre, and a number of marine tourism providers.

1.6.3 SCUBA Diving Opportunities on Koh Tao

There is a large variety of dive courses available on the island suitable for all budgets, certification levels and duration of course. International diving agencies represented on Koh Tao include PADI, SSI, IANTD, BSAC, CMAS and NAUI. Novice and professional divers have an opportunity to select courses from 15 different languages islandwide. Diving is possible year-round, with April being the peak season for Thais, and December to March and July to August for international tourists corresponding with a long holiday period at the tourists’ origin. With nice weather, visibility can reach up to 30 m. Though it is the changeover from Southwest to Northeast monsoon in the Gulf of Thailand in November, diving is still possible with sheltered sites on one or the other side of the island.

The most popular dive course is PADI Open Water for dive beginners. The four-day course costs a minimum of 9,000 THB (295 USD) [conversion rate as of January 2011]. Budget accommodation during courses is usually offered, costing from 250 THB (8 USD) per night for a fan room or 500 THB (16 USD) per night for an air-condition room. Otherwise, divers can choose accommodation of their choice with a wide range of luxury, costing up to 20,000 THB (300 USD) per night, and organize the pick-up services on the day of the dive trips. For certified SCUBA divers, one dive typically costs 700-900 THB (30 USD) depending upon seasons and dive operators. A ten-dive package is available for 7,000 THB (230 USD) with a 15% discount when divers provide their own diving gear. In addition, a three-day liveaboard dive package and underwater photography course is offered by particular dive operators.

Divers have the opportunity to explore over 30 dive sites in the close proximity of Koh Tao. The dive sites vary from gently sloping coral gardens to massive granite pinnacles. Dive sites depth range from 10 to 40+ m making SCUBA diving enjoyable for all levels of divers. Most of the dive sites have English names reflecting the influence of Westerners in the dive history; for example, Red Rock, Green Rock and White
Rock. The three dive sites were discovered by an Italian diver and named after the Italian flag. Examples of the biophysical attributes of the selected dive sites, and the underwater photographs of tourists diving experience are illustrated in Figure 1.6 and 1.7, respectively.

Figure 1.6 The biophysical attributes of dive sites at Green Rock, White Rock, South West Pinnacle, and Chumpon Pinnacle.
Source: http://www.kohtaocenter.com

Being a popular diving destination does not guarantee a low risk of problems encountered while diving. Koh Tao provides internationally approved diving safety courses and 24 hr emergency recompression treatment facilities for divers who may experience symptoms of Decompression Illnesses (DCI). Badalveda Diving Medicine Centre in Mae Haad supports emergency evacuation service to a small, one-person recompression chamber on 24 hr standby. Larger recompression facilities are on Koh Samui, ninety minutes away by speedboat (www.badalveda.com).
Apart from coral reefs, tourists visit Koh Tao for sun, sand, and sea as other coastal tourism destinations. There are 11 bays, 10 rocky headlands, small rocky beaches and long white sandy beaches around the island. Tourists can find small and secluded beaches on the eastern side, and more developed beaches with beachfront resorts and bars on the western side. Furthermore, Koh Tao offers an array of non-water based activities, including rock climbing, trekking, mountain biking, quad motorcycle, flying trapeze, bowling, mini golf, Thai boxing, Thai cooking classes, Thai massage, yoga, as well as and beauty and spa (TAT, 2009), making this small and remote island a destination suitable for everyone.

1.7 RESEARCH ORIGINALITY

The island of Koh Tao provides a unique case study as it is located in a developing country where the government does not place a high priority on environmental protection unlike other reef-based dive tourism destinations in developed countries such as the GBR in Australia or the Florida Keys in...
the United States. Generally, Koh Tao might share a similar trend of increasing tourist numbers as other destinations worldwide, but the limitation of small size and remoteness, the dominance of tourism industry over other land-based and marine-based activities, the reciprocal relationship between Thai locals and skilled expatriates, and the lack of regulation or legislative framework in relation to tourism development have created an intensity of dive tourism issues which make this island a special case.

This study presents a holistic picture of reef-based SCUBA dive tourism system. It includes a multitudinal perspective of all key players (divers, residents, dive operators) within a single study and integrates the physical environment and the social environment by incorporating the complexity of socio-economic factors of the tourism system and the interrelationship between the industry, stakeholders, local community and natural environments into the management of reef-based dive tourism. It is expected that this research will contribute to a growing pool of research endeavours that seeks to advance the understanding of the dynamics that takes place between the tourism industry and the coastal and marine environments. The researcher also hopes that the case study of Koh Tao, Thailand can draw attention to a more integrated and holistic approach to coastal management that takes account of both the biophysical dimension and the multidisciplinary background within the tourism industry.

1.8 THESIS STRUCTURE

It has been apparent that major stakeholders in the reef-based SCUBA dive tourism (residents, dive operators and SCUBA divers) not only contribute to the tourism opportunities and economy but also leave behind negative impacts on coastal communities. Therefore, all of these stakeholders are responsible for putting the sustainability agenda of tourism destinations into practice. However, each stakeholder has distinctive perspectives, interests and potential contribution under the framework of sustainability. For ease of understanding the different sectors of the industry, chapters 3-5 are structured and organized according to the stakeholders. This permits a holistic view enabling synthesis and discussion in later chapters. The thesis has no stand-alone literature review chapter, rather, the theoretical underpinnings of the research are discussed in Chapter 1 and the background information needed to understand particular topics is segmented into different chapters on the basis of relevance.
Chapter 2 justifies and describes the methods used in conducting this research. The chapter includes research foundations, ideology development, data collection processes, data processing and analysis. Detailed methods and data sampling of specific stakeholders are however described in separate chapters. Similar structures are applied to Chapter 3 to 5, beginning with a brief introduction which states the aim and objectives of the chapter, followed by a critical review of relevant previous studies in the research field. The detail description of methods undertaken and the presentation of results and analysis are organized in a logical sequence. The chapters end with a short summary to highlight the significant findings and provide a brief overview of what to expect in the next chapter.

Chapter 3 describes residents as a stakeholder. The chapter sets the stage for the whole research as it demonstrates the growth of dive tourism over time, the demographics of people residing on the island, as well as how tourism benefits or negatively impacts the coastal community.

Chapter 4 focuses on the dive operating businesses because they are the most important tourism provider supplying SCUBA diving services for tourists. The chapter examines the dive operators’ responsibility to the tourism sustainability by assessing their performance in complying with the internationally-accepted environmental standards. Both environmentally unsustainable and sustainable practices of the dive operating businesses are presented. Importantly, this chapter provides information of what factors influence the adoption of the codes of conduct, along with the challenges facing their diving operations.

Chapter 5 provides background information on divers participating in the Koh Tao diving experience. As tourist satisfaction can influence the sustainability of tourism destinations, this study considers it as one aspect of sustainability. The chapter focuses on the SCUBA divers behaviour underwater and the satisfaction/dissatisfaction of divers in relation to biophysical attributes as well as other peripheral factors surrounding the dive settings. Apart from this, their demographics, coral setting history, knowledge and experience in diving activities are also discussed.

Chapter 6 details the local initiatives in relation to sustainable development of dive tourism. The chapter illustrates the past and present efforts as well as investigates the obstructing and facilitating factors affecting the effectiveness of the partnership in delivering the goals. The chapter demonstrates different stakeholders’ attitudes towards the existing control mechanism of dive tourism, of which are useful for better management of Koh Tao dive tourism.

Chapter 7 presents the interpretation of the results and synthesizes the findings from the previous four chapters (Chapter 3 to 6). The chapter relates the findings to the aims of this research, and
elaborates the similarities as well as differences between this study’s findings and the previous studies. In this chapter, the implications of the study for managers and/or policy makers are discussed along with the practical recommendations for the diving destination to achieving sustainable tourism.

The final chapter, Chapter 8, draws together some of the themes and issues identified in the introductory chapter and highlighted throughout the thesis. This chapter aims not only to indicate the substantial contribution that social science dimension has made to the analysis of sustainable tourism development but also develop a management framework for the reef-based dive tourism.
CHAPTER 2
METHODOLOGY

This chapter provides a detailed description of methods selected to achieve the aims of the study. The following sections begin with research foundations demonstrating the study design and the research process, followed by research methods and data collection procedures. Data processing and analysis are outlined in the final section of the chapter.

2.1 RESEARCH FOUNDATIONS

As suggested by Neuman (2006), identifying the dimensions of research is helpful for researchers as decision-making outlines to design a study and collect data in order to answer the research questions, and then proceed in research processes. Based on Neuman’s classification, four main dimensions of research are: (i) audience for and use of research, (ii) time dimension, (iii) purpose, and (iv) data collection and analysis techniques. Social research has two distinct branches when considering the audience for and consumers of the research findings. Some researchers are more detached, scientific, and academic-oriented; whereas, others are more activist, pragmatic, and reform-oriented. Research designed to seek an understanding of the fundamental nature of social reality and build or test theoretical explanations is known as ‘basic research’ (also called academic research or pure research). In contrast, research designed to offer practical solutions to address an immediate and specific issue is referred to ‘applied research’. In the context of this study, the researcher not only sought to understand the nature of reef-based SCUBA dive tourism and its impacts but also offered practical recommendations in response to immediate and specific issues confronting dive tourism sustainability. For this reason, the present study of Koh Tao can be considered applied research. The primary audience for and consumers of this research type are practitioners (e.g. teachers, counsellors, and caseworkers) or decision makers (e.g. managers, committees, and officials) (Somekh & Lewin, 2005). Figure 2.1 illustrates the foundation of research and study design based on the four research dimensions described above. This diagram presents the research processes in a sequential order starting from identifying research questions to providing recommendations and conclusion to the study.
Figure 2.1 The foundations of research, demonstrating the study design, data collection procedures and research process of this study.

Source: Author, After Neuman (2006)
In regard to the dimension of purpose, three of the most common research purposes are: exploration, description and explanation. The literature (Neuman, 2006; Yin, 2009) suggested that the ‘what’ question is a justifiable rationale for conducting ‘exploratory research’, while the ‘who’, ‘when’, ‘where’, and ‘how’ questions are for ‘descriptive’, and the dominance of ‘how’ and ‘why’ questions are more likely to be ‘explanatory’. As discussed in Chapter 1, this study attempted to explain ‘what is happening’ on Koh Tao in relation to the management of dive tourism as well as ‘why, who, when, where, and how’ according to its relevance. Evidently, this study has multiple purposes.

Another dimension of research relates to an awareness of time. Three distinct approaches in conducting social research include cross-sectional research, longitudinal research and case-study research. ‘Cross-sectional research’ focuses on a single point in time and allows researchers to analyse it in detail, while ‘longitudinal research’ provides a moving picture that lets researchers follow events, people, or social relations over periods of time. On the other hand, a ‘case study’ focuses on one or a few cases during a limited time period. According to Ragin (1994), the data from case-study research are usually more detailed, varied, and extensive compared to other methods. For this reason, this approach was selected to obtain results in this study. The small-scale study was expected to provide results which are of practical use as it took an example of an activity and used multiple methods and data sources to explore and interrogate it (Walker, 1974). However, the case study approach, as other methods, has peculiar advantages and disadvantages. The external validity or generalization of case study research has posed concern among various scholars (Bryman, 2008). The method has been claimed as of little use and less significance since they allowed little quantification and no generalization. In response, Yin (2009) argued that the case study approach is acknowledged to avoid the generalization based on empirical data of sample population or commonly known as ‘statistical generalization’. Nevertheless, it emphasizes the generalization of an idea based on a previously developed theory or referred to as ‘analytic generalization’ (Yin, 2009).

The last dimension of research foundation is the data collection and analysis techniques. These techniques in social research are distinguished into two paradigms, ‘quantitative and qualitative’. Quantitative research involves the collection and analysis of data that can be presented numerically or codified and subjected to statistical testing. In major quantitative methods, data is gathered through surveys, questionnaires and structured interviews. The qualitative research, on the other hand, is ‘meaning’ making, with the focus on smaller units of people and society. Qualitative methods and analyses draw out the meanings, perceptions and understandings that individuals and groups attach to behaviours, experiences and social phenomena. Methods involve various forms of observation, focus groups and unstructured interviews. Research that integrates quantitative and
qualitative research within a single project is referred to as ‘mixed methods research’. It has been argued that mixed methods research is likely to consume considerably more time and financial resources and cause researchers difficulties with the integration of the findings derived from their research. Some criticized the integration of quantitative and qualitative strategies as the two are based on incompatible epistemological positions providing ‘irreconcilable views’ to study the social reality (Bryman, 2007; O’Cathain, Murphy, & Nicholl, 2007). On the contrary, Burgess (1986) and Creswell (2009) believed that employing multiple research strategies can increase internal validity and provide a better understanding of research problems than either approach alone. This can be undertaken through the use of a multiple observers, theoretical perspectives, sources of data, and methodologies which referred to as ‘triangulation’. Types of triangulation can be triangulation of measures, triangulation of observers, triangulation of theory and triangulation of method (Neuman, 2006). Regardless of what method(s) is/are employed, it must be competently designed and conducted as well as compatible with research questions (Bryman, 2008). Notably, the limitations inherent in the use of either the quantitative or qualitative paradigm individually will not immediately be resolved simply by employing a mixed-method approach (Bryman & Teevan, 2004).

Brannen (2003) and Ritchie and Lewis (2003) suggested two primary styles in which the two methods can be utilized together. Firstly, one approach can be carried out prior to the other approach in order to facilitate the other. Secondly, the two approaches can be carried out alongside each other. As shown in Figure 2.1, this study adopted the first style (sequential mixed-methods), commencing with the quantitative approach through self-administered questionnaire survey, followed by a qualitative in-depth interview. The purpose of interconnecting the results from these two techniques is to mutually reinforce findings and “achieve an understanding (of the phenomena) that neither method alone can offer” (Ritchie & Lewis, 2003). In the case of Koh Tao, the in-depth interview certainly provided more understanding of issues raised in the survey and allowed the researcher to discover the complexities of participants’ perceptions and experiences as expressed in their own words.

2.2 IDEOLOGY DEVELOPMENT

Reviewing the existing literature is an essential early step in the research process (Bryman, 2008). In this study, an extensive literature review associated with SCUBA dive tourism, sustainable tourism, coastal management and community participation was conducted as an ongoing basis throughout the research to help support the domain of the study. The ideas and findings of other scholars were utilized to support a particular viewpoint or argument in relation to the research topics. Research literature used was in several forms, including books, scholarly journal articles, dissertations,
government documents, policy reports and periodicals. Neuman (2006) has suggested a good literature review must be selective, comprehensive, critical, and current. In this context, it means that the review must identify the most relevant past studies, comment on the details of some specific studies and evaluate them as they relate to the current study. The major conceptual frameworks and general background of the research were presented in the previous chapter. However, the detailed reviewed literature with regard to specific topics will be presented in each of the chapters prior to the result sections.

2.3 DATA COLLECTION APPROACHES

This section justifies the selection and provides general information of data collection approaches undertaken in the study. Detailed sampling techniques and sample size will however be discussed in the methods sections of each chapter. As previously stated, this study adopted different types of data gathering techniques because collecting data from a variety of sources and methods serves as a means of ‘perceptual triangulation’, thus increasing internal validity (Daldeniz & Hampton, 2012). In general terms, this strategy involves using as many data sources as possible to illuminate the same objective matter. By an attempt to reconcile the gathered evidence across data types and between cases, the likelihood of generating and reforming perceptions into a more robust understanding increases (Eisenhardt, 1989). This ability to deal with a full variety of evidence, documents, artefacts, interviews, and observations, according to Yin (2009), is the unique strength of case study research.

Data can be found in various forms including self-reports (e.g. attitudes, behaviours, memories, characteristics), computerized manual, hard copy, research databases, observations and others (Bickman & Rog, 2009). Primary sources in this case included people, independent descriptive observations of events and activities, and physical documents. The main types of data collection instruments in this study involved participant observations, self-administered questionnaires, and semi-structured interviews. The researcher took into account the resources available and the limitations of those resources before selecting the research design and the type of data collection procedures. Such resources related to data [sources of information and how to collect them], time [total time required to complete the project], personnel [skills budget and person loading], and financial resources.

Secondary sources of data include information that has not been collected directly by the researcher although is available through other media (Bryman, 2008); for example, national Bureau of Statistics and media reports. The use of existing data, compared with collecting primary data, has the advantage of lower cost and time savings; however, there are issues of managing a large amount of
flawed and/or inappropriate data (Bickman & Rog, 2009). In many cases, data exist in formats designed for particular research purposes responding to specific responsible organizations. In this respect, these data may not answer research questions of the researcher who collects data from them. Moreover, data sets can be exceedingly complex, with changes occurring in data fields and documentation over time. In case of very poor documentation, making interpretation of the data can be difficult (Bryman, 2008).

In this study, secondary data were collected as supplementary information using documents in regards to topic categories and issues raised, for instance, development of reef-based SCUBA dive tourism, tourism impacts, coastal management, tourism policy and planning, and relevant legislative framework at local, regional and national scales. Examples of responsible organizations which the researcher collected data from are as follows:

- The International Union for Conservation of Nature (IUCN), Thailand;
- Tourism Authority of Thailand (TAT);
- Office of Natural Resources and Environmental Policy and Planning (ONEP);
- Office of Marine and Coastal Resources Conservation (OMCRC);
- Regional Environmental Office 14 (REO 14);
- National Statistical Office (NSO);
- Marine Biodiversity Research Group (MBRG);
- Ramkamhaeng University (RU), Mahidol University (MU), Prince of Songkla University (PSU)
- The local government, Koh Tao Tambon Administration Office (TAO);
- Koh Tao Post, the local newspaper; and
- Online sources (government, NGOs and private sectors).

### 2.3.1 Surveys

Questionnaires are the most common method of obtaining data in the social sciences (Nardi, 2006). They are often inexpensive compared to other data collection strategies, less time consuming, easily repeated and can be geographically disbursed. Written questionnaires are widely utilized by social researchers to gather information on the backgrounds, behaviours, values, opinions, beliefs, or attitudes of a large number of people (Walter, 2010). In survey research, researchers do not manipulate a situation or condition to see how people react, instead, they simply record answers from many respondents who have been asked the same questions. Survey results are typically presented in the forms of charts, graphs, or tables and analysed with statistics (Neuman, 2006).
Surveys have some distinct advantages as they can be used to investigate a wide array of topics, from varying perspectives and across a range of different respondents. Moreover, they can collect a lot of information from a large sample in a relatively short period of time. However, there are debates that surveys have some weaknesses and drawbacks because they are mostly collected at a specific time and, therefore, are reflective of this time rather than being constant and fixed phenomenon (Walter, 2010).

To conduct a survey, the sequential steps are research formulation, selecting the sample, survey development, implementing the survey, and analysis, interpretation and presentation (Figure 2.2). In this study, the questionnaire survey was conducted from November 2010 to February 2011. This period was selected as representative of a full diving season for foreign tourists [high seasons are usually from December to March and July to August]. The researcher attempted to sample as many respondents to ensure a wide range of participants. The questionnaires were distributed to the major tourism stakeholders including residents, dive operators and SCUBA divers. Each respondent group was given different set of questionnaires constructed with general questions similar to others; and additional questions specific to particular stakeholder. The questionnaire content was based on the management and governance frameworks of ICM and STD.

All of the questionnaires were distributed directly to respondents by the researcher alone. This can be seen as another advantage as any questions arising in the study site would be clarified by only one researcher who was fully aware of the research objectives and research processes. Information and instructions on completing the questionnaire were provided on the first page of every set of the questionnaires. In fact, the tourism high season period also served as an advantage to the study as it allowed the researcher to observe SCUBA diving activities, tourism operations, and management controls in relation to diving impacts and resources degradation. On the other hand, it led to time constraint for potential participants to participate in the study. Given the limited time available of both residents and dive operators, the researcher used an ‘onsite self-administered’ questionnaire survey which offered opportunities for participants to complete in their own convenience. Questions were developed as descriptive, attitudinal and behavioural, using a mixed-style of both ‘closed- and open-ended’ in order to reduce disadvantages of a question form and meet the purpose and the practical limitations of the research project. There has been a long debate about open versus closed questions in survey research. Each form has advantages and disadvantages. However, the crucial issue is not which form is the best but it is under what conditions a form is most appropriate (Neuman, 2006).
All of the questionnaires were distributed directly to respondents by the researcher alone. This can be seen as another advantage as any questions arising in the study site would be clarified by only one researcher who was fully aware of the research objectives and research processes. Information and instructions on completing the questionnaire were provided on the first page of every set of the questionnaires. In fact, the tourism high season period also served as an advantage to the study as it allowed the researcher to observe SCUBA diving activities, tourism operations, and management controls in relation to diving impacts and resources degradation. On the other hand, it led to time constraint for potential participants to participate in the study. Given the limited time available of both residents and dive operators, the researcher used an 'onsite self-administered' questionnaire survey which offered opportunities for participants to complete in their own convenience. Questions were developed as descriptive, attitudinal and behavioural, using a mixed-style of both 'closed- and open-ended' in order to reduce disadvantages of a question form and meet the purpose and the practical limitations of the research project. There has been a long debate about open versus closed
questions in survey research. Each form has advantages and disadvantages. However, the crucial issue is not which form is the best but it is under what conditions a form is most appropriate (Neuman, 2006).

According to Bryman (2008), closed-ended questions tend to be more suitable for large-scale surveys because they are quicker and easier for both respondents and researchers. Yet some information may be lost when one’s feelings and beliefs are forced into a few fixed points that a researcher created. To avoid such issue in this study, additional space for reasoning was provided along with the closed-ended questions in order to give respondents an opportunity to express their feelings or opinions if not already listed. The most common close-ended questions in the questionnaires consisted of binary ‘yes, no’; Likert scaling both horizontally and vertically on the page; rating scales; and ranking of lists (see examples in Figure 2.3). When many possible answers were expected, open-ended question form was chosen to allow respondents to answer in detail and express their logic, thinking process and frame of reference.

### 2.3.2 Interviews

Qualitative interviewing, especially an in-depth interview, is extensively used as a key method to explore social meaning within social science research. The interview method reflects two basic research decisions which are the research questions and the theoretical framework of the project (Travers, 2010). An in-depth interview involves communicating with a participant about the topic of research, guided by a set of general themes, rather than using pre-set questions. This qualitative method allows the interviewer to discover the complexities of participants’ perceptions and experiences as expressed in their own words (Mack et al., 2005; Patton, 1980).

<table>
<thead>
<tr>
<th>Closed Binary ‘YES, NO’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you participating in or being a member of any eco-friendly diving program?</td>
</tr>
<tr>
<td>□ Yes □ No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Horizontal Likert</th>
</tr>
</thead>
<tbody>
<tr>
<td>In your opinion, do reef-related tourism activities and tourist facility development generate negative impacts on coastal and marine environment?</td>
</tr>
<tr>
<td>□ □ □ □</td>
</tr>
<tr>
<td>Strongly agree Somewhat agree Somewhat disagree Strongly disagree I don’t know</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vertical Likert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you believe we can solve all of the coastal issues mentioned above?</td>
</tr>
<tr>
<td>□ Yes, all</td>
</tr>
<tr>
<td>□ Mostly yes, but with some exceptions</td>
</tr>
<tr>
<td>□ Maybe</td>
</tr>
<tr>
<td>□ No not all, but with a few success</td>
</tr>
<tr>
<td>□ No, never</td>
</tr>
</tbody>
</table>
### Rating Scale

Overall in your opinion, how would you rate coral quality at dive sites you have visited?

(Please circle one number only)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>very high quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>very low quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Ranking

Please prioritize the following reasons supporting your choice of dive operator on Koh Tao by placing a 1, 2, 3, 4 or 5 (1 being the most important and 5 being the least important)

- [ ] Attractive dive sites
- [ ] Reasonable price
- [ ] Dive operator’s reputation
- [ ] Personal recommendations
- [ ] Coral friendly operator (good management practices)
- [ ] Others: (please state)

### Open-ended

What do you like/dislike about diving experiences on Koh Tao?

**like:**

_____________________________________________________________________

**dislike:**

_____________________________________________________________________

---

Figure 2.3 Examples of question types within the structured questionnaires (selected from each of the three sets of questionnaires)

There are no pre-set rules on the number of interviews needed in qualitative research (Travers, 2010). The numbers of in-depth interviews conducted varies among research projects, depending on the purpose and the aim of the project as well as the research questions. The large number of interviews does not indicate the value of research findings. It is often found that interesting and meaningful findings are obtained through conducting only a few interviews. However, it has to be noted that qualitative findings cannot be generalized to findings about the broader population (Boyce & Neale, 2006).

The in-depth interview phase in this study took place in January 2011, while the researcher commenced the data collection process at the study site in November 2010. This allowed the researcher two months to participate in social events, to be familiar with the local populations, and to understand the biophysical, socio-cultural and economic settings of Koh Tao. The time spent prior to the interview allowed the researcher to select interviewees or informants appropriately according to their relevance to the subject in question. Given the fact that Koh Tao is a multi-cultural society with at least sixteen nationalities involved in the tourism industry, the researcher selected both Thais and foreigners as informants for this study. As expected, the interviews were conducted in Thai and English. Since Thailand is the researcher’s country of origin, it provided the primary advantage to the study. Regardless of whether the interviews were in Thai or English language, the researcher was able to understand and encourage the discussion to be as open as possible. This was found to be
particularly necessary in the situation where cultural concepts could not be easily translated into English. Although some of the local Thai populations spoke a Southern dialect which differs from the official Thai (Bangkok dialect), this was not a problem during the interviews.

The nature of the research questions suggested a stepwise design. This means that the first step of data collection was to explore and generate a wide range of insider perspectives about the subject. Any themes which emerged from the initial questions were then pursued further. In this study, semi-structured interviews were conducted with key informants from dive operating businesses, local, regional and national government, NGOs, and community leaders and members. The informants were asked general questions relating to the research topics, specific questions raised from the survey, and particular questions relevant to each stakeholder’s roles and responsibilities. All sources of information including the surroundings and nonverbal communication (e.g. shrugs, gestures) were absorbed. The researcher explained the purpose of the interview to key informants before conducting face-to-face interviews and informed the informants that the conversation would be recorded. Interviews were mostly conducted at either the informant’s house or their workplace, depending on their preference. In case that an informant was preoccupied or there was no privacy, an alternative setting was selected (e.g. restaurant, coffee shop). Details of identification of key informants and structure of interviews will be discussed in Chapter 6.

2.3.3 Participant observation

Participant observation, as noted in Fetterman (2009), is significant to effective fieldwork. It is a special mode of observation in which researchers actually participate in the events and people lives being studied (Yin, 2009), while maintaining a professional role in observing and recording data (Bickman & Rog, 2009). Participant observation allows certain distinctive opportunities to occur. It helps the researcher learn the perspectives of the populations by experiencing the participants’ lives in their own environment as well as their day-to-day experiences (Denzin, 2009). Therefore, it is very useful for gaining an understanding of the physical, social, cultural and economic contexts in which participants live, the relationships among people, contexts, ideas, norms and events, and people’s behaviours and activities (Mack et al., 2005). Many researchers have stated that such a perspective is invaluable in producing an “accurate” picture of a case study phenomenon (Bickman & Rog, 2009; Yin, 2009).

The weaknesses of participant observation however are related to the potential biases produced. Researchers may have less ability to work as an external observer and become a supporter of the group or organization being studied. Moreover, the participant role may simply require much more attention compared to the observer role. Participant observers may not have sufficient time to record
data or to raise questions regarding situations participating in. Given the benefits and issues that participant observation can provide, researchers must think and plan seriously before undertaking the study to maximize benefits of and minimize biases occur (Yin, 2009).

In this study, the researcher spent time getting to know personally the people being studied and has become a familiar sight to people in the field setting. During the study period, the researcher participated in diver and environmental associations meetings, tourism experiences, public talks concerning conservation and community development, and workshops in relation to tourism. These meetings not only provided background materials and observations for further inquiry but also provided opportunities for the researcher to introduce herself and the research topic. Additionally, informal interviews were conducted when the researcher interacted with people on the street, in the local shop, waiting for a ferry or having meal at the restaurant. Often, people chat without any particular expectations. The researcher paid close attention, watched, listened and used all senses thoroughly in the field. All sources of information were noticed and noted on a daily basis although she did not know the relevance of what she was observing because such details were expected to be valuable and to help assigning the meanings later.

As suggested by Newing (2011), informal interviews are useful in providing information related to the background and context of the study, cross-checking information gathered by other sources, and revealing issues researchers may have been overlooked or misunderstood. In this case, informal interviews revealed information on sensitive subjects such as illegal activities or social conflicts on Koh Tao, which people may be unwilling to discuss in a more formal situation. Besides, informal interviews were also useful in identifying good candidates for in-depth interviews.

2.3.4 Ethical Issues Involving Research Participants

As reported in Bryman (2008), it is relatively easy to make records anonymous and to report findings without an identification of any individuals in quantitative research. In contrast, in qualitative research, possible identification of persons and places are more likely to be problematic. Particularly in case study research, researchers do not study physical, chemical, or other nonhuman systems; rather it is the study of “a contemporary phenomenon in its real-life context” (Yin, 2009, p.73). Therefore, as part of the protection, it is the responsibility of researchers to conduct a case study with special care and sensitivity. In this context, it means that the possible negative effects of research on those being studied, so called ‘ethical issues’, need to be addressed.

According to the ethical principles in social research (Neuman, 2006), the research participants in this study were protected from physical harm, psychological harm, legal harm, and harm to a
person’s career or income. The participation in both quantitative survey and qualitative interviews were completely based on the principle of voluntary consent. People were informed of what they were participating in, became aware of their rights and signed an informed consent, a statement of agreement to participate. Informed consent statements provided a brief description of the purpose and procedure of the research, a guarantee of privacy, anonymity and the confidentiality of records, an offer of a research findings summary, and a statement that allow participants to terminate the study at any time, as suggested in Habibis (2010).

2.4 DATA PROCESSING AND ANALYSIS

An important aspect of data interpretation is given by Marshal and Rossman (2006, p.157), stating that: “Raw data have no inherent meaning: the interpretive act brings meaning to those data and displays that meaning to the reader through the written report”. The following section details the fundamentals of organizing and analysing quantitative and qualitative data as the subsequent stage of the research process.

2.4.1 Quantitative data analysis

Quantitative data collected are in the form of numbers which represent values of variables. These numbers are in a raw form, on questionnaires, note pads, recording sheets, or paper. It is the researchers’ responsibility to reorganize data into a form suitable for computers, present them in charts, graphs, or tables to summarize their features, and interpret or give theoretical meaning to the results (Neuman, 2006).

2.4.1.1 Dealing with Data - coding, entering and cleaning data

Neuman (2006, p.344) defined ‘coding’ as “systematically reorganizing raw data into a format that is machine readable”. When the data are recorded as numbers on well-organized recording sheets, coding can be a simple task. On the other hand, when researchers want to code answers to open-ended survey questions into numbers, this task can be difficult. In coding data, researchers use a coding procedure and a codebook. The coding procedure is a set of rules stating that certain numbers are assigned to variable attributes. These rules have to be created and consistently applied when transferring information from one form to another. A codebook is a document describing the coding procedure and the location of data for variables in a format that computers can use (Babbie, 2004). In the context of this study, results from the resident survey were coded into R, dive operator survey into DO, and tourist survey into T. Questions were coded into V (variable) and each of the answers was coded into numbers, for example, R136-V2-3. R136 is the resident sample 136 (of total
236). V2 refers to question 2 as ranked in the questionnaire, and 3 means that the answer of respondent to that particular question being option 3 as offered in the questionnaire. In this study, detailed codebook was created and multiple copies were made to ensure the accurate coding and data entering.

Most of computer programs designed for data analysis require data in a grid format; in short, a grid of numbers. This grid is typically comprised of a massive set of numbers across columns and rows. The numbers in each row represent the sequence of answers related to a specific respondent. The numbers filling in each column show the pattern of answers correspondent to particular questions (Neuman, 2006; Walter, 2010).

In many cases, errors are made when coding or entering data into a computer. This inaccuracy threatens the validity of measures and causes misleading results. After very careful coding, Neuman (2006) suggested that researchers may check the accuracy of coding or so called ‘cleaning data’. There are two ways of verifying coding: possible code cleaning and contingency cleaning. The first method involves checking the categories of all variables for impossible codes while the second method involves cross-classifying two variables and looking for logically impossible combinations. If no coding errors occur in a 10 to 15% random sample, researchers can proceed; otherwise, all coding has to be rechecked (Babbie, 2004; Neuman, 2006).

2.4.1.2 Computer-assisted Quantitative Analysis: using SPSS

As mentioned above, computers enable researchers to perform complex operations in processing quantitative data. The researcher used SPSS (Statistical Product and Service Solutions) which is a software package used in both academic and industry settings (Walter, 2010). Its main benefits are the ease of use and the ability to analyse large data sets. SPSS allows users to undertake sophisticated analysis and provides easily readable output results. The researcher can use SPSS to generate both descriptive and inferential statistics as well as high-level simulations and model-building from their data (Walter, 2010).

2.4.2 Qualitative data analysis

Qualitative data are in the form of written words, text, phrases, or symbols describing or representing people, actions, and events in social life. Qualitative data analysis can be systematic and logically rigorous however differs from quantitative or statistical analysis (Neuman, 2006).
2.4.2.1 Thematic Analysis

Thematic analysis is the most commonly used approach in qualitative research, particularly research involving interviews. Coding the transcripts and exploring how codes fit together into categories helps the researcher find particular ideas or concepts that lead to the interpretation or explanation of the data. These ideas or concepts are known as ‘themes’.

Green and colleagues (2007, p.549) stated that:

A theme is more than a category. The generation of themes requires moving beyond a description of a range of categories; it involves shifting to an explanation, or even better, an interpretation of the issue under investigation.

A theme is indeed a central idea that emerges from the data. In case that substantial reading has been done on the topic, themes may be predetermined. Thus analysis involves the exploration of those themes within the data gathered. It means that researchers attempt to identify themes that emerge from within the data. Thematic analysis emphasizes a close reading and coding of the data, expression of participants when encounter with researcher, and the capacity to interpret and fit different accounts within the research topic (Willis, 2010). Themes emerged within the context of this study will be discussed in the following chapters, according to particular subjects.

2.4.2.2 Content analysis

Content analysis is a research method that detects, records and analyses the presence, meanings and relationships of specified words and concepts in forms of communication. Content refers to the words, phrases, pictures or photos, symbols, themes or other communicative devices within a form of text. These include books or book chapters, essay historical documents, newspaper headlines or articles, and transcriptions of speeches, interviews or discussions. Moreover, the term ‘text’ also covers other forms of communication, such as informal conversation, imagery, theatre and advertising. Indeed, any form of communicative language can be subject to content analysis (Sproule, 2010).

The fundamental process of content analysis is to code or break down the text into manageable categories (Berg, 2009). The text can be coded or broken down on a variety of levels; for instance, the coding or breakdown occurs from a word or word sense perspective, or by phrase, sentence or theme. By reducing the text to a set of categories, researchers can focus on, and code for specific words or patterns that are relevant to the research questions. In other word, coding is a process of selective reduction. Content analysis allows researchers to discover and document specific features
that might otherwise be unnoticed. In most cases, it is often used for descriptive purposes, but can also be used for exploratory or explanatory research (Neuman, 2006; Sproule, 2010).

Holsti (1968, p.602) advised that “content analysis may be considered as a supplement to, not as a substitute for, subjective examination of documents”. According to Neuman (2006, p.324), it reveals the content in text but cannot interpret the content’s significance. Thus, researchers should examine the text directly. Advantages of content analysis are that it is cost effective; it allow for both quantitative and qualitative analysis; and it can deal with current events, past events or both (Bryman, 2008; Sproule, 2010). Given that this study used the mixed-methods techniques, investigated both past and current phenomena, and had time and budget constraint, content analysis was appropriate to analyse the gathered data.

2.4.3 Data presentation

The distinct characteristics of quantitative and qualitative research have caused different concerns in data processing. In quantitative research, the primary considerations are the associations and relationships between variables, and the scale and extent of the influence of these variables on the social phenomenon. In qualitative research, major concerns involve drawing out the understanding of respondents and the elaboration of meaning. For this reason, the presentations of data in quantitative and qualitative analysis within the writing-up process are different (Gabriel, 2010).

In this study, quantitative data and findings were typically presented in the form of tables and graphs (i.e. line, pie, column and bar charts). The two important standard conventions in data presentation to ensure the clear and concise information relate to the nature of the information and the style and layout (Bryman, 2008; Gabriel, 2010). If the researcher referred to secondary data, the reference of that data was certainly acknowledged at the base of the figure.

The interpretations of qualitative analysis based extensively on in-depth interviews were referred to the interview transcripts and provided a commentary of the context in which particular statements were made. Direct quotations were presented rather than paraphrasing of the informants’ words because paraphrasing can intentionally or unintentionally cause a misunderstanding or loss of its original meaning (Gabriel, 2010). However, it was imperative for the Thai quotations to be translated into English when writing up the thesis. The qualitative analysis section in this thesis was categorized into a number of themes based on major issues and priorities identified in the study. As suggested by Creswell and Tashakkori (2007), by the end of the manuscript, a conclusion extracted from the two domains should be integrated to provide a fuller understanding of the phenomenon under study.
In this regard, integration was conducted through comparing, contrasting, building on, and embedding one type of conclusion with the other.

2.5 CHAPTER SUMMARY

This chapter provides details on the methods used to advance this study. The Koh Tao case study was used to reflect on a theoretical base developed from the literature reviewed. A sequential methodology was designed and employed to address questions of internal and external validity, as well as triangulation of data. The data collection techniques involved participant observation, questionnaire surveys, in-depth interviews, and the gathering of secondary and archival data. Emerging themes were extracted using the literature reviewed, research propositions, and a proposed working outline as principal guidelines. Quantitative and qualitative results were integrated at the end of the data processing and analysis stage. The information presented in the next chapter (Chapter 3) can be seen as a necessary setting for the remaining chapters. The development of SCUBA dive tourism will be referred to, together with its consequences, the significance of the dive tourism industry to the community and the perceptions of residents towards dive tourism development.
3.1 CHAPTER OVERVIEW

This chapter presents how the dive tourism on Koh Tao has been developed overtime, what impacts are associated with it, to what extent the residents are involved in the tourism industry, and what their perceptions and attitudes are towards tourism development and its impact. The chapter begins with identifying specific objectives of the chapter, followed by reviewing relevant previous studies, demonstrating methods undertaken, and interpreting and discussing the results.

3.2 OBJECTIVES OF THE STUDY

Due to the fact that the tourism products can only be consumed by tourists in the destination, both positive and negative consequences will impact on the host community (Brida, Osti, & Faccioli, 2011). In order for dive tourism to develop in such a way that minimize negative impacts while maximizing benefits to the communities, it is important to understand residents perceptions and attitudes towards tourism (Sharma & Dyer, 2009; Williams & Lawson, 2001). This information can be useful in determining their contribution to the long-term sustainability of dive tourism in the destination. The specific objectives of this study are:

1. To examine the involvement of residents in the dive tourism industry.
2. To investigate the adverse consequences of dive tourism from the residents’ perspective.
3. To explore the residents’ attitudes towards dive tourism development.
3.3 LITERATURE REVIEW

3.3.1 Growing Pressure from the Dive Tourism Development

Based on previous studies (Jamulitrat, 1999; Kornisaranukul, 2001), Koh Tao was entirely covered with forestry areas until the late 1980s. The reputation of the island as a reef-based tourism destination has attracted tourists and necessitated an increase of tourist accommodation. The first bungalow was constructed on Koh Tao in 1983. During a short period of time, a significant number of bungalow and hotel rooms were built, many of which were in the close proximity to the coast (Szuster et al., 2011). Figure 3.1 shows a growing trend of tourist accommodations and rooms constructed on Koh Tao in the past three decades. The increased number of rooms over 500% within a decade (2000 as compared to 1990) indicates the high demand of tourist accommodation on the island and the success of Koh Tao in attracting tourists.

Figure 3.1 Tourist accommodation and rooms constructed between 1983 and 2000.
Source: Jamulitrat (1999) and Kornisaranukul (2001)

The study commissioned by the Tourism Authority of Thailand (TAT) in 1994 suggested that the maximum amount of rooms before the island exceed its carrying capacity is at 1,420 rooms (TISTR, 1994). As seen in Figure 3.1, the number of rooms has exceeded the carrying capacity of the island even before 1998. This was due mainly to the absence of proper management and regulation in relation to tourism development. As discussed in Sudara and Yeemin (1995), the lack of planning and management will contribute to the uncontrolled development, and result in the irreversible environmental degradation.
Not only attracting tourists from across the world, the dramatic growth of Koh Tao dive tourism has also caught attention from external investors (Thais and foreigners). As documented in the history of Koh Tao by various scholars, there were approximately 400 people on the island in 1980s. However, as the dive tourism has continued to grow, the number of people on the island has increased accordingly. The data from Komitsaranukul (2001) and the local government confirmed the rise in the registered population, growing from 465 in 1990 to 1796 in 2009 (Figure 3.2).

![Figure 3.2 The number of populations on Koh Tao between 1992 and 2009. Source: Komitsaranukul (2001) and Koh Tao TAO (2009)](image)

Evidently, the increased numbers of both residents and tourists have put great stress on the limited natural resources and the environments of Koh Tao. This growing pressure was verified by the remote sensing data from Weterings (2009). His investigation of remote sensed data of Koh Tao land-use in 1975, 1994, 2001 and 2005 demonstrated a decrease in forest coverage but an increase in coconut plantation (see Figure 3.3). According to the residents, coconut farms represent increasing occupancy of land. Painting on a coconut tree by using different colours was a common practice to identify the boundary of each property. Based on the land-use data, over 300 hectares of forest were exploited in the southern and western side of the island between 2001 and 2005, whereas nearly seven hundred hectares of coconut farms were planted between 1975 and 2005. Since the year 2000, more than 50% of these coconut farms have however been converted into residential areas, tourism facilities, roads and other commercial purposes. As estimated by Weterings (2009), there might be no forest area left in the next 60 years unless this development is controlled and properly regulated.
Table 3.1 provides a general idea of how intense the development of dive tourism associated facilities has been. As of 2009, there were 128 tourist accommodation buildings (hotel, resort, bungalow, and guesthouse), 115 bars and restaurants, and 43 dive operators on the area of 21 km$^2$ of Koh Tao. As the dive tourism industry involves multiple sectors, it is relatively common for Koh Tao residents to have more than one business. Often, tourist accommodation - dive operation - restaurant, boat operation – dive operation, and motorbike rental - petrol station are owned by the same entrepreneur.

Figure 3.3 Three Land-use classifications based on remote sensing data 1975, 1994, 2001, and 2005. 


NOTE: This figure/table/image has been removed to comply with copyright regulations. It is included in the print copy of the thesis held by the University of Adelaide Library.
Although reef-based tourism and recreation activities are beneficial to coastal nations and states across the world, several studies confirm the potential impacts of tourism on coastal and marine environments in many ways (e.g. boat anchoring, boat littering, and diver trampling). Sedimentation and wastewater pollution associated with rapid coastal development account for significant impacts on coral reefs (Murray, 2007). According to the study on threat levels to coral reefs by UNEP (2007), coral reefs on Koh Tao are facing high levels of threat from tourism and recreation activities as well as natural impact; medium level threats from fishing and development impacts; and low level threat from land-based pollution (Figure 3.4).
In addition to the study by the UNEP, the high level threat to coral reefs from dive tourism development and activities was supported by the study by Weterings in 2009. In his study, threats to the natural environments were assessed using the data of bottom composition of reef areas in shallow water monitored between 2005 and 2008. The results showed that higher nutrient input, higher percentage of dead corals, and low numbers of butterfly fish were found in the southern and western sides of the island, in comparison to the northern and eastern sides. In considering the intensity of dive tourism development in the western and southern part of the island, and the close association between butterfly fish and corals (Crosby & Reese, 1996; Kerry, 2011), these findings confirmed that the health of coral reefs surrounding Koh Tao is greatly affected by tourism development and recreation activities.

3.3.2 Host Community Attitude towards Tourism

The social and environmental impacts of tourism have been widely documented in various places throughout the world (Murray, 2007). In previous time, several studies focused on economic and biophysical impacts of tourism while ignoring social and cultural aspects (Pizam, 1978). However, in the past three decades, a significant amount of literature has refocused on the increasing importance of negative impacts on the host communities and their perceptions developed towards tourism development, for example, the study in the Balearic Islands of Spain by Perez and Nadal (2005); in Florida, the USA by Davis, Allen and Cosenza (1988); in Gold Coast, Australia by Fredline and Faulkner (2000); in ten New Zealand towns by Williams and Lawson (2001) and comparative studies of Sedona, the USA and York, the UK by Madrigal (1995). Adverse consequences of tourism have been shown to affect the economy of tourism dependent communities even if they are not directly involved in the tourism industry (Ofiara & Brown, 1999). Having been negatively affected by tourism development, there is a possibility that the host community might retaliate by exhibiting hostile behaviour towards incoming tourists. This phenomenon may result in reducing the attractiveness of the destination, and negatively affect tourism earnings and employment opportunities in the local tourism industry (Ismail & Turner, 2008).

As noted in previous studies, residents’ perceptions are affected by several factors. Table 3.2 presents selected literature on residents’ attitudes towards tourism according to various influential factors. A number of studies take into consideration the role of socio-demographic aspects (e.g. age, language, gender, occupation, marital status) in affecting the attitudes of the residents towards tourism development; however, it is noted that these factors play a relatively minor, and sometimes contradictory, role in explaining the variation in resident attitudes (Daldeniz & Hampton, 2012). In terms of age, older residents have positive attitudes (Tomijenovic & Faulkner, 2000), whereas in
another study, they are negative (Cavus & Tanrisevdi, 2002). Women in the study by Harill and Pott (2003) and Sheldon and Var (1984) have more negative views of tourism development. On the other hand, men are found to be more opposed to tourism development projects than women in the study of Petrzelka et al. (2005). In relation to proximity to the tourism centre, distance of residence shows positive attitudes in some cases (Korça, 1998), but negative attitudes are identified in others (Gursoy, Jurowski, & Uysal, 2002; Sheldon & Var, 1984). The evidence regarding community attachment or length of residence to resident attitudes show considerably similar results in many studies (Belisle & Hoy, 1980; Harrill, 2004; Pearce, 1989; Sheldon & Var, 1984; Williams & Lawson, 2001). In most studies the longer an individual resides in a community, the more negative the attitude towards tourism development. Anderenck et al. (2005) argued that this correlation reveals a high degree of context sensitivity which is not always valid in every circumstance. With regards to the knowledge about tourism and contact with tourists, Anderenck et al. (2005), Akis et al. (1996) and Brida et al. (2011) suggest that the more residents possess knowledge about tourism and have a high interaction with tourists, the more their perceptions of the benefits of tourism will be positive. Similar to people dependant on tourism and who derive the majority of their income from it, they are likely to be more supportive towards new development projects (Cavus & Tanrisevdi, 2003; Liu & Var, 1986; Maccarthy, O’neill, & Williams, 2006; Pizam, 1978).

Table 3.2 Selected literature on residents’ attitudes towards tourism development.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic variables</td>
<td>(Chen, 2000; Liu &amp; Var, 1986; Petrzelka et al., 2005; Sharma &amp; Dyer, 2009)</td>
</tr>
<tr>
<td>Distance of residence from the tourism centre</td>
<td>(Davis et al., 1988; Harrill, 2004; Liu &amp; Var, 1986; Pizam, 1978; Sheldon &amp; Abenoja, 2001)</td>
</tr>
<tr>
<td>Knowledge about tourism</td>
<td>(Andereck et al., 2005)</td>
</tr>
<tr>
<td>The host-guest interaction</td>
<td>(Andereck et al., 2005; Brida et al., 2011; Madrigal, 1995)</td>
</tr>
<tr>
<td>Economic dependency on the tourism industry</td>
<td>(Haley, Snaith, &amp; Miller, 2005; Liu &amp; Var, 1986)</td>
</tr>
<tr>
<td>Level of tourism development</td>
<td>(Harrill, 2004; Madrigal, 1995).</td>
</tr>
</tbody>
</table>

Source: Author, Adapted from Brida et al. (2011) and Harrill (2004)

Many of these studies proposed to understand the residents’ perceptions to tourism development using cluster analysis. However, the identification of cluster groups differs from one to another. Perez
and Nadal (2005) had local attitudes segmented into five different opinion groups namely ‘development supporter’, ‘prudent developer’, ‘ambivalent and cautious’, ‘protectionist’ and ‘alternative developer’. The Balearic ‘protectionists’ can be associated with the ‘haters’ identified by Davis et al (1988), Fredline and Faulkner (2000), and Madrigal (1995). Similarly, Balearic ‘development supporters’ are comparable to the ‘lovers’ identified in the same studies. From the above studies, residents’ attitudes can generally be divided into three main groups: those who are enthusiastic and supportive of tourism, those who show some concerns, and those who are in opposition to the tourism development.

Previously in Koh Tao, studies addressing social aspect of tourism impacts tend to receive little attention. Over the past two decades, most of the studies focused on the measurement of environmental impacts and status of coral reefs. The studies involving the social sphere have only been conducted recently, of which one regarded residents perception of tourism carrying capacity and tourist satisfaction in tourism services (Kornitsaranukul, 2001); the perception of tourism stakeholders on the capacity of local government towards sustainable tourism planning and development by Churugsa et al. (2007); residents’ and tourists' perceptions on marine and coastal resource conservation and tourism management by Sedthachatanan (2009); and climate change perception of dive tourism industry by Rongrongmuang (2010).

The findings of previous studies indicated that residents were often aware of the degradation of natural resources and the depletion of marine life (Churugsa et al., 2007; Sedthachatanan, 2009). However, they were more likely to be concerned about the unequal distribution of economic income, insufficient infrastructure, obscure land ownership and tourism industry expansion; rather than taking actions in response to the existing impacts (Kornitsaranukul, 2001). Additionally, it was found that over half of business owners were opposed to the control of tourist numbers. They weighed profit maximization over environmentally sustainable tourism. Although those studies proposed to examine the perceptions of host communities, the understandings of factors influencing their attitudes, and relationships between tourism impacts and their support towards tourism development were not investigated.

3.4 METHODS

3.4.1 Questionnaire Design and Content

A questionnaire survey was used as the main data collection instrument for this study. The questionnaire was based on literature in the areas of SCUBA dive tourism and residents’ attitudes towards tourism. However, a number of modifications had to be included, given the specific
characteristics of Koh Tao and the objectives of the study. Due to the multinational population of the study area, the questionnaire was provided in Thai and English. The on-site self-administered questionnaire comprised a total of 48 questions over 4 pages; 46 closed and 2 open-ended questions (Appendix I). Closed-ended questions contained a mixture of binary ‘yes, no’; Likert scaling both horizontally and vertically on the page; and ranking of lists. Open-ended questions allowed respondents to provide personal experiences and their perceptions of particular issues. The questionnaire was constructed in four major sections:

Section 1 – Demographics

To understand backgrounds of respondents, variables of interest were gender, age, marital status, highest level of education, occupation and time of residence on the island.

Section 2 – Involvement in the dive tourism industry

To determine the involvement of respondents in the dive tourism industry, the occupation of respondents and occupation of immediate family members living on Koh Tao were examined.

Section 3 – Perceived adverse consequences of dive tourism

The level of agreement or disagreement with the existence of negative impacts as a result of dive tourism development were measured by a five-point Likert scale (strongly agree, somewhat agree, somewhat disagree, strongly disagree, do not know). Additionally, the selected 32 adverse consequences were listed in three dimensions: physical-ecological, socio-demographic, and political-economic. Respondents were allowed to select as many items as relevant in order to identify the most affected issues.

Section 4 – Attitudes towards dive tourism development

A final section of the questionnaire explored respondents’ attitude towards dive tourism development. In order to avoid the ambiguity of the ‘nature of development’ which was found to be a limitation of a similar study by Andereck and Vogt (2000), the researcher proposed three attitudinal statements clearly stating the development directions. Respondents were asked to select the most suitable attitudinal statement as to whether they were: A) happy with the current situation and preferred to see more tourism development; or B) preferred no more tourism development unless towards environmentally responsible practices; or C) preferred less tourism development. Sufficient space was provided for further recommendations in which directions tourism should be developed and how to minimize existing problems from the respondents’ perspective.
3.4.2 Sample Size and Sampling Techniques

The sample consisted of 236 respondents from the three villages of Koh Tao (Sairee, Mae Haad, and Chalok Baan Kao) during November 2010 and February 2011. The total 306 questionnaires (along with information and instructions on completing it) were randomly distributed. Table 3.3 presents details of the entire population, sample size and response rate during the study period.

Table 3.3 Local census, sample size, questionnaire returned, response rate and percentage of responses from Sairee, Mae Hadd and Chalok Baan Kao.

<table>
<thead>
<tr>
<th></th>
<th>Sairee</th>
<th>Mae Hadd</th>
<th>Chalok Baan Kao</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>690</td>
<td>720</td>
<td>330</td>
</tr>
<tr>
<td>Sample</td>
<td>72</td>
<td>72</td>
<td>58</td>
</tr>
<tr>
<td>Responses</td>
<td>68</td>
<td>71</td>
<td>48</td>
</tr>
<tr>
<td>Response Rate</td>
<td>94%</td>
<td>98%</td>
<td>96%</td>
</tr>
</tbody>
</table>

To explain the sampling procedure, total population $N$ is 1,709 and the sample $n$ is 306. Here, the interval $k$ is 5.58 (1,709/306). Using this method, the value of $k$ was rounded to the nearest integer (6). That means every 6th premise would be sampled. Each of the samples was identified in a clockwise direction, starting from north to south following the major and minor roads. Questionnaires were given to selected samples regardless of the type of premises [most residents live in their place of business]. A random starting point in this case was in Sairee village, followed by Mae Haad, and ended in Chalok Baan Kao. Until the closing date of responses, the researcher received 77% responses. Prior to the distribution of questionnaires, the researcher spent approximately a month getting to know people being studied and participating in local events. The familiarity of respondents with the researcher and the subjects being studied might be the major factor contributing to this high response rate.

3.5 RESULTS AND ANALYSIS

3.5.1 Demographics

The survey results showed that most of the respondents were younger than 40 years old (71%), a slightly higher distribution of female (56%), approximately half married (52%), 40% unmarried and 8% were single parents. A great proportion of respondents have been residing on Koh Tao for less than 10 years (65%), nearly one quarter between 10 to 19 years (22%) and the remainder over 20
years (13%). It is important to note that the majority (69%) of respondents have completed a university degree [undergraduate and/or postgraduate] showing that these participants were mostly well-educated. The descriptive information along with pie charts on the profiles of 236 respondents is presented in Table 3.4.

Table 3.4 The demographics of respondents including age, gender, marital status, highest level of education and time of resident on Koh Tao (n = 236).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>34%</td>
</tr>
<tr>
<td>30-39</td>
<td>37%</td>
</tr>
<tr>
<td>40-49</td>
<td>22%</td>
</tr>
<tr>
<td>50-59</td>
<td>6%</td>
</tr>
<tr>
<td>60 and above</td>
<td>1%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>44%</td>
</tr>
<tr>
<td>Female</td>
<td>56%</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
</tr>
<tr>
<td>Unmarried</td>
<td>52%</td>
</tr>
<tr>
<td>Married</td>
<td>40%</td>
</tr>
<tr>
<td>Single parent</td>
<td>8%</td>
</tr>
<tr>
<td>Highest level of education</td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>31%</td>
</tr>
<tr>
<td>Undergraduate degree</td>
<td>64%</td>
</tr>
<tr>
<td>Post-graduate/professional school degree</td>
<td>5%</td>
</tr>
</tbody>
</table>
CHAPTER 3

3.5.2 Residents’ Involvement in Dive Tourism Industry

The dive tourism industry in this study includes tourism providers (dive operators, hotels/resorts/bungalows, and restaurants) as well as other tourism associated services (i.e. travel agents, internet cafés, supermarkets, retail shops, photo studios, laundry services, Thai massage, and transportation). The overall results indicate that the majority of respondents worked in the dive tourism industry (78%), and only a small proportion were involved in a monetary institution, medical or health sector, school, and government organization (22%). Approximately half of the respondents (54%) who were economically dependent upon tourism stated that other members of their immediate family also lived on the island and worked in the dive tourism industry. Apart from the occupations mentioned above, there was surprisingly no agriculture or fishery sector reported in the questionnaire survey.

The main occupation of Thai respondents was entrepreneur (39%), followed by professional and manager/administrator (equal proportion of 22%). With respect to foreign respondents, the survey demonstrated that nearly all (94%) were directly employed and benefited from the dive tourism industry (Figure 3.5). As expected, the majority of foreigners were professional (69%) working for dive operators as dive instructors, dive masters and underwater photographers. The remainder were general/environmental managers or clerks in dive centres, bartenders and other casual workers. Despite no official record of the number of foreigners working on Koh Tao, there was clearly a significant number (estimated at 300-400) in the local society. They communicated in English and tend to speak basic Thai. However, most [if not all] were working illegally on tourist visas.
Despite the differences in nationality and language, the non-Thai community members shared many commonalities including the purpose for residing on Koh Tao, the involvement in SCUBA diving, age group, marital status, as well as the experience as foreigners in Thailand. Amongst these community members, length of residence seemed to be an influential factor to form groups in the society rather than nationality. Those who have been on the island for several years tended to have a close relation with each other but looser friendships with recent arrivals (Field Observation).

### 3.5.3 Residents’ Perceptions of Dive Tourism Impacts

A significant number of respondents (89% strongly agree and somewhat agree) indicated that the existence of negative impacts on the local communities as well as the coastal and marine environments were a result of dive tourism development. The levels of agreement were unlikely to associate with respondents’ nationality, age group, gender, highest level of education, proximity to the tourism centre, length of residence or economic reliance on tourism. Of those who disagreed that tourism has caused adverse consequences, they believed that the benefits of dive tourism greatly outweighed the negative impacts. Additionally, they perceived these consequences as minor and at an acceptable level. Table 3.5 shows the perceived negative impacts of dive tourism activities and its associated development. These issues are categorised into physical-ecological, socio-demographic, and economic dimensions, and ranked by percentage of respondents.

Overall, the most affected negative impacts of dive tourism were the high cost of living, followed by rubbish overload, uncontrolled development, high dependence on tourism, unsustainable use of
energy, pressure on the sewage system, and impacts on visual amenity/aesthetics. From the respondents’ perspective, the physical-ecological and economic impacts were more evident than the socio-demographic. In order to better understand how respondents prioritized the existing impacts or how the impacts affected different groups of people, the researcher took into considerations the respondents’ characteristics including nationality, occupation, and economic reliance on tourism. It was found that the ten most affected impacts were perceived relatively similar; however, with different ranking order.

Table 3.5 Negative impacts associated with SCUBA dive tourism activities and development, as perceived by Koh Tao residents.

<table>
<thead>
<tr>
<th>Physical-Ecological Impacts</th>
<th>Overall perceived impacts (ranked) (%)</th>
<th>Socio-Demographic Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubbish overload (90)</td>
<td>Increase in drugs (84)</td>
<td>Increase in accidents (81)</td>
</tr>
<tr>
<td>Uncontrolled development (90)</td>
<td>Seasonal crowding-out of locals (76)</td>
<td>Abandonment of traditional activities (69)</td>
</tr>
<tr>
<td>Unsustainable use of energy (88)</td>
<td>Adjustment of residents to tourists' life styles (70)</td>
<td></td>
</tr>
<tr>
<td>Pressure on sewage system (87)</td>
<td>Increase in crimes (62)</td>
<td>Tourist-resident conflicts (52)</td>
</tr>
<tr>
<td>Visual amenity/aesthetic (87)</td>
<td>All year crowding-out of locals (51)</td>
<td>Irritation of local population (42)</td>
</tr>
<tr>
<td>Coastal erosion (86)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest clearance (85)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine pollution (84)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of biodiversity (83)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil erosion (78)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damage to natural and cultural heritage (76)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshwater contamination (69)</td>
<td>Higher cost of living for residents (94)</td>
<td></td>
</tr>
<tr>
<td>Traffic congestion (66)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise pollution (66)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air pollution (52)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.6 relates the impact priorities to respondents’ characteristics. The results showed that negative impacts of dive tourism were ranked variably depending upon nationality, occupation and involvement in the dive tourism industry. Thai respondents perceived the high cost of living as the most affected problem on Koh Tao. This might be because they could find similar goods and services at a cheaper price elsewhere in the country. Foreign respondents found the high dependence on tourism as the major problem as nearly all of them migrated to Koh Tao for employment in the tourism industry. Respondents who were entrepreneurs showed the concern over the increased dependence on imports. This might be because they acknowledged the limited
resources available on the island since they were the tourism providers who supplied tourism goods and services to tourists. Non-tourism related respondents noted the tourist-resident conflicts and reported that dive tourism led to irritation to the local population; whereas, these problems were not mentioned by the tourism-related respondents. It can also be observed that a number of tourism impacts perceived by non-tourism related respondents considerably differed from those stated by the other groups. For instance, increased accidents and drugs, seasonal crowding of tourists over locals, traffic congestion, forest clearance, and coastal erosion.

Table 3.6 Comparison of residents’ perceptions of the dive tourism impacts in accordance with their selected characteristics.

<table>
<thead>
<tr>
<th>Overall</th>
<th>Thai</th>
<th>Foreigner</th>
<th>Entrepreneur</th>
<th>Other tourism-related</th>
<th>Non-tourism related</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Higher cost of living for residents</td>
<td>Higher cost of living for residents</td>
<td>Uncontrolled development, High dependence on tourism</td>
<td>High dependence on tourism</td>
<td>Higher cost of living for residents</td>
<td>Uncontrolled development, Rubbish overload, Unsustainable use of energy, Visual amenity, loss of biodiversity</td>
</tr>
<tr>
<td>2. Rubbish overload</td>
<td>Rubbish overload</td>
<td>Soil erosion</td>
<td>Rubbish overload</td>
<td>Rubbish overload</td>
<td>Seasonal crowding-out of locals, Increased accidents, High dependence on tourism</td>
</tr>
<tr>
<td>3. Uncontrolled development</td>
<td>High dependence on tourism</td>
<td>Rubbish overload</td>
<td>Higher cost of living for residents</td>
<td>Pressure on sewage system</td>
<td>Traffic congestion, Coastal erosion</td>
</tr>
<tr>
<td>4. High dependence on tourism</td>
<td>Uncontrolled development</td>
<td>Pressure on sewage system</td>
<td>Uncontrolled development</td>
<td>High dependence on tourism</td>
<td>Marine pollution, Forest clearance, Increase in drugs</td>
</tr>
<tr>
<td>5. Unsustainable use of energy</td>
<td>Unsustainable use of energy</td>
<td>Unsustainable use of energy</td>
<td>Unsustainable use of energy</td>
<td>Forest clearance</td>
<td>Tourist-resident conflicts</td>
</tr>
<tr>
<td>6. Pressure on sewage system</td>
<td>Pressure on sewage system</td>
<td>Marine Pollution</td>
<td>Pressure on sewage system</td>
<td>Uncontrolled development</td>
<td>Pressure on sewage system</td>
</tr>
<tr>
<td>7. Visual amenity</td>
<td>Visual amenity</td>
<td>Visual amenity</td>
<td>Increased dependence on imports</td>
<td>Coastal erosion</td>
<td>Irritation of local population</td>
</tr>
</tbody>
</table>
Based on the field observation and the information disclosed by respondents, the development of dive tourism on Koh Tao has been uncontrolled both in terms of quantity and quality. There was no regulation that oversaw the development of building and tourism infrastructure. Most of the medium and large-sized businesses adopted the quality standards and attempted to construct in harmony with the surrounding environments. However, this was different among the small-sized enterprises. Tourism infrastructures could be built according to the entrepreneurs' desire, regardless of location, design or material used. In other words, any individuals could convert their land [though illegally occupied] into accommodation, dive shop, restaurant, or supermarket without having to abide by any rules. Some bungalows could be seen on the boulders with boat access only. Some restaurants were built at the beachfront and have restricted public access to the beach. This phenomenon seemed to be common around the island (personal observation, November 2010-February 2011).

This unplanned and uncontrolled development was the origin of many other subsequent problems. These included unsustainable use of natural resources, high cost of living, pollution, decreased aesthetic values, and high dependence on tourism. According to respondents, tourists, fishermen and other communities from the mainland were responsible for solid waste overload on Koh Tao. They claimed that most of the rubbish found on the shore was transported from elsewhere by wind and current. One of the common examples given in the survey was that plastic water bottles produced and sold locally in Pataya (>300 km away) were always collected on Koh Tao beaches during the monthly beach clean-ups. This piled up the already overload solid waste from many island-based sources (open-ended questionnaire survey, November 2010-February 2011).

In terms of wastewater discharge, respondents revealed that there was no centralized wastewater treatment plant on the island. Sewage from households, tourist accommodations and other facilities were usually treated by private septic tanks. Often, wastewater and sewage were discharged untreated into the ocean, particularly in wet seasons. The researcher walked along the beach and observed a few pipes that originated from the restaurants and ended in the sea. The purpose of these pipes were not clarified by the owners of the properties but informed by other residents during the participant observation. It was confirmed that these pipes were intentionally built to release wastewater during the night and rainwater overflow. This has reduced aesthetic value in the tourist destination. The visual pollution resulted from dive tourism development as listed by respondents also involved modern buildings that were not compatible or in harmony or on a scale with traditional buildings; overcrowded beach resorts and restaurants; disordered and scattered tourism facility development; aboveground PVC pipes supplying freshwater from wells to tourist accommodations; and overhead electrical wires. In many circumstances incompatible architectural designs were seen in small-sized and low-budget accommodation. The prominent colour of roof and wall visible from the
sea shoreward seemed to be the most common complaints among respondents. A few pictures were taken from the island and presented in Figure 3.6 as an illustration of the issues discovered above.

Figure 3.6 Examples of tourism impacts, illustrating unregulated construction; rubbish overload; uncontrolled development; wastewater discharge; disordered water pipes; overhead electrical wires; incompatible (yellow) and compatible (blue) architectural design.

Source: Author
3.5.4 Residents’ Attitudes towards Dive Tourism Development

Residents’ attitudes towards dive tourism development were examined according to three attitudinal statements. As demonstrated in Figure 3.6 (left), the results showed that over half of respondents (58%) preferred no more dive tourism development unless it is developed conditional to environmentally responsible practices (Attitudinal Statement B). Approximately one-third (35%) were happy with current situation and would like to see more tourism development (Attitudinal Statement A). A small proportion (7%) preferred less tourism development regardless of the development nature (Attitudinal Statement C). In considering the respondents’ attitudes according to their nationalities, the column chart (Figure 3.6 – right) presented differences rather than similarities. Thai respondents had relatively equal preferences towards Attitudinal Statement A and B, with A being slightly higher. In contrast, foreign respondents had preference towards Attitudinal Statement B greatly higher than Attitudinal Statement A. In comparing attitudes of both respondent groups towards Attitudinal Statement C, it was evident that foreign respondents had a higher preference than the Thais. In fact, the foreigners weighed Attitudinal Statement A and C not very far from each other. These results represented the differences between the two communities in terms of their support or opposition to the dive tourism development. To better understand what affected the Koh Tao community’s attitudes towards dive tourism development, wider range of characteristics were taken into considerations (see Table 3.7).

**Figure 3.7** Residents’ attitudes towards dive tourism development according to three categories
Attitudinal Statement A: Happy with current situation and want to see more tourism development; Attitudinal Statement B: No more tourism development unless towards responsible practices; Attitudinal Statement C: Prefer less tourism development.
Table 3.7 Comparison of respondents’ attitudes towards dive tourism development according to their characteristics.

<table>
<thead>
<tr>
<th>Attitudinal Statement A</th>
<th>Attitudinal Statement B</th>
<th>Attitudinal Statement C</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘tourism development supporter’</td>
<td>‘precautionary and alternative developers’</td>
<td>‘protectionist’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nationality</th>
<th>Thai</th>
<th>Foreigner</th>
<th>Foreigner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Female</td>
<td>Male</td>
<td>Male</td>
</tr>
<tr>
<td>Age group</td>
<td>20-29 years old</td>
<td>30-39 years old</td>
<td>&gt;40 years old</td>
</tr>
<tr>
<td>Education</td>
<td>High school</td>
<td>University and/or TAFE</td>
<td>Postgraduate</td>
</tr>
<tr>
<td>Time of residence</td>
<td>&lt;9 years</td>
<td>10-19 years</td>
<td>20-29 years</td>
</tr>
<tr>
<td>Economic dependence</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Perception of impacts</td>
<td>Strongly disagree</td>
<td>Strongly agree</td>
<td>Strongly agree</td>
</tr>
</tbody>
</table>

The results in Table 3.7 demonstrates that the majority of respondents (mode) whose attitudes were towards Attitudinal Statement A were female respondents, Thai nationals, between 20-29 years of age, completed high school as the highest education, and have resided on Koh Tao for less than 9 years. They strongly disagreed that dive tourism was responsible for the existing negative impacts. As a result, they did not perceive the need to control the nature and intensity the development of tourism. On the contrary, they were supportive to an increase of tourism products and services in order to attract a wider range of tourists. Surprisingly, the economic dependence on tourism was unlikely to change their favour to tourism development. Respondents who did not rely on dive tourism for their livelihood showed great support towards new tourism development. As this group of respondents were in favour of new tourism developments, they can be identified according to Perex and Nadal (2005) as ‘tourism development supporters’.

The majority of respondents (mode) whose attitudes were towards Attitudinal Statement B were foreigners. Most were male between 30-39 years of age, had a university or tertiary qualification at the diploma or certificate level, and have resided on the island between 10-19 years. This group of respondents benefited from tourism but believed that tourism has created particular damage to the local community; therefore they were conscious about the conservation of natural resources supporting the tourism industry, as well as the tourism sustainability. According to Perez and Nadal (2005), they can be identified as ‘precautionary and alternative developers’.

Respondents whose attitudes were towards Attitudinal Statement C were distinctly foreigners (mode) as compared to the Thais. Most were men over 40 years old, had a postgraduate degree qualification and have resided on Koh Tao for 20-29 years. They were dependent upon tourism...
businesses and strongly believed that the existing problems on Koh Tao were a result of the dive tourism development. Therefore, they exerted some opposition towards the implementation of new tourism facilities. This group of people had a preference towards less development in the future, and thus they were considered ‘protectionist’ according to the study in Belearic Islands of Spain by Perez and Nadal (2005). Nevertheless, the protectionists are the minority in the Koh Tao community.

In addition to the three pre-designed attitudinal statements provided by the researcher, respondents were asked in the opened-ended questionnaire survey to suggest the directions that dive tourism should be developed in the future. Respondents whose preferences were towards Attitudinal Statement A and Attitudinal Statement C offered recommendations to deal with the existing issues and the responsive management needed to achieve tourism sustainability. The main themes are ranked and presented in Table 3.8.

Table 3.8 Residents’ perceptions of management control required for sustainable dive tourism.

<table>
<thead>
<tr>
<th>What do you wish to see in the future?</th>
<th>No. of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental awareness and knowledge among local residents</td>
<td>20</td>
</tr>
<tr>
<td>Green operation and regular maintenance of tourism providers (i.e. alternative energy, recycle, renewable resources, wastewater treatment)</td>
<td>20</td>
</tr>
<tr>
<td>Local regulation and enforcement</td>
<td>12</td>
</tr>
<tr>
<td>Eco-tourism</td>
<td>9</td>
</tr>
<tr>
<td>Building structure/architecture in harmony with the nature (e.g. materials, colours, design, and etc.)</td>
<td>7</td>
</tr>
<tr>
<td>Marine and land-use zoning</td>
<td>5</td>
</tr>
<tr>
<td>Environmental awareness and knowledge among tourists</td>
<td>5</td>
</tr>
<tr>
<td>Limit number of tourists</td>
<td>5</td>
</tr>
<tr>
<td>Limit number of tourism facilities (e.g. hotel room) built each year</td>
<td>4</td>
</tr>
<tr>
<td>Concern about health and safety (e.g. road, diving)</td>
<td>4</td>
</tr>
<tr>
<td>Standard pricing in tourism goods and services</td>
<td>3</td>
</tr>
<tr>
<td>Standard code of practice in Taxi and car/bike/ATVs for rent</td>
<td>2</td>
</tr>
<tr>
<td>Other (e.g. no girl bars, establish tourist centre, effective local government)</td>
<td>8</td>
</tr>
</tbody>
</table>

\[ n = 21 \text{ mentioned 2 themes per response} \]
\[ n = 9 \text{ mentioned 3 themes per response} \]
\[ n = 2 \text{ mentioned 4 themes per response} \]
The results suggested that there is a need for more consideration of sustainable development. Key issues as perceived by respondents included greater environmental awareness and knowledge; more sustainable tourism operation; greater environmental regulation and enforcement; enhancement of local leadership; effective local government; environmental friendly building structure and architecture; marine and land-use zoning; carrying capacity controlling tourist and tourism facilities; health and safety; standard pricing control; and the need for regulation of vehicle hiring. The findings from this chapter can be developed into a useful tool for planning tourism management regulations at local level. This information can help responsible bodies to focus on the most problematic areas related to tourism development and enhance positive aspects of future tourism.

3.6 CHAPTER SUMMARY

This chapter provides the overview of the dive tourism development on Koh Tao through the local community’s eyes using the questionnaire survey instrument. The results from the study showed the high dependence of the community on the dive tourism industry regardless of what nationality. Thai respondents were mostly involved in the tourist accommodation, restaurants, and other tourism associated businesses, whereas the foreigners were fully engaged with the dive operating business, working as dive instructors, dive masters, underwater photographers, general/environmental managers, and dive shop clerks.

Although dive tourism played an important role in the local socio-economic development, a significant number of respondents were aware of the subsequent adverse consequences. According to the results, the physical-ecological impacts seemed to affect the local coastal communities to a greater scale when compared with the economic and socio-demographic impacts. Demographic variables, time of residence and perception of tourism impacts tended to be important factors influencing the respondents’ attitudes towards dive tourism development. The findings outlined in this chapter provide a foundation for further investigation in the following chapters. In the next chapter, Chapter 4, issues confronting the dive tourism industry from the perspective of a marine tourism provider will be illustrated.
CHAPTER 4
SURVEY RESULTS: DIVE OPERATORS’ AND THEIR SUSTAINABLE PRACTICES

4.1 CHAPTER OVERVIEW

This chapter not only highlights the specific characteristics of the dive operating business, but also provides a detailed description of the diving operations in the coral reef environments. It illustrates how diving operations contribute to the impacts on coastal communities and what influence their compliance or not compliance with the environmentally sustainable standards. The chapter begins with specific objectives of this chapter, followed by relevant previous studies, methods undertaken, and interpretation and analysis of results.

4.2 OBJECTIVES OF THE STUDY

Environmentally unsustainable operations have become a significant concern within the dive tourism industry due to the rapid growth of marine tourism associated with near-shore and coral reef environments in the past few years. This study proposed to develop an understanding of the consequences associated with diving operations in the coral reef settings and to identify motivators and/or barriers to the sustainable management of dive tourism. The specific objectives of this study are:

1. To investigate the practical action the dive operators are taking towards environmentally sustainable diving standards.
2. To examine factors influencing the adoption of environmental good practices.
4.3 LITERATURE REVIEW

4.3.1 The Dive Operator

The ‘dive operator’, as defined by Tabata (1992, p.175) are those operators “which have a retail store offering a variety of services, including tours and dive tour operators who principally offer shore or boat dives”. In comparison to other tourism businesses (such as accommodation, restaurant or souvenir selling), establishing the dive business is more difficult because it requires a high investment cost in terms of training, equipment and boats (Townsend, 2008). Equipment that assists divers to breathe underwater involves SCUBA masks, breathing regulators, buoyancy devices, fins, and gauges. SCUBA divers are required to present their dive certification to commercial operators as well as dive clubs for the type of diving they intend to participate. Certified divers can participate in day trips that focus on one or two dive sites, or liveaboard trips that go further afield and visit a wide variety of dive sites while staying overnight onboard. Uncertified people are not allowed to dive, hire diving equipment nor have their diving cylinders filled. However, many dive shops in popular holiday locations offer training courses that teach tourists to dive and become certified divers in a few days. Initial training typically takes place in three environments: 1) Classroom - where material is presented and reviewed; 2) Confined Water (swimming pool or equivalent natural body of water) - where skills are taught and initially practiced; and 3) Open Water - where students demonstrate and refine the skills they have learned. Competent diving instructors may work independently or through a dive school or a dive shop. Diver training courses will be offered according to the standards of the certification organization that the dive instructors comply with (e.g. PADI, SSI, CMAS, or BSAC). To work in dive tourism as a dive master or a dive instructor necessitates a good educational background, along with competence in English or other language(s) (Townsend, 2008). It is important for the dive operators to become experienced providers in order to offer the best experience to customers and increase the return customer base (Dwyer et al., 2009).

Dive tourism businesses are often owned and run by foreigners or outsiders, particularly in developing countries (Flumerfelt, 2000), since the investment, experience and understanding of the market that are necessary for any new tourism business can only come from outside (Townsend, 2008). It is however the new businesses’ option to continue to import ready-trained and experienced staff from outside the area, or they can choose to work with, train and employ local people as much as practicable. In Madagascar, one of the hotel owners assisted the local school by financing the education and training programs for the communities in order to create a better-educated next generation and potential future employees. Given the fact that this group of people is likely to be
committed to the area they live in, this effort can lead to the reduction of staff turnover (Townsend, 2008).

According to the literature, tourism offerings have become more numerous and varied, thus the ‘stand alone’ strategy is no longer viable to operate the dive tourism business (Haywood & Jayawardena, 2004; Jayawardena, 2002). The most attractive offerings to tourists typically consist of different businesses contributing to one package deal, for example, seven nights accommodation + three days diving + buffet lunch onboard. In order to maintain the business profits, the idea of partnerships and cooperation between dive operators and other tourism providers has become more significant. The study by Haywood and Jayawardena (2004) reported the influence of tourism providers to the market, suggesting that dive operators can either strengthen or weaken the destination’s brand and value creation.

4.3.2 Potential Impacts from Diving Operations

Although diving has been seen as a sustainable use of coral reefs in comparison to other threats (i.e. coastal development, ocean warming, and the over-exploitation of marine flora and fauna) (Dearden et al., 2007), a significant amount of literature argues that diving, together with its associated development, is a major source of reef damage (Barker & Roberts, 2004; Bryant et al., 1998; Burke et al., 2011; Davenport & Davenport, 2006; Prior, Ormond, Hitchen, & Wormald, 1995; Schleyer & Tomalin, 2000). In the Caribbean’s Bonaire Marine Park (Dixon et al., 1993), Cayman Island and dive sites in Egypt (Hawkins & Roberts, 1992; Tratalosa & Austin, 2001), changes to the coral communities due to the intensity of diving at a single site can be detected. If the level of diving activity is high enough, a change to the aesthetics of the reef will also occur (Hawkins & Roberts, 1992). However, the impacts of sunscreens and insect repellents from divers on the reef have yet to be understood (Danovaro & Corinaldesi, 2003).

Dive operators tend to form a habit, preferring to visit the same sites on a continual basis. A study by Dimmock (2007) in New South Wales, Australia, confirmed that routine travel destinations were an essential and fundamental part of the dive operations. The dive sites to be visited generally coincided with the experience of the divers, which means that every time a group of beginner divers come aboard they would be visiting the same site as the previous groups of novice divers (Tabata, 1992). This finding is consistent with a study in Saba by Hawkins et al. (2005, p.377) who found that “dive operators were very conservative in their movements and normally took divers to the same places”. In turn, this routine can result in the overuse of resources and also inevitable damage to coral reefs.
Dive operations can have significant impacts on coastal and marine resources in many ways. These include both boat-induced (anchoring, ship grounding, litter, waste discharge) and water-based activities and infrastructure (diving, snorkelling, reef walking, turtle-watching, whale-watching, pontoons, moorings, fish feeding) (Harriott, 2002). Boat anchoring damages corals and other benthic organisms not only as a result of anchor dropping (Hale & Olsen, 1993), but also the movement of the anchor chain across the substrate (Dinesen & Oliver, 1997). Moreover, boat-induced impacts relate to litter and discharge of waste overboard. The excess nutrient to the waters surrounding coral reefs leads to an overgrowth of algae which results in reduced growth rates, coral disease and mortality (Kaczmarsky, Draud, & Williams, 2005). In terms of wildlife interactions, speeding vessels and long-tail boats can kill, injure and/or disturb the social bonding of marine wildlife. As reported by the Australian studies in the Great Barrier Reef Marine Park Authority (GBRMPA), dugongs were killed in the Hinchinbrook region (Preen, 2001) and many turtles were injured and killed by speeding vessels in Cleveland Bay near Townsville in north Queensland (Van Parijs & Corkeron, 2001).

4.3.3 Environmentally Sustainable Considerations for Dive Tourism Providers

For a number of years, the diver certification organizations such as PADI and SSI, along with individual businesses, have recognized their responsibility and put significant efforts into environmental conservation (Townsend, 2008). There are a number of organizations that have been established by the dive industry or by divers themselves, such as the PADI Aquatic World Awareness, Responsibility and Education Foundation (Project AWARE) and the Reef Environmental Education Foundation (REEF). These organizations specifically focus on marine conservation. The Project AWARE Foundation has offices in the United States, the United Kingdom, Australia, New Zealand and Japan. It is empowering thousands of divers and involving more than 11,000 volunteer scientists over 5,700 dive centres and resorts across 180 countries and territories (Project Aware Foundation, 2011). In addition, there are organizations like Coral Cay Conservation, Blue Ventures and Earthwatch, which allow volunteers on working holidays to undertake scientific work. Most often, they survey reefs or other ecosystems to provide an ecological baseline, monitor change and learn about the impacts of certain environmental conditions. Such organizations are mainly founded and run by scientists who have limited manpower and limited funding. These local, regional, and global efforts have played an important role in collecting information, raising awareness, and providing funds for marine conservation projects (Townsend, 2008).

There are general standard requirements, responsible dive operation guidelines and environmentally sustainable considerations across the world. However, these standards vary from region to region.
The internationally accepted sustainable guidelines for dive tourism providers as presented by The Coral Reef Alliance (CORAL) to the United Nations Conference on Sustainable Tourism in the Dominican Republic, and in the International Coral Reef Initiative Workshop in the Philippines are summarized and presented in Table 4.1. These standard requirements were associated with the "Green Leaf Questionnaire" developed by the Pacific Asia Travel Association (PATA). Each of the aspects addressed enables SCUBA divers, resort owners, dive boat operators and other people involved in dive tourism to consider whether their practices are helping protect coral reefs.

Even though there is a large number of effort encouraging and empowering divers and dive businesses to adopt these guidelines and codes of conduct, successful compliance in a wider scale is a great challenge. One reason contributing to this issue is the highly fragmented nature of the dive tourism industry. The great majority of which consists of independent small and medium sized businesses scattered across the globe, with no centralized certifying or regulatory body to oversee the business (World Travel and Tourism Council, 2002). Although PADI and other training organizations have influence over dive businesses and they have been instrumental in encouraging and recognizing environmental good practices, they have no power over the individual dive operators. It is up to the dive businesses to take action and voluntarily subscribe to sustainable principles through codes of conduct and business practices (Dwyer et al., 2009).

4.4 METHODS

4.4.1 Questionnaire Design and Content

This study used a questionnaire survey as the data collection instrument. The questions were designed based on the best practices guideline for marine tourism providers from various sources, such as the CORAL, the Green Fins Codes of Conduct, the Tourism Operator’s Handbook for the GBR, the PADI Project AWARE and the International Centre for Ecotourism Research. Given a variety of nationality background of people involved in the dive operating businesses on Koh Tao, the onsite self-administered questionnaire was provided in English. The structured questionnaire contained a total of 23 questions over 5 pages (Appendix II). Close-ended questions consisted of a mixture of binary ‘yes, no’, as well as horizontal and vertical Likert. Sufficient space under each of the questions allowed for the relevant detailed descriptions. Open-ended questions involved personal experience and perceptions of particular issues. The questionnaire was constructed in three major sections:
Table 4.1 The environmentally sustainable considerations for dive tourism providers.

### Before a Dive Trip

- Are visitors encouraged to learn about the geography, culture & ecology of dive destinations to be visited prior to leaving home?
- Is pre-trip information about the destination's local customs and proper dive etiquette provided to all visitors?
- Are references to educational materials provided to visitors ahead of time to facilitate the learning process?
- Is specific attention drawn to coral reef ecology and to guidelines/regulations for boating, snorkelling, SCUBA diving, fishing and other recreational uses of the reef?
- Are tours designed to enhance visitor awareness and understanding of the coral reef ecosystems that will be visited?

### Dive Tourism Operations

- Do tours respect all local guidelines, laws, regulations and customs?
- Are local dive guides and masters hired where possible and appropriate?
- Are local perspectives sought in planning interpretive programs?
- Are pre-dive talks offered by knowledgeable dive masters?
- Do they educate divers about the special features of the dive sites and reinforce rules for divers, such as: maintaining neutral buoyancy; maintaining control of fins, gauges and accessories; no touching, standing on or collecting coral; no feeding or handling fish and other living organisms; abiding by any fishing and game regulations?
- Are mooring buoys used when possible, anchors never dropped onto coral reefs?
- Are engines well maintained to avoid release of petroleum products in reef areas?
- Is all sewage disposed of in a way that does not affect the nutrient balance of the reef ecosystem?
- Are environmentally-sound methods of trash disposal used on boats and on the land?
- Are special provisions made for disposal of harmful substances, such as chemicals used for film processing?
- Do tour operators limit the group size and frequency of dives?
- Do dive masters rotate dive sites to avoid over-using a particular site?
- Do dive masters verify the proficiency of new divers before allowing them to dive at fragile or difficult dive sites?

### General Considerations

- Are visitors encouraged to participate in local conservation efforts, particularly regarding the use of energy and fresh water?
- Are visitors informed of how they can make donations or give other support to local coral reef conservation initiatives?
- Do tour operators donate money or assistance to help the local environment?
- Do tour operators work with local authorities to minimize the environmental impact of visitors, particularly in marine protected areas?
- Is all construction planned to avoid negative environmental impacts on coral reefs, mangrove and seagrass ecosystems?
- Is public participation sought and encouraged for all projects affecting the community?
- Are local traditions and use patterns for the reefs respected?
- Are local naturalists hired when possible and appropriate?
- Do visitors stay in lodging that fits the environment?
- Are local businesses and service providers supported as much as possible?
- Are visitors encouraged to buy authentic arts and crafts of local artisans and to purchase other products and services which benefit the local economy?
- Is purchasing coral or souvenirs made from coral, turtles and other threatened wildlife prohibited or strongly discouraged?

*Source: Author, Adapted from the Sustainable Diving Checklist, CORAL AND PATA (1996)*
Section 1 - Dive operators’ performance

The major considerations in the questionnaires included the use of alternative energy; sewage and wastewater minimization; prevention of solid waste entering marine environment; seafood consumption; harvest of marine species; the use of mooring buoys; the interaction with marine life and corals; environmental knowledge and awareness of employees and tourists; and the involvement in the eco-friendly dive program. Each question addressed a key issue and proposed a good practice. The dive operators were to answer how they perceived these issues in terms of being threats to the coral environments and how their company responded to each of the problems.

Section 2 - Factors influencing the adoption of good practices

The dive operators were asked to provide reasons if they were unable to comply with any of the codes of conduct. Four potential barriers were listed in the questionnaires, including limited budget; limited knowledge and awareness; limited human resource and disagreement that these issues need to be addressed. However, the operators could provide more details and/or other limitations to their compliance with the standards in the space provided (if not already listed).

Section 3 - Background information of the dive business

Variables of interest included years of experience as a dive operator, the cheapest and most expensive dive offered, and the number of tourists per day during high and low seasons. For further potential use, the respondent’s demographic information was also recorded.

4.4.2 Sample Size and Sampling Techniques

Based on the information gathered by secondary sources (e.g. local government report, dive magazines, tourist brochures, and pamphlets), there were 43 dive operators located on the island. Of all dive operators in the list, 41 were operating during the study period - 1 operator was closed for the season and the other was recently closed down due to personal financial issues. The questionnaires were distributed to all 41 dive operators in order to gain as many responses as possible.

The researcher personally distributed the questionnaires to each of the operators, beginning in Sairee, followed by Mae Haad and finishing in Chalok Baan Kao Village. The introduction to the study, objectives and questionnaire instruction were provided on the front page of the questionnaires. Respondents were allowed to return the completed questionnaires directly to the researcher when possible or keep them until the collection period. At the end of the study, 22 questionnaires were completed and returned to the researcher (54%). A map-based number of total dive centres and the number of those who participated in the survey were demonstrated in Figure 4.1
4.5 RESULTS AND ANALYSIS

4.5.1 Dive Operating Business Information

The dive tourism industry on Koh Tao was greatly influenced by the European. Most (if not all) dive centres relied on the mutual dependence of skilled foreigners and local Thai owners. The Thai owners invested in the dive operating businesses but often gave complete responsibility to the foreigners to manage the business. This was because of their diving skill and expertise. Being foreigners in Thailand, these skilled expatriates have bonded with the Thai locals for social and
cultural support in the community. Based on the information provided by Thai residents, there were illegal foreigners working in every dive shop on the island, might be a manager, dive master/instructor, underwater photographer or desk clerk. This information was however never disclosed by business owners or foreigners.

The results from the survey with dive operators revealed a wide range of visitor number during low and high seasons. The number of divers visiting one operator ranged from 1 to 100 per day during low seasons, and from 8 to 300 divers per day during high seasons. The lowest records of visitors per day both in low and high seasons were from the same dive operator. Likewise, the dive operator which had the highest number of customers in the low season also attracted the majority of divers in the high season. The cost for one certified dive ranged from 550 THB (18 USD) to 1,500 THB (49 USD) per person (equipment provided). Approximately half of respondents have been in the dive operating business for 10-19 years (53%), one-third for less than 10 years (33%), and the remainder for more than 20 years (14%). All respondents in this survey were dive managers whose regions of origin were Europe (70% - 25% the United Kingdom and 45% other European countries including Germany, France, Belgium, Denmark, and the Netherlands), followed by Australia/New Zealand (15%), Thailand (10%), and the United States (5%).

4.5.2 The Performance Standards of Dive Operators

In order for dive operators to understand and adopt responsible codes of conduct, the researcher allowed them to compare their own performance against environmental good practices. The results showed that six out of eleven environmental good practices were adopted by all respondents (100%), while five practices seemed to be difficult (Figure 4.2). The most difficult practice to comply with was minimizing sewage and wastewater discharge (63%), followed by adopting alternative or clean-burning technology (41%), keeping an adequate distance from marine life (18%), and implementing no-contact policy (5%) and participating in the eco-friendly dive program (5%).

Respondents indicated the greater use of ‘marine toilet’ on their dive boats as compared to ‘self-contained toilet’. In other words, most of the dive boats typically evacuated untreated water directly into the ocean, rather than installing holding tank systems. Some respondents believed that toilet waste was harmless to the marine environment unless released onto coral reef areas. In terms of wildlife interactions, respondents reported that their boat captains usually shut off the engine when whale sharks were spotted and kept a safe distance from them as practicable, then let divers swim closer to the wildlife. However, due to the limitation of information regarding whale sharks migratory patterns and breeding behaviour, it was difficult for boat captains to ensure proper distance.
In regard to the good practices, there were six practical actions which were adopted by all respondents. These included preventing garbage and solid waste into the water; providing good environmental practices and education for customers; providing good environmental knowledge and awareness to dive employees; using mooring buoys when possible; providing refresher course and buoyancy control orientation for new or out-of-practice divers; and participating in local reef protection program.

In relation to the prevention of garbage and solid waste entering the water, cloth shopping bags were used to replace plastic bags, and reusable lunch containers were used to replace one-time-use foam containers. Divers at all levels were encouraged to participate in the “Say No to Plastic Bags” campaign. To support this, a number of dive operators provided free water fills to reduce plastic bottles accumulation on this small and remote island. In terms of providing environmental education and awareness, respondents indicated that they provided widespread educational signage throughout their business; a number of marine ecology courses; and dive briefings which contained information about corals and global threats to them. The environmentally responsible behaviour...
underwater provided by Green Fins, SSI Ecological, Project AWARE, as well as Thailand Diving Association (TDA) were regarded as general knowledge and behaviours while diving and snorkelling.

Concerning the use of mooring buoys, most of the respondents participated in Koh Tao Mooring Buoy Program in reporting and replacing missing and old buoys. According to respondents, new buoys were anchored every year to dive sites. Most of them were provided by the Save Koh Tao Conservation Group (SKT) to volunteer dive shops, to put out around the island at the yearly event ‘Underwater World Festival’. As indicated in the survey, all 22 respondents participated in the local conservation program of the SKT, involving monthly beach and underwater clean-ups, artificial coral building, bio-rock program, and Reef Checks. Detailed information of local conservation efforts will be further discussed in Chapter 6.

To provide additional evidence whether the dive operators integrated environmental responsible practices into their day-to-day operations, these practical actions were also assessed by the onboard dive tourists without the acknowledgement of dive operators. The dive tourists reported both good practices and the environmentally unsustainable ones. The responsible practices observed by SCUBA divers included: the pre-dive talks offered by knowledgeable dive masters (100%); the onboard dive briefings (99%); the use of mooring buoys when possible (97%); pre-dive environmental briefings (96%); and no anchor dropped onto corals (92%) (Figure 4.3). The irresponsible practices involved: wastewater discharge into the water (84%); petroleum leakage from boat engines (22%); and not well stowed garbage and solid waste (18%).

The results from dive operators’ self-assessment compared with the observation of dive tourists indicated a few differences. The dive operators stated that they had solid waste and cigarette butts well stowed; whereas, onboard tourists observed that plastic objects and cigarette butts were blown overboard. Moreover, divers observed petroleum leakage from boat engines whilst this matter was never mentioned by dive operators. Sewage and wastewater discharge overboard appeared to be a common problem reported in both dive operators and divers assessment. Apart from these issues, the remaining practices were likely to be sustainably managed (i.e. boat anchoring, seafood consumption, purchase of marine life souvenirs, pre-dive briefings, environmental knowledge and awareness among staff, and the use of mooring buoys).
Figure 4.3 Dive operators’ performance, as observed by onboard SCUBA divers (n = 100).

4.5.3 Factors Influencing the Adoption of Good Practices

The additional description provided in the dive operator survey offered an insight into the reasons for adopting (or not adopting) the particular environmentally responsible practices. Respondents who have implemented codes of conduct, best environmental practices, and eco-friendly dive programs indicated that they paid extra attention to providing information about environmentally sustainable dive tourism through a variety of materials (e.g. leaflets, travel brochures, environmental reports). These materials were produced by the dive operators themselves and/or in collaboration with scientific organizations, NGOs, academia and concerned locals. More than half of respondents invested human and financial resources into actively educating their customers and staff in order to move towards environmentally sustainable practices. They perceived public image as an important competitive advantage for their dive tourism market. They felt that becoming involved in local socio-cultural development projects or local conservation programs, in turn, made them stand out from other dive operators. They believed that good practices differentiated them from their competitors and also helped them in operational cost savings in the long run.
For those respondents who were unable to comply with good practices, the barriers involved insufficient budget, a lack of knowledgeable staff, limited knowledge and awareness, and a lack of customer interest. These respondents believed that compliance with codes of conduct would put them at a commercial disadvantage. Additionally, respondents felt that there was a lack of knowledge and awareness in relation to sustainable approach amongst the Thai community. Thus, regardless of how much they tried, the locals would continue to exploit the natural resources. The results from the survey also suggested that tourists’ demand for a low price holiday package has recently become a great concern. As described by respondents, most of the recent divers were not willing to spend money for sustainable products or eco-friendly tour operating business as they were often more expensive. Rather, divers sought for the lowest budget accommodation and dive packages. For this reason, it was a great challenge for the dive operators to allocate their budget to the regular maintenance of diving operations and natural resource conservation without raising the price or compromising the customers’ interest.

It is important to mention that during the field survey, approximately 10 operators refused to participate in the study from the first time they were approached. This group of people showed negative attitudes towards moving Koh Tao to a sustainable dive tourism destination. One of the dive managers in Chalok Baan Kao said that “There’s nothing you can do here, it has already been damaged and it is too late to improve”. Other simultaneous responses included “Nothing’s gonna change”; “There are always other things more important to do”; “Who cares about the impacts? We don’t live here. If there’s no tourist, we will just leave”. The list of dive operators who participated in the survey was cross-checked with the list of dive operators who regularly participated in the local conservation and social development activities. It was found that the operators who refused to complete the questionnaires were the same group who never participated in or contributed to the local efforts. Based on the field observation, these dive operators were small businesses and have been operating on the island for less than ten years. These findings represented the existence of the lack of interest in sustainable approaches and the limited sense of ownership of local natural resources.

4.5.4 Dive Operators’ Attitudes towards Dive Tourism Development

Given the heterogeneous feedbacks from dive operators, it was important to explore their personal attitudes with regards to the sustainable tourism approach. The dive operators’ attitudes towards dive tourism development were examined according to three attitudinal statements (Figure 4.4).
Figure 4.4 Dive operators’ attitude towards dive tourism development according to three categories (n = 21).

Attitudinal Statement A: Happy with current situation and want to see more tourism development;
Attitudinal Statement B: No more tourism development unless towards responsible practices;
Attitudinal Statement C: Prefer less tourism development.

The results demonstrated that a significant amount of respondents (86%) preferred less or no additional tourism development unless it was sustainably managed. This indicates that the majority of respondents (76%) had positive attitudes towards sustainable tourism development although preferences towards less tourism development may reflect simple commercial desire to avoid further competition. Responsive mechanisms to dive tourism impacts as suggested by respondents included the need for greater sustainable tourism operation; the control of tourist number and tourism facilities development; the need for compatible architecture; the environmental regulation and enforcement; the promotion of environmental knowledge and awareness; the sufficient and standard infrastructure; the use of dive site guidelines (dive site relief program); the introduction of standard pricing control; and the implementation of user pays principle. It can be noticed that most of these recommendations were consistent with those suggested by residents in the previous chapter.

4.6 CHAPTER SUMMARY

This chapter develops an understanding of how the diving operations have impacted coastal and marine environments, what practical action has been taken to minimize such impacts, and what factors contributed to their decision making to comply with the sustainable standards. To obtain information from a wide range of interest, questionnaire surveys were distributed to all dive operators on Koh Tao. The results from the study revealed both environmentally sustainable and unsustainable dive operations. The study demonstrated a complex series of motivations that played an important role in the decision-making processes to adopt environmental good practices. Factors such as
economic benefits, influence of relevant stakeholders, recognition of environmental commitment, and public image tended to be major driving forces that facilitate the adoption of good practices. On the other hand, budget constraint and lack of knowledgeable staff were likely to be limiting factors to move forward.

In response to the attitudes towards dive tourism development, the study found that dive operators who had the lowest and the highest number of visitors would like to see additional tourism development. However, the majority of dive operators in Koh Tao had a preference towards less tourism development, unless conditional to sustainable management practices. The information presented here can be seen as inputs from the tourism stakeholder who supply tourism goods and services in the destination. The next chapter will give full attention to SCUBA divers who consume tourism goods and services and participate in diving activities.
CHAPTER 5
SURVEY RESULTS: SCUBA DIVERS AND THEIR ROLES IN DIVE TOURISM

5.1 CHAPTER OVERVIEW

This chapter focuses on SCUBA divers who invest time and money participating in SCUBA diving activities. The chapter provides an understanding of how divers use resources, how they perceive the severity of environmental problems associated with dive tourism activities, and what contributes to their experience and satisfaction with Koh Tao reef-based tourism. Similar to the structure of previous chapters, the chapter begins with the main objectives, followed by a review of literature, methods used to undertake the study, and results and analysis.

5.2 OBJECTIVES OF THE STUDY

The increasing demand for dive tourism activities has resulted in concerns over SCUBA divers’ cumulative impacts on the underwater marine environment. As divers play an important role in tourism as well as the economic and ecological sustainability of coral reefs, there is a need to better understand divers’ underwater behaviours, their expectation and satisfaction, as well as their attitudes towards options for management (Dearden et al., 2007; Ong & Musa, 2011). It is expected that tourist satisfaction indicators can be used to examine the sustainability of coastal tourism development as tourist satisfaction can provide tourism management with information on which aspects should be improved to increase tourism’s competitiveness. The specific objectives of this study are:

- To examine the characteristics of SCUBA divers;
- To investigate SCUBA divers’ behaviour underwater and their impacts on coral reefs;
- To examine factors contributing to divers’ satisfaction with Koh Tao dive tourism;
- To explore SCUBA divers’ attitudes towards tourism development and management practices.
1. To examine the characteristics of SCUBA divers in terms of their:
   - Demographics;
   - Previous SCUBA diving history;
   - Level of involvement in SCUBA diving; and
   - Level of coral reef interest and knowledge.
2. To investigate SCUBA divers' behaviour underwater and their impacts on coral reefs.
3. To examine factors contributing to SCUBA divers' satisfaction with Koh Tao dive tourism.
4. To explore SCUBA divers' attitudes towards tourism development and management practices.

5.3 LITERATURE REVIEW

5.3.1 The SCUBA Diver

With more than 20 million certified divers visiting over 6,000 dive centres located in 91 countries and states, SCUBA dive tourism has been referred to as “ubiquitous” (Spalding, Ravilious, & P.Green, 2001). According to the PADI worldwide certification history (Figure 5.1), the number of diving certifications per year has grown significantly; from 23,736 in 1970 to 440,418 in 1990, and 930,941 in 2011 (PADI, 2011). Due to this high rate of participation in the diving activities around the world, SCUBA dive tourism can be considered one of the fastest growing leisure activities (Davenport & Davenport, 2006). Divers must be trained and certified in order to be able to dive unassisted. Despite the differences in the way each training agency (i.e. PADI, SSI, NAUI) teaches participants how to dive, the structure of learning and the acquiring skill is the same. There are five broad certification levels that need to be completed in a sequential order from: Open Water, Advanced Open Water, Rescue Diver, Dive Master, and finally Open Water SCUBA Instructor (www.padi.com). In completing each certification level, additional knowledge and skills are acquired that allow divers to undertake more technical pursuits. Both the Dive Master and Dive Instructor certifications are recognized as professional certification; hence, the holders are allowed to lead commercial diving tours (Dive Master and Dive Instructor) and teach new and certified divers (Dive Instructor). The priority of the diver is set on the diving ground itself (i.e. marine species, clear blue water, coral reefs) instead of the accommodation, the landscape or the attractions around (Garrod & Gössling, 2008; Oram, 1999).
According to a previous study (EAS, 2009), Koh Tao alone is responsible for one-third of the annual registrations of PADI around the world. Factors contributing to the popularity of this island involve the natural features (such as its remoteness, its small size, the mountain interior, surrounding sandy beaches and coral reefs with abundant marine life) and its reputation for a great variety of dive courses. Most tourists are from Europe and the USA (Churugsa et al., 2007; Flumerfelt, 2000; Srisaowalak, 2011). The majority of them stay on the island and others visit with organized group trips from the nearby islands. A large proportion of international tourists rank SCUBA diving as the primary purpose of visiting, whereas snorkelling and beach relaxing appear to be the major attractions for Thai tourists (Flumerfelt, 2000). The number of visitors to Koh Tao has never been recorded until ten years ago. Despite inconsistent data among different data sources (e.g. the Marine Department, TAO, individual ferry business), the statistical records show an increasing tourist trend - 30,462 visitors in 1993 (TISTR, 1994); 136,000 visitors in 2002 (Koh Tao Tambon Admistrative Organization, 2003); and 167,549 visitors in 2009 (Marine Department, 2010). Based on qualitative observation from November 2010 to February 2011, the records that each of the ferry businesses gave to the responsible authority was often different to their own confidential records. As a result, the actual number of tourists was more likely to be much higher than shown in the official statistics.
5.3.2 Potential Impacts from SCUBA Divers

The rapid expansion of the SCUBA diving industry on Koh Tao, as well as in other coral reef destinations, has made the sustainable management of this diverse ecosystem complicated and necessary (Gardner et al., 2003). Several studies identified SCUBA divers as the main cause of coral damage globally (Medio, Ormond, & Pearson, 1997). Divers often collide with the reefs, and these actions can lead to short- and long-term damage to corals (Harriott et al., 1997; Hawkins et al., 1999; Tratalosa & Austin, 2001). The extent of this damage is directly related to the intensity of site usage by divers (Barker & Roberts, 2004; Dixon et al., 1993; Hawkins et al., 2005). Direct damage from divers involves kicking, trampling, holding on to, standing or kneeling on the coral, stirring up sediment, and also by collecting coral and other species for souvenirs (Dearden et al., 2007; Zakai & Chadwick-Furman, 2002). Certain dive and diver characteristics have been linked to diver damage. According to Roberts and Harriott (1994), inexperienced divers are likely to cause more damage to corals as they struggle to maintain buoyancy control or use proper finning technique. The study by Rouphael (1997) however found no such trend, but discovered that both inexperienced and experienced divers who possess underwater cameras, male divers, and the initial phase of the dive are more likely to be associated with increased levels of reef damage (Davis & Tisdell, 1995; Rouphael & Inglis, 1997).

Although the damage done by individuals is relatively minor, there is evidence that the cumulative effects of these disturbances can cause significant localized destruction of sensitive marine organisms (Hawkins et al., 1999; Plathong, Inglis, & Huber, 2000; Rouphael & Inglis, 2001) and have long-term consequences (Dearden et al., 2007). At sites that are heavily used, diver impacts may render the reef ecosystem less able to recover from bigger stressors such as hurricanes, storms and disease (Hawkins & Roberts, 1992). Divers’ impacts on the coral reef environments have been suggested to affect aesthetic values, or the beauty, of a reef well before the biological values are affected (Hawkins & Roberts, 1992). As the diving intensity over 4,000 - 6,000 dives per year, reef damage increases at exponential rates (Hawkins et al., 1999; Prior et al., 1995). Research into the management of diver impacts has focused largely on estimating the number of dives that can be accommodated at particular sites before serious damage is done, so called carrying capacity (Davis & Tisdell, 1995; Dixon et al., 1993; Hawkins & Roberts, 1994). In addition to this, environmental concerns and beliefs (Cheng, Thapa, & Confer, 2005), diver motivations (Meisel & Cottrell, 2004), diver behaviours (Rouphael & Hanafy, 2007) and educational benefits (Townsend, 2003) have been explored for the management purposes.
5.3.3 Divers Satisfaction and the Dive Consumption Experience

Satisfaction is the primary method used to measure the quality of tourists experience (Tonge & Moore, 2007) and in turn assess the success of the industry in meeting customer expectations of environmental and social features of the tourism site (Mannell, 1999; Schofield, 2000; Ziegler, Dearden, & Rollins, 2011). If the tourists experience meets their expectations, their satisfaction will have feedback in seeking similar experiences in the future. The high satisfaction ratings can benefit tourism providers in the destination by attracting new customers through improved word of mouth advertising (Maccarthy et al., 2006) and creating competitive advantage (Baker & Crompton, 2000). In contrast, if their experiences do not meet expectations or are unsatisfactory, tourists may not select this activity in the future regardless of the tourism destination (Maccarthy et al., 2006; Mannell, 1999); regional investments in the tourism industry can depreciate rapidly; and employment from tourism can decline (Dixon et al., 1993).

As indicated in previous studies in relation to visitors experience within marine tourism around the world, the key features influencing divers satisfaction include coral diversity and experience of marine life encounter (Leujak & Ormond, 2007; Shafer & Inglis, 2000), weather condition (Coghlan & Prideaux, 2009; Martín & Belén, 2005), perceived crowding (Breen & Breen, 2008; Davis et al., 1997; Inglis et al., 1999; Lankford, Inui, & Whittle, 2008; Uyarra et al., 2009), environmental impacts (Curtin, Richards, & Westcott, 2009; Uyarra et al., 2009), and marketing approach (Uyarra et al., 2009). Divers demographics and their previous diving history may contribute to various satisfaction levels. On the same dive site, and even during the same dive, a beginner SCUBA diver with very low levels of diving and coral reef history might have different experiences and perceptions as compared to a diver with very high levels of diving and coral reef history (Davis & Tisdell, 1995). Understanding how well the activity meets the needs and expectations of people investing time and money participating in marine tourism activities can confirm that visitors are satisfied with the experiences provided (Mannell, 1999; Ziegler et al., 2011), and also provide valuable insights for management planning and decision-making (Ziegler et al., 2011).

5.4 METHODS

5.4.1 Questionnaire Design and Content

According to previous studies on Koh Tao (Churugsa et al., 2007; Flumerfelt, 2000; Srisaowalak, 2011) together with field observation, the majority of SCUBA divers visiting Koh Tao were foreigners. Therefore, the questionnaire was provided only in English. The structured questionnaire contained a
total of 33 questions over 4 pages; 29 closed and 4 open-ended questions (Appendix III). The questionnaire was structured into six sections:

**Section 1 - SCUBA diver demographics**

To understand the background of the respondents, country of origin, gender, age, highest level of education, and occupation were examined.

**Section 2 - Previous SCUBA diving history**

Based on other relevant studies, respondents' diving history was examined according to a range of variables; each of which explored different aspects of participation, training, and associated skills in recreational SCUBA diving. In this study, variable of interests included the diving agency which certified the respondent, the highest level of SCUBA diving certification, total number of dives in coral environments, previous diving experience elsewhere in the world, in Thailand, and on Koh Tao prior to this particular trip. Other major coral reef locations mentioned in the questionnaire were Red Sea, Caribbean, Australia/New Zealand, South East Asia, East Africa, Mediterranean, Indian Ocean, and Other Pacific. Divers might have difficulty recalling this information; however, most variables required are usually recorded in SCUBA divers' Log Books. The Log Book serves purposes both related to safety and personal records. Information in a log book contains date, time, location, the profile of the dive, equipment used, air usage, above and below water conditions (e.g. temperature, current, wind and waves), general comments, verification of buddy and instructor.

**Section 3 - Level of participation in SCUBA diving**

This sub-section explored the participation level and coral reef knowledge of SCUBA divers by using self-assessment ratings. Divers evaluated themselves whether they: 1) have recently started diving; 2) were no longer new to the activity but had limited diving and coral reef experience; 3) had higher level-certifications and have established diving as a regular part of leisure with moderate exposure to coral reef settings; or 4) had professional certifications (Dive Master or Instructor) and highly engaged in the activity of diving with high exposure to coral reef settings. The level of coral reef knowledge was measured using a three point scale ranging from basic to advanced. Additionally, ownership and use of an underwater camera and a coral reef- and/or fish guidebook were also utilized as information supporting participation and coral reef interest.

**Section 4 - Diver behaviour in coral reef environments**

The behaviours while divers were in the water related to buoyancy control, contact with corals, disturbance of the sediment, contact with marine life, and underwater photography. Divers were
asked to report whether they were neutrally buoyant at all times; contacted or touched corals; stirred up the sediment; took anything living or dead out of the water; chased or tried to touch marine life; or took pictures and/or video underwater.

Section 5 - Satisfaction of reef-based SCUBA diving

After diving, divers were asked to evaluate the overall satisfaction of their dive experience, including coral quality at dive sites, coral diversity, underwater visibility, weather conditions, diversity of and interaction with marine life, the information received in the dive brief, as well as the staff satisfaction (regarding their knowledge, friendliness and helpfulness). These were based on a 5-point scale, ranging from very poor, poor, moderate, good to excellent. Moreover, the questionnaire asked whether they would return to Koh Tao for another vacation based on their current holiday experience and whether they would recommend Koh Tao to a friend, relative, co-worker, or acquaintance in the future.

Section 6 - Divers’ perceptions of impacts and management practices

Based on the experience while on Koh Tao, divers were asked to provide comments and suggestions relating to impacts and management practices of the reef-based tourism. In addition, the questionnaire examined how well they were informed about and encouraged to support the existing local coral reef conservation projects.

5.4.2 Sample Size and Sampling Techniques

This study aimed to gain as many responses as possible; hence, the questionnaires were distributed to all of the 41 dive operators. The researcher was present with each of the operators to distribute questionnaires. This was to familiarize the crew with the administration of the questionnaire. The researcher also provided a one-page introduction to the research and its aims, and instructions on how to complete the questionnaire. This was done to ensure all respondents were given the same information prior to completing the questionnaire regardless of the dive boat or which crewmember was distributing and explaining it. After the initial demonstration by the researcher on the first trip, the designated crewmembers distributed questionnaires at the beginning of subsequent trips until the end of the sample period. The researcher made additional personal visits to reinforce the process and support crew with the surveys. Enough questionnaires were made available for all passengers on each of the trips. Crews were instructed to distribute and explain the questionnaire before leaving the wharf. Completed questionnaires were handed to the crew at the end of the trip. A total of 100 questionnaires from 20 dive operators [all of which were participants in the dive operator survey in
Chapter 4] around the island were either delivered directly to the researcher by the staff, or picked up by the researcher.

5.5 RESULTS AND ANALYSIS

5.5.1 Demographics

Table 5.1 presents the descriptive information, as well as pie charts, illustrating a percentage breakdown on the profiles of the 100 day trips participants. Age groups of respondents ranged from 20-29 to 50-59 years old. Although elder divers also participated in diving activities, 55% were in 20-29 age group followed by 39% in 30-39 age group. There were twice as many males than females (66%). Respondents originated from different regions across the world. Of all the countries represented, most visitors came from Europe (81%), and much less number of visitors from the USA (15%). Only 2% were from Asia and 2% from Australia/New Zealand. Most of the respondents were well-educated (76% completed undergraduate and/or postgraduate degrees).

Table 5.1 SCUBA divers’ demographics (n = 100).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>55%</td>
</tr>
<tr>
<td>30-39</td>
<td>29%</td>
</tr>
<tr>
<td>40-49</td>
<td>15%</td>
</tr>
<tr>
<td>50-59</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>66%</td>
</tr>
<tr>
<td>Female</td>
<td>34%</td>
</tr>
<tr>
<td><strong>Country of Origin</strong></td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>28%</td>
</tr>
<tr>
<td>United States</td>
<td>15%</td>
</tr>
<tr>
<td>Europe</td>
<td>53%</td>
</tr>
<tr>
<td>Asia</td>
<td>2%</td>
</tr>
<tr>
<td>Australia/New Zealand</td>
<td>2%</td>
</tr>
</tbody>
</table>
In addition to the types of SCUBA divers visiting Koh Tao, the survey also revealed factors influencing their decision to select dive operators. Respondents prioritized ‘reasonable price of dive trips’ over other factors (78% important), followed by ‘dive operator reputation’ (72% important), ‘personal recommendation’ and ‘attractive dive sites’ (65% important), and lastly ‘good environmental practices of dive operators’ (50% important) (Figure 5.2). The combined somewhat not important and least important scores of ‘good environmental practices’ presented equal distribution to the combined most important, somewhat important, and moderately important scores (50% compared to 50%). This indicates that the eco-standard of dive operation or its environmental responsibility was unlikely to be taken into consideration by divers when selecting dive operators.

Figure 5.2 Factors influencing SCUBA divers’ decisions on the selection of dive operators (n = 100).
5.5.2 Previous SCUBA Diving History

Table 5.2 provides respondents’ information on previous diving history in coral reef environments, including dive experience in various locations, total dives, certification agency, and highest level of dive certificate. Although over half of the respondents (60%) were first-time Koh Tao divers, they were not new to the activities. Rather, half of them (59%) have dived at other coral reef locations around the world. The most common dive sites were the Caribbean (24%), followed by the Red Sea (20%). The least dived of the seven locations was the Mediterranean (3%). Of all respondents who had experience in dive sites elsewhere, 25% have been to two up to five locations (9% two locations; 9% three locations; 5% four locations; and 2% five locations).

The number of total dives for respondents varied considerably, and ranged from less than 10 to 1001-5000 dives. Approximately one third of the respondents (35%) have experienced less than 10 dives. Less than half (44%) have made in excess of 50 dives, of which more than half were more than 100 dives. The majority of respondents (76%) were certified by PADI, with much less by SSI (21%). A significantly small percentage of respondents were trained by other agencies such as NAUI, CMAS, and BSAC (total 3%). In considering the highest certification level of respondents, there were relatively equal distributions of Open Water (33%), Advanced Open Water (31%) and professional certifications (Dive Master and Dive Instructor) (30%).

Table 5.2 Previous dive history of SCUBA divers visiting Koh Tao dive sites (n = 100).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous dive experience on Koh Tao</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>40%</td>
</tr>
<tr>
<td>No</td>
<td>60%</td>
</tr>
<tr>
<td>Previous dive sites around the world</td>
<td></td>
</tr>
<tr>
<td>Red Sea</td>
<td>20%</td>
</tr>
<tr>
<td>Caribbean</td>
<td>24%</td>
</tr>
<tr>
<td>Australia/New Zealand</td>
<td>16%</td>
</tr>
<tr>
<td>East Africa</td>
<td>18%</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>3%</td>
</tr>
<tr>
<td>Indian Ocean</td>
<td>11%</td>
</tr>
<tr>
<td>Other Pacific</td>
<td>8%</td>
</tr>
</tbody>
</table>
## Total dives in coral environments

<table>
<thead>
<tr>
<th>Range</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10</td>
<td>36%</td>
</tr>
<tr>
<td>11-20</td>
<td>16%</td>
</tr>
<tr>
<td>21-50</td>
<td>5%</td>
</tr>
<tr>
<td>51-100</td>
<td>17%</td>
</tr>
<tr>
<td>101-200</td>
<td>8%</td>
</tr>
<tr>
<td>201-500</td>
<td>10%</td>
</tr>
<tr>
<td>501-1000</td>
<td>3%</td>
</tr>
<tr>
<td>1001-5000</td>
<td>5%</td>
</tr>
</tbody>
</table>

![Graph showing distribution of total dives in coral environments](image)

## Diving certification agency

<table>
<thead>
<tr>
<th>Agency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PADI</td>
<td>76%</td>
</tr>
<tr>
<td>NAUI</td>
<td>1%</td>
</tr>
<tr>
<td>SSI</td>
<td>21%</td>
</tr>
<tr>
<td>CMAS</td>
<td>1%</td>
</tr>
<tr>
<td>BSAC</td>
<td>1%</td>
</tr>
</tbody>
</table>

![Graph showing distribution of diving certification agencies](image)

## Highest diving certification

<table>
<thead>
<tr>
<th>Certification</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Water</td>
<td>33%</td>
</tr>
<tr>
<td>Advanced Open Water</td>
<td>31%</td>
</tr>
<tr>
<td>Rescue</td>
<td>6%</td>
</tr>
<tr>
<td>Dive Master</td>
<td>15%</td>
</tr>
<tr>
<td>Dive Instructor</td>
<td>15%</td>
</tr>
</tbody>
</table>

![Graph showing distribution of highest diving certification](image)

## 5.5.3 Level of Participation in SCUBA Diving

Respondents rated their participation level in SCUBA diving activities using four conditions of engagement (Figure 5.3). Over one third of respondents (41%) have recently started diving activities while 23% highly engaged in diving with high exposure to coral settings and 21% were not new to diving but had limited experience. The smallest proportion of respondents (14%) was moderately engaged in diving with moderately exposure to coral settings.
Figure 5.3 SCUBA divers’ engagement in diving activities (n = 100).

About half of respondents (54%) considered themselves having basic knowledge about coral reefs, whilst only 8% rated their level of coral reef knowledge ‘advanced’. Of all respondents, only 23% owned and used an underwater camera and 32% owned and used a coral reef/fish guidebook.

### 5.5.4 Divers Behaviour in Coral Reef Environments

Approximately three quarters of respondents reported that they were neutrally buoyant at all time (76%). Slightly more than half (56%) stirred up the sediment and took photos/video of corals and marine life (52%) [Though the results found only 32% owned and used underwater cameras]. More than half of respondents (60%) did not contact corals by any means. Moreover, nearly all of them (92%) stated that they did not chase or try to touch marine life when they were in the water. This finding represented positive results in terms of impacts on coral environments caused by SCUBA divers. Damage to marine life through direct physical contact involved fins (56%), hands (22%), knees (13%), legs (6%), and tank (3%). Figure 5.4 shows the underwater behaviour of respondents.

Further analysis of the results indicated that 59% of the accidental contacts were caused by female respondents, while 80% of the intentional contacts were caused by male divers. However, damage to coral reefs was unlikely to be associated with the use of underwater cameras. Of those who possessed cameras, 35% have made contact with coral reefs, compared with those who did not use a camera, 41% of them have made contacts.
Figure 5.4 SCUBA divers behaviour in coral reef environments (n = 100).

5.5.5 Diving Experience and Satisfaction

The results from the survey revealed that the most visited dive sites for respondents were Chumpon Pinnacle, Twin Rock, and White Rock (Figure 5.5). Japanese Garden represented a little less popularity. According to the dive operators, Twin Rock, White Rock, Green Rock, Japanese Garden, Red Rock, Shark Island and Mango Bay were the main destinations for novice divers due to the maximum depth, visibility and current. Chumpon Pinnacle (5 km northwest) and South West Pinnacle (12 km southwest) were suitable for intermediate or more advanced certified SCUBA divers.

The respondents were asked to rate their satisfaction of dive experience on a five-point Likert scale with scores of 1 corresponding to ‘very poor’ and a score of 5 to ‘excellent’. The results presented in Figure 5.6 revealed a very high ‘overall satisfaction’ of the diving experience in the coral reef environments (52% excellent and 35% good). Respondents were more likely to be satisfied with the ‘staff’ than other aspects (79% excellent and 14% good, with no poor or very poor), followed by the ‘dive briefings information’ (60% excellent and 33% good), the ‘interaction with marine life’ (22% excellent and 47% good), and ‘coral quality’ (20% excellent and 38% good). All respondents were happy in terms of the staff knowledge, helpfulness and friendliness. They stated that ‘pre-dive briefings’ were provided by knowledgeable dive masters/instructors, involving special features of the sites and reinforcing rules for divers such as: maintain neutral buoyancy; maintain control of fins, gauges, and accessories; no touching, standing on, or collecting corals; and no feeding or handling fish and other living organisms.
The satisfaction score of good and excellent indicated that most of the respondents’ expectations have been well or greatly met, with the exemption of the ‘underwater visibility’ (50%) and the ‘weather condition’ (41%). In considering the very poor and poor satisfaction levels, ‘underwater visibility’ (13%), ‘coral quality’ (13%), and ‘weather condition’ (10%) had greater proportion than other aspects. The ‘underwater visibility’ and the ‘coral quality’ were the only two aspects that had respondents rated as very poor condition (2% and 1%, respectively). Two respondents who felt that the underwater visibility was very poor, one was male between 20-29 years old from North America, never dived on Koh Tao but has experienced 51-100 dives in South East Asia, held a dive master certificate and was highly engaged in diving with high exposure to coral settings; the other respondent was female between 20-29 years old from Europe, previously dived on Koh Tao and has experienced 21-50 dives in the Red Sea, held an Advanced Open Water certificate, used an underwater camera, and has recently started diving. The only one respondent who rated the ‘coral
quality’ as very poor was male between 20-29 years old from Europe, previously dived on Koh Tao and has experienced 21-50 dives, previously dived in Australia/New Zealand and the Mediterranean, held an Advanced Open Water certificate and was not new to SCUBA diving but had limited experience.

In addition to the satisfaction factors listed above, respondents were asked to provide a brief description of their likes and dislikes in relation to their dive experience as well as their overall holiday on Koh Tao. A large majority of respondents commented about crowding of divers and boat operators at particular dive sites. One of the respondents stated that “(name of dive operator) took 20 inexperience divers in the water in one group”. Other respondents complained that “I could see divers everywhere” and “sometimes there were approximately ten dive boats at one site”.

The second concern for divers was the environmentally unsustainable practices of boat operators. A few examples of the complaints were “toilet water was released into the water”; “one of the dive sites I visited was full of garbage”; and “environmental effects were obvious, human waste, garbage, oil on the water”.

Another concern amongst divers related to increased night life on Koh Tao. Divers stated that “I like the laid back environment and diver-friendly but not the parties at night”; “don’t become another Pattaya, people can party at Koh Phangan… tourists should see corals not night clubs and alcohol”.

Figure 5.6 Post-trip satisfaction score evaluated by SCUBA divers (n = 100).
The above factors seemed to affect divers satisfaction of experience on Koh Tao; however, the following positive comments were also noted: “great effort from the staff to inform about the environment”; “it’s the staff who makes you feel passionate about diving”; “diversity of dive spots, close proximity, warm water”; “beautiful fish, great variety of marine life”; “beautiful corals and friendliness of the Thais”.

In spite of some unexpected experiences, all respondents would recommend dive tourism on Koh Tao to others including friends and family, with 96% of respondents willing to return to the island again. The remaining 4% of respondents stated their reasons for not returning as “there are many other places to see/dive”. This trend can be linked to the finding in Table 5.2, suggesting 40% of respondents have previously dived on Koh Tao before the trip. Consequently, it can be assumed that there is approximately 40% chance that SCUBA divers visiting Koh Tao would return to this place with family or friends in the future.

5.5.6 Divers’ Perception of Impacts and Options for Management

This section addressed tourists’ perceptions of dive tourism negative consequences. Figure 5.7 presents respondents’ level of agreement or disagreement with the existence of negative impacts as a result of tourism activities and development. Approximately three quarters of respondents agreed that dive tourism caused negative impacts to coastal and marine environments on Koh Tao, with 17% strongly agreed and approximately half (55%) agreed to some extent. The minority of respondents (19%) disagreed and a small proportion (8%) did not know whether or not dive tourism created negative impacts.

![Figure 5.7 Divers’ perceptions of negative impacts as a consequence of the dive tourism development (n = 100).](image-url)
A content analysis of the open-ended questions allows themes that are important in the diver experience to be identified. Approximately 80% of the responses supported management interventions that would limit the number of boats and tourists at dive sites, as well as reduce negative environmental impacts. Their suggestions for Koh Tao to becoming a more sustainable dive tourism destination can be categorized into: reduce the number of divers at dive sites; reduce the number of dive operators; introduce rotating dive sites policy; create more artificial reef sites; introduce eco-standard operation with waste minimization policy; improve basic infrastructure; prohibit fishing on the reefs and reinforce fishing law; better promote the SKT campaign; and introduce a user-pay principle.

A number of divers suggested the installation of a local coral reef management program which was indeed an active and on-going effort (the SKT campaign). This indicated a need for effective dissemination of information to visitors. According to information provided by dive tourists, over half of the respondents were informed about the SKT and 66% were encouraged to participate in the conservation projects, through staff including signage at hotels and dive schools. These local efforts and activities for divers to participate referred to beach clean ups, underwater clean ups, donation, purchasing souvenirs from the SKT and participating in the yearly fund-raising event, the ‘Koh Tao Underwater World Festival’.

5.6 CHAPTER SUMMARY

This chapter provides inputs from SCUBA divers who were directly involved in diving activities and played an important role in the sustainability of the dive tourism industry. The study identified types of divers visiting Koh Tao, the potential impacts on coral reef environments caused by divers, their satisfaction of dive experience, and their attitudes towards options for management. The results from the questionnaire survey indicated the environmentally responsible behaviour of the Koh Tao divers underwater. However, male divers were likely to make higher intentional contacts as compared to their female counterparts. Despite the high overall satisfaction with their dive experience in coral settings and the willingness to recommend Koh Tao to their family members and friends, a number of respondents expressed critical comments with regard to the overcrowding at dive sites and the environmentally unsustainable practices of dive operators.
This chapter, together with Chapter 3 and 4 has developed understandings of the dive tourism impacts, the contributions of key stakeholders in the sustainability of tourism, their attitudes towards dive tourism development, as well as their perceptions towards options for management. In order to recommend appropriate management for Koh Tao, it is important to understand what effort has been done and how effective or ineffective it has been. The next chapter presents the local initiatives in response to the existing issues and emerging challenges to the sustainability of the Koh Tao dive tourism.
CHAPTER 6
SURVEY RESULTS: CURRENT MANAGEMENT PRACTICES

6.1 CHAPTER OVERVIEW

This chapter presents descriptive information on how the Koh Tao community responded to the past and existing tourism negative impacts, how local initiatives and cooperative coastal management affected the coastal communities, and how effective the partnership was from the perspective of residents. The chapter begins with specific objectives of the study, followed by a brief introduction to the Koh Tao local conservation group, data collection procedures, the current management arrangements, and the residents’ perceptions towards the local initiatives, their roles and responsibilities.

6.2 OBJECTIVES OF THE STUDY

The specific objectives of this study are:

1. To investigate local initiatives and cooperative coastal management in response to impacts of dive tourism.
2. To identify factors influencing the success or failure of the local partnership in coastal and marine resources management.

6.3 AN INTRODUCTION TO LOCAL INITIATIVES AND COOPERATIVE COASTAL MANAGEMENT

In recent years, the approach of community driven tourism as a tool for both conservation and development has been increasingly recognized by government, business, private, and community sectors (Jain & Triraganon, 2003). The efforts from within communities to manage natural resources have existed in various forms throughout the world. Since these local endeavours incorporate
stakeholder values and social circumstances, they have a high prospect for success (Luttinger, 1997). The case study of Koh Tao provides an example of what a small island community could do in order to manage coral resources while sustaining the dive tourism industry.

The Save Koh Tao Conservation Group, referred to here as the SKT, was formed by Koh Tao community members in 2000 as a responsive mechanism to the uncontrolled rapid development of dive tourism and the subsequent degradation of coral reefs. It aims to conserve natural resources and environment as well as local cultural values, which is a significant capital for sustainable tourism development. According to the SKT official website (www.savekohtao.com), its main objectives are: 1) To conserve the local natural resources and environment; 2) To build capacity and the role of stakeholders in order for sustainable tourism to be achieved; 3) To support and disseminate knowledge and understanding of the sustainable development concept to the community; and 4) To encourage community participatory process in sustainable tourism development.

The SKT was initiated by a few concerned residents, relying solely upon a small donation and a contribution from the local entrepreneurs and dive operators. For this reason, the projects conducted during the first few years had limitations to great achievement (Informant 9, personal communication, November 2010). In 2003, a coalition of local dive operators known as ‘Koh Tao Dive Operator Club’ (KTDOC) was founded. The coalition was relatively small but the outcomes of their efforts in coping with environmental and social issues were significant (Environmental Research Institute Chulalongkorn University and the Bumi Kita Foundation, 2007). There were 28 dive operators participating in the Club, led by a Thai national who owned a large dive operating business on the island. The KTDOC, with the support from the Royal Thai Navy, had successfully organized fund raising for the marine education program for Koh Tao school children; conducted a coral reef rehabilitation experiment; and organized the first ‘Koh Tao Underwater World Festival’. As indicated by the Informants, the KTDOC was suspended a few years later because of personal relationships problems between members. The majority of the group members however united with the SKT and has played a significant role in marine conservation until present date (Informant 10, personal communication, January 2011).

The SKT had learned its lessons and subsequently improved its organizational structure. It has expanded to a multi-stakeholder body which includes the local government, dive operators, tourist accommodation businesses, restaurants, Koh Tao Tourism Association, Koh Tao Sport Club and community members (Larpnun, Scott, & Surasawadi, 2011). The SKT consults broadly with relevant government agencies, academia, businesses and NGOs to address the existing issues on Koh Tao and to propose appropriate solutions (Larpnun et al., 2011).
The SKT projects are conducted under its three branches: 1) Marine Conservation; 2) Land Conservation; and 3) Education (Figure 6.1). These projects are funded through private donations, merchandise sales, and fund raising events. Each of the meetings and activity preparations has been conducted at various locations, including dive operators, bars, or restaurants on a voluntary basis [until the beginning of 2012, when the SKT opened its official working station] (Save Koh Tao Facebook, March 2012). The local entrepreneurs often assist in the projects through financial support, manpower, tea break/meals, and equipment (Informant 17, personal communication, January 2011).

Figure 6.1 Projects and activities developed through the Save Koh Tao Conservation Group.
Source: Adapted from www.marineconservationkohtao.com

As a result of a high dependence of Koh Tao tourism upon coastal and marine resources, the marine conservation branch receives the greatest attention. Figure 6.2 illustrates the SKT year-round event calendar in 2011. The calendar shows a wide range of activities conducted by the SKT, various support from external bodies, and the continuity of local endeavours. Most of the activities are run by the Save Koh Tao Marine Branch (SKTMB), aiming to solve problems facing coral reefs and to become a sustainable dive tourism destination. The SKTMB proposes to study, protect, and restore coral reefs around the island in order to maintain their amenity and biological values in the long-term future (Larpnun et al., 2011). Participants in the activities consist of both Thai and foreign residents who share common goals of protecting the environment and enriching Koh Tao’s close knit society. The local conservation efforts not only help protect local resources, but further increase awareness as well as community involvement in environmental conservation projects (Interview 19, personal communication, January 2011).
Figure 6.2 The 2011 year-round event calendar of the Save Koh Tao Conservation Group. 
Source: Save Koh Tao Facebook Page (2012)

6.4 METHODS

6.4.1 In-depth Interviews

As described in Chapter 2, this research employed a sequential mixed methods design – first quantitative (questionnaire surveys) and then qualitative (in-depth interviews). The results of the survey (as presented in Chapter 3, 4 and 5) helped to identify issues to be investigated in more detail using an in-depth interview technique. Based on the literature, in-depth interviews allow the interviewer to discover the complexities of participants’ perceptions and experiences as expressed in their own words (Patton, 1980). In this study, the interviews provided an insight into dive tourism development, its impacts, existing management responses, and perceived management options suitable for Koh Tao. Potential respondents were selected using snowball sampling technique. After making initial contact with respondents referred to as ‘informants’ or ‘gatekeepers’, each respondent was asked to suggest other respondents. As argued in Walter (2010, p.138), “snowball sampling will, by its nature, be unrepresentative of the population. However, as the technique is often used to locate members of a specific subgroup, sample representativeness is often not of primary concern”. The time the researcher spent in the community prior to the distribution of questionnaires contributed significantly to the appropriate selection of potential respondents for the in-depth interview.
6.4.2 Identification of Key Informants

In this study, the in-depth interviews were conducted with 22 key informants involved with dive tourism and coastal resources management at local, regional, and national levels. Respondents were from various sectors; for example, community members, private sector, government sector, NGOs, and academics (Table 6.1). The study targeted a diverse background of participants in order to reflect multidimensional interests and experiences with relevance to the research topic. However, to maintain a level of anonymity as declared in the consent form, the in-text citation in this thesis is represented in codes instead of the informants’ names.

Table 6.1 Key informants in in-depth interviews conducted on Koh Tao between November 2010 and February 2011.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Key Informant</th>
<th>Cited as</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community</td>
<td>Local leader - head of village</td>
<td>Informant 1</td>
</tr>
<tr>
<td></td>
<td>Fisherman</td>
<td>Informant 2</td>
</tr>
<tr>
<td></td>
<td>Transport sector - taxi car and taxi boat</td>
<td>Informant 3, 4</td>
</tr>
<tr>
<td></td>
<td>Health sector - nurse</td>
<td>Informant 5</td>
</tr>
<tr>
<td></td>
<td>Academic staff - primary school teacher</td>
<td>Informant 6</td>
</tr>
<tr>
<td></td>
<td>Policeman</td>
<td>Informant 7</td>
</tr>
<tr>
<td></td>
<td>Foreign resident</td>
<td>Informant 8</td>
</tr>
<tr>
<td>Business</td>
<td>Tourist accommodation</td>
<td>Informant 9</td>
</tr>
<tr>
<td></td>
<td>Dive operator</td>
<td>Informant 10</td>
</tr>
<tr>
<td></td>
<td>Restaurant</td>
<td>Informant 11</td>
</tr>
<tr>
<td></td>
<td>Retail/wholesale</td>
<td>Informant 12</td>
</tr>
<tr>
<td></td>
<td>Boat operator</td>
<td>Informant 13</td>
</tr>
<tr>
<td>Government</td>
<td>Local level - Koh Tao TAO</td>
<td>Informant 14</td>
</tr>
<tr>
<td></td>
<td>Regional level – REO14</td>
<td>Informant 15</td>
</tr>
<tr>
<td></td>
<td>National level - DMCR</td>
<td>Informant 16</td>
</tr>
<tr>
<td>NGOs</td>
<td>Save Koh Tao</td>
<td>Informant 17</td>
</tr>
<tr>
<td></td>
<td>Koh Tao Tourism Association</td>
<td>Informant 18</td>
</tr>
<tr>
<td></td>
<td>IUCN</td>
<td>Informant 19</td>
</tr>
<tr>
<td>Academic</td>
<td>Prince of Songkla University</td>
<td>Informant 20</td>
</tr>
<tr>
<td></td>
<td>Mahidol University</td>
<td>Informant 21</td>
</tr>
<tr>
<td></td>
<td>Freelance researcher</td>
<td>Informant 22</td>
</tr>
<tr>
<td></td>
<td>[who had conducted various workshops on Koh Tao]</td>
<td></td>
</tr>
</tbody>
</table>
6.4.3 Structure of the Interview

A total of twenty-two potential informants were approached by the researcher and all of them were willing to participate in the in-depth interviews. Interviews were based on an interview guide that was prepared by the researcher in advance (Appendix IV) or known as ‘semi-structured interviews’. The wording and order of the points on the interview guide however was not fixed in advance. The initial response to each question was open to be followed up with comments, prompts and further questions while a conversation developed. The interviews lasted between one and two or even three hours depended very much upon how talkative and interested the respondent was.

During the interview, the researcher introduced the first item on the guide, listened to the response, probed for more detail or asked follow-up questions as appropriate. The researcher looked at a checklist from time to time. When all the points on the guide have been covered, informants were asked if they would like to add any information or had any questions before closing the interview.

The in-depth interviews included open-ended questions examining the informants’ perceptions of the dive tourism consequences; causes of current issues; roles and responsibilities of the perceived responsible parties; capacity of existing efforts to deliver effective coastal resource management, including critical elements contributing to sustainable reef-based SCUBA dive tourism development. Nearly all informants were Thai nationals; therefore, the interviews were mostly conducted in Thai, except for the interviews with foreign residents and a key member in the SKTMB. To ensure the accuracy of data as recommended by Newing (2011), both note taking and audio recording were undertaken during the interview.

6.5 CURRENT MANAGEMENT ARRANGEMENTS

For ease of understanding the management arrangements, the past and current projects conducting on Koh Tao are grouped and presented according to areas of interest. Table 6.2 summarizes the local initiatives in response to issues facing the sustainability of reef-based SCUBA dive tourism industry. The existing control mechanism includes reducing damages from underwater activities; coral reef conservation and restoration; marine life conservation; rubbish and waste management; and environmental education and awareness raising. The following section provides descriptive information of activities conducted along with brief outcomes of each project.
### Table 6.2 Local conservation projects, categorized by issues facing the Koh Tao dive tourism.

<table>
<thead>
<tr>
<th>Area of Interest</th>
<th>Project/Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SCUBA diving activities</strong></td>
<td>Mooring buoys Project</td>
</tr>
<tr>
<td></td>
<td>Buoyancy World</td>
</tr>
<tr>
<td></td>
<td>Shipwreck</td>
</tr>
<tr>
<td><strong>Coral resources</strong></td>
<td>Hin Fai Biorock</td>
</tr>
<tr>
<td></td>
<td>Coral nursery</td>
</tr>
<tr>
<td></td>
<td>Environmental Monitoring Program (EMP)</td>
</tr>
<tr>
<td></td>
<td>Reef Watch and Reef Check</td>
</tr>
<tr>
<td><strong>Marine wildlife</strong></td>
<td>Turtle release</td>
</tr>
<tr>
<td></td>
<td>Giant Clam Nursery and Rehabilitation Project</td>
</tr>
<tr>
<td></td>
<td>Whale shark database</td>
</tr>
<tr>
<td></td>
<td>Sea Turtle database</td>
</tr>
<tr>
<td><strong>Rubbish and waste</strong></td>
<td>Beach and underwater Clean-ups</td>
</tr>
<tr>
<td></td>
<td>Effective Microorganism (EM)</td>
</tr>
<tr>
<td></td>
<td>‘Say No to Plastic’</td>
</tr>
<tr>
<td><strong>Education and awareness</strong></td>
<td>Marine Resource Management Course (MRM)</td>
</tr>
<tr>
<td></td>
<td>Marine Branch Meetings and the Save Koh Tao meetings</td>
</tr>
<tr>
<td></td>
<td>Young Environmentalist Program</td>
</tr>
<tr>
<td></td>
<td>Koh Tao Underwater World Festival</td>
</tr>
<tr>
<td></td>
<td>Koh Tao Film Festival</td>
</tr>
<tr>
<td></td>
<td>The local newspaper, Koh Tao Post</td>
</tr>
<tr>
<td></td>
<td>The online social network, Save Koh Tao Facebook Page and Marine Conservation Koh Tao Facebook Page</td>
</tr>
</tbody>
</table>

*Source: Author, Summarized from various sources*

### 6.5.1 Reducing Marine-based Damage on Coral Reefs

#### 6.5.1.1 Mooring Buoy Project

The use of mooring buoys was found to reduce anchor damage on coral reefs in the early 1970s. Since then, mooring buoys installation has been widely accepted worldwide as another effective solution to reduce coral structural damage. Often, mooring buoys are installed close to or over a site where boats traditionally anchor. Boat users tie off to the mooring instead of anchoring. The mooring buoys can be used to zone an area for a particular activity and help avoid conflicts between resource
users, for example, fishermen and divers. Additionally, they can also be used as an ongoing aid to coral reef conservation (International PADI Inc., 2005).

According to PADI, installing mooring buoys requires professional expertise at all phases of project planning and implementation. Financial resource for installation and ongoing maintenance are a crucial element of any mooring buoys system. As stated in Flumerfelt (2000), a mooring buoy can cost about 160 USD for a basic oil canister while the more sturdy and reliable buoy can cost up to 1,000 USD. Apart from these efforts, educational programs must be undertaken to ensure that private users understand what the buoys are for and adequate arrangements for enforcement of the project or site regulations need to be in place (International PADI Inc., 2005).

The mooring buoy installation efforts on Koh Tao started in 1998 with donations from dive operators around the island. Due to a lack of constant maintenance, the long-term outcome of the project has become a great challenge (Flumerfelt, 2000). In recent years, the large number of dive boat users has put greater pressure on Koh Tao coral reefs. This has led to an urgent need for effective coral reef monitoring. Self-funded coral reef monitoring was established by the SKT and undertaken by volunteer divers, without support from government or any outsiders. The Royal Thai Navy and the DMCR acknowledged this local effort in 2009 and offered the mooring balls, ropes and other materials necessary to support the mooring buoy project. Dive operators were trained in installation techniques by academia and technicians from the DMCR, but the repairs and maintenance were conducted by the community and volunteer divers (Informant 8, personal communication, January 2011). Figure 6.3 shows mooring buoys installation by the volunteer divers in 2009 and 2011. Figure 6.4 illustrates the mooring line installation and repairs in 1998 and 2011 based on their locations, together with responsible dive operators, as well as date and bottom depth. As presented in Figure 6.4, the number of mooring lines has been reduced from 15 in 1998 to 11 in 2011. Nine of the 2011 mooring lines were installed at the same location, and two additional mooring lines were installed into the existing line in Mango Bay (total 3 lines). These changes were made in accordance with the need, the popularity of dive sites and the severity of coral damage (Informant 8, personal communication, January 2011).
Three mooring systems currently in use on Koh Tao are: 1) dive and fishing boat moorings - the strongest moorings [require the largest anchor points], marking with large red balls; 2) small craft moorings - the single boat anchors for smaller boats, indicating with a single or double yellow ball; 3) ‘No Boat Zones’ and long-tail moorings - the floating strands that demarcate bay areas as no boat zones which consist of a long surface line with a yellow ball every 2m, and several tie downs (every 15-25 m) (Scott, 2011b).

All dive operators are encouraged to participate in installation, report and repair processes because they have routine and repeat dive schedules which provide a good opportunity to notice if mooring buoys are damaged. In many cases, they break from overuse, big boats, storm, or from improper installation. Sometimes they are cut by fishermen when they get in the way of their nets. Any installations or repairs by responsible dive operators are recorded in the Mooring Buoy Reporting Form and further sent to the DMCR (Informant 8, personal communication, January 2011).

A common frustration expressed by participants in the mooring buoy installation program was that they spent time, energy and money organizing the mooring buoys only to have them break within a short time. A few examples of these complaints were:

- We put so much effort on this project and then what, somebody just destroy them in one day;
- It’s not something that can be done in one shot; it’s an ongoing project that needs maintenance;
- All dive schools should participate and look after them, not like 10 of them try so hard and the rest don’t even bother.
In response to that, the SKT allocated certain dive sites to certain dive operators. Each operator was responsible to ensure that the site was well-maintained (as demonstrated in Figure 6.4).

6.5.1.2 Buoyancy World

Buoyancy World is an alternative dive site and coral nursery designed and constructed by the Koh Tao community, with the leadership of dive operators. The project was introduced through the SKT in 2009 with an aim to reduce coral damage by increasing novice divers’ buoyancy skills. This island
wide project was part of a larger program being enacted by the SKTMB to monitor and protect the local resources and ecosystems (Marine Conservation Koh Tao, 2009b). Non-toxic materials such as bamboo, glass bottles, rope, and concrete were used to create a variety of sculptures. In February 2010, the structures were submerged onto a sandy area just north of Koh Tao’s most crowded dive site, Twin Rocks. A few months later, more structures and training aids were also added to the existing ones (Informant 8, personal communication, January 2011). This alternative training dive site features training aids including swim-throughs or caves, rings, hoops, balance beams, hover weights, permanent CESA lines, navigation check points, search and recovery objects, as well as Reef Check Belt Transects (Figure 6.5). These structures not only help divers in their buoyancy control, but also provide a suitable environment for fish aggregates and coral nursery (Cantrell, 2009).

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Figure 6.5 Preparation of various sculptures in the Buoyancy World Project (top) and the use of the dive site by SCUBA divers underwater (bottom).
Source: Save Koh Tao member (2010)

The investment cost of this project has been estimated at half a million THB (16,400 USD), which was gathered from sponsorship, donation, together with fund raising events. Participating dive operators must submit a structure design, and a commitment fee of 8,000 THB (262 USD) to the SKTMB. The group members and volunteers worked closely with advisors and partners from the DMCR, the DOF, the IUCN Global Marine Program, MU, PSU, and RU. As indicated by the selected
dive operators, most of them use the Buoyancy World more than once a week and they agreed that it helps in buoyancy control for dive students (Informant 8, personal communication, January 2011).

6.5.1.3 Shipwrecks

Most of Koh Tao’s alternative dive sites are in shallow waters appropriate for dive beginners, but there are many more advanced SCUBA divers who prefer dive sites of a greater depth and more exciting. MV Trident and HTMS Sattakut wrecks provide such experience as alternatives to the natural sites. MV Trident, a 29m long, 8m high, 6m wide steel vessel, was decommissioned in 2010. The ship was purchased by the SKT and sunk off Shark Island. It is located at approximately 35m depth and is safe for recreational limits. Another wreck, the HTMS Sattakut, was a World War II military vessel and a Royal Thai Navy Vessel for many years. It was paid for and set up by the Petroleum Authority of Thailand (PTT) and the DMCR. This wreck was sunk in 2011 by the Royal Thai Navy just 300m off Sairee beach. The bottom sits at about 28 m and the top at 18 m. Both of the wrecks not only provide a resource for wreck dive training, but also ease congestion on nearby dive sites (Save Koh Tao, 2011).

6.5.2 Coral Reef Conservation and Restoration

6.5.2.1 Ecological Monitoring Program (EMP)

The Ecological Monitoring Program (EMP) is a coral reef research program started by the CPAD foundation and carried forth by the SKT and the individual dive shops. The EMP is designed to provide a detailed record of the health, abundance and biodiversity of the coral reefs surrounding Koh Tao. It is based on the standards and techniques of the CPAD Foundation, Reef Watch International and Reef Check (Brongers & Schalk, 2011). Since 2006, reef surveys have been conducted monthly in eight of the bays around the island, both shallow and deep locations. Currently, the certification courses for interested persons [divers only] can be undertaken at three dive operators. For non-divers, there are opportunities to participate in water sampling and analysis. Regular water samples from bays around the island and freshwater streams in the main villages are analysed and sent to the responsible authority in Chumporn province (the REO14). Volunteers are required to enter data into an excel format file and submit to the SKT. In many cases, photo-documentation [with date and location] is also required in order to create a changes timeline on Koh Tao (Marine Conservation Koh Tao, 2011b). The data collected through this program is valuable to the protection and restoration of local coral reefs and also to local and regional government bodies for future project planning (Eco Koh Tao, 2010). A few examples of the EMP activities are shown in Figure 6.6.
6.5.2.2 Hin Fai BioRock

Biorock is an artificial reef structure that uses low voltage electrical current to improve the growing conditions for corals and other reef organisms. It was developed in 1988 by an architect and marine scientist, Prof. Wolf H. Hilbertz and a coral ecologist, Dr. Thomas J. Goreau with a focus on coral propagation, preservation of corals and coral restoration (Biorock Inc, 2006). This process uses electrolysis of sea water to lower the surrounding water pH level which causes minerals to precipitate out and collect on the structure. Corals, clams, and other calcium carbonate secreting organisms growing on the structure are able to grow on an average of 3 to 5 times faster, and in a wider range of environmental conditions, such as warmer, more acidic, or more nutrient rich waters (Marine Conservation Koh Tao, 2009a).
Since 2005, the local community has tested the applicability of BioRock technology through a small pilot project built by the (now disbanded) KTDOC and BioRock Thailand. This project was initiated in response to the mass coral bleaching event of 1998 which killed almost 100% of Koh Tao corals in Shark Bay and Ao Taa Chaa. With the success of the pilot project, a larger BioRock was constructed in 2008 at Hin Fai aiming to function as an eco-attraction that helps raise awareness amongst tourists. Approximately 100 volunteers from seventeen local dive operators, community members, along with the SKT helped to locate the almost 1,000 m$^2$ of BioRock structure underwater (Figure 6.7). Components such as the power source, anodes, and wiring were installed by engineers from BioRock Technologies Inc. and the volunteers.

Figure 6.7 Preparation of BioRock (top left); the deployment of BioRock (bottom left) and the BioRock underwater (right).

Source: Save Koh Tao member (2009)

The one million Baht investment was funded by the local businesses through the SKT. Throughout 2011, volunteers have worked at the site to transplant dying and broken coral fragments onto the structures for rehabilitation, collecting growth rates of the corals and assessing the percentage cover of the corals on the structure (Eco Koh Tao, 2010). According to the interviews, the project was a great success and has the added benefit of pulling together and educating the local community (Informant 8, Informant 10 and Informant 17, personal communication, January 2011).
6.5.2.3 Adopt-A-Reef Program

During the summer of 2010, the El Niño Southern Oscillation (ENSO) caused high seawater temperatures over the northern Indian Ocean and Southeast Asia regions triggering mass bleaching and coral death (Cook, 2010). To help recover the local coral resources, a coral nursery program was initiated by the SKT with the support from the PSU and the DMCR. Five local dive operators voluntarily participated in the program to put the nurseries in a total of seven Adopt-A-Reef sites. Each dive operator was responsible for looking after their reef area with various research and restoration methods (Save Koh Tao, 2011). A total of 48 coral nursery trays were constructed and deployed over a week, with the assistance of local divers and community members. Workshops were organized to ensure that each of the dive operators had proper knowledge about coral transfer and preparation techniques, and how to collect data on the growth of the transferred fragments. The growth rates of corals comparing between sites, methods and season of the year are analyzed over time. As of 2011, there was 30% coral mortality at all Adopt-A-Reef sites due to Crown of Thorn Starfish and wave action. Although the outcome of this project is not finalised, hundreds of corals are budding to a proper size and have been transplanted to the surrounding dive areas (Scott, 2011a). In addition to the Adopt-A-Reef sites, there are other coral nurseries including Tanote Reef Ball and Suan Olan in the South Eastern side of the island (Save Koh Tao, 2011).

6.5.3 Marine Life Conservation

6.5.3.1 Giant Clam Nursery

Giant clams (*Tridacna maxima*, *T. squamosa*, and *T. crocea*) are bivalve mollusks which live in coral reefs areas restricted to the tropical Indo-Pacific. A living clam is ecologically important to the health and biodiversity of coral reefs due to its role in removing suspended and soluble nutrients from sea water through filter feeding (Prachuap Khiri Khan Coastal Fisheries Research and Development Center, 2004). Giant clams are considered a protected species under the Thai Wildlife Preservation and Protection Act, B.E. 2535 (1992) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix II since 1985. It is illegal to harvest, relocate, sell, buy, or posses a giant clam or its shell. However, this law has rarely been enforced on Koh Tao as evidenced by shells being used for decoration in the restaurants and resorts (Field Observation). According to residents, giant clams are no longer harvested because Koh Tao residents are now aware of the importance of them to coral reefs.

The Koh Tao Giant Clam Nursery and Restoration project was initiated in February 2009 with an attempt to increase the abundance and diversity of giant clams. The local government, Koh Tao
TAO, began working with the SKT in this project by funding 100,000 THB (3,280 USD). This long-term project is being managed by the SKT under the guidance and supervision of the Prechuap Khiri Khan Coastal Fisheries Research and Development Centre. The 1,000 clams had been bred and raised in captivity at the Prachuap Khiri Khan centre until one year old. In March 2009, these juvenile clams were donated to the SKT. These clams have been placed into 10 large cages in the sea where they are allowed to grow up before being transplanted to natural reef areas around the island. In April 2009 divers counted the clams and found approximately 457 living clams in the cages, indicating a 54% mortality rate for the small juveniles in the first 3.5 weeks of the project. In the cage with the larger clams there was much higher success rate with only one fatality. According to the SKTMB, a high mortality rate was expected in projects such as this, and one of the main goals of this project is to refine and develop techniques to improve the success of future projects (Marine Conservation Koh Tao, 2009b).

6.5.3.2 Sea Turtle Head-start/Release

In addition to the accidental capture and drowning of turtles from fishing operations, the overexploitation for Asian food markets is the largest factor contributing to a decreased number of sea turtles throughout the Asian continent (Engstrom, Shaffer, & McCord, 2002). Moreover, artificial light (e.g. tourism activities and development in coastal areas) can cause disorientation to both adult turtles and hatchlings, making them unable to locate the sea (South Carolina Sea Turtle Conservation Program, 2009). According to previous studies in the Gulf of Thailand, only 1 in 1,000 baby sea turtles survive to the reproductive age. Most of them are eaten by predators in the first few months, caught in fishing nets or choked by litter and pollution while still juveniles (Settle, 1995). Figure 6.8 shows sea turtles that were found dead in Chalok Baan Kao in July 2009 and May 2012.

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Figure 6.8 A dead sea turtle running aground (left) and an autopsy of the sea turtle showing the stomach contents of plastic, rope and fishing net (right).

*Source: Save Koh Tao Facebook Page (2009, 2012)*
Turtle Head-start Program of the SKT was designed in 2008 to protect and care for the turtles for about 9 months to a year after hatching in order to ensure that they are no longer vulnerable to predators such as birds and other aquatic organisms. The baby sea turtles were moved to the artificial enclosure which was constructed between rocks in a secluded bay with a bamboo wall, allowing water to flow in and out of the enclosure naturally. These baby sea turtles were threatened by octopuses, resulting in a high mortality rate. A few months later, the bamboo enclosure was damaged by a storm surge, releasing the 18 baby turtles into the ocean and prematurely terminated the 2008 project (Marine Conservation Koh Tao, 2009b).

In 2009, the second attempt for sea turtle conservation was made using an artificial enclosure which was constructed a few metres from the sea. A pool was built using stones and concrete, with a bamboo roof over the top to prevent the build-up heat. The sea water could circulate constantly; flushing out the pool and allowing a natural exchange of algae and plankton. The second attempt had lower mortality of sea turtles compared to the 2008 project; however, they were stolen before the SKT could release them back to the ocean (Eco Koh Tao, 2010).

The SKT had learned its lessons from the previous attempts and sought the external professional support to achieve the project goal (Informant 8, personal communication, January 2011). The SKT contacted the Central Gulf of Thailand Marine and Coastal Resources Research Centre in Chumpon province [under the jurisdiction of the DMCR] after a mother turtle was seen laying eggs on Lamtien Beach in July 2009. Baby turtles from the SKT and turtle eggs from the beach were relocated to a turtle nursery in the Chumpon centre. After one year, the turtles were returned to Koh Tao and released into the ocean during the annual Koh Tao Underwater World Festival (Figure 6.9).

Figure 6.9 Sea turtle hatching (left); sea turtle nursery (centre) and sea turtle release (right).  
Source: Save Koh Tao member (2010)
6.5.3.3 Underwater Life Sightings Database

There are seven existing species of marine turtles globally. All of which are listed in Appendix I of the CITES - three are classified as critically endangered by the IUCN and a further three are classified as endangered. Five of the seven species are found around the globe (mainly in tropical and subtropical waters) whilst 2 species have relatively restricted ranges: Kemp's ridley occurs mainly in the Gulf of Mexico and the flatback turtle around northern Australia and southern Papua New Guinea (WWF, 2012). Around Koh Tao, Hawksbill turtles, Green turtles, and Olive Ridley turtles are the most commonly seen.

In 2009 the SKT established the Underwater Life Sightings Program, proposing to record turtle and whale shark sightings around the island. All sightings have been reported by observers through the online SKTMB database. For turtle sightings report, the time and date of sighting, observer name, location, depth, species, approximate size and condition noted by observers are required. Between February 2009 and May 2011 there have been 95 entries into the turtle database. Over one third (32%) were sighted near White Rock with a majority of them being Hawksbill turtles (78%) (Figure 6.10) (Marine Conservation Koh Tao, 2011a).

![NOTE: This figure/table/image has been removed to comply with copyright regulations. It is included in the print copy of the thesis held by the University of Adelaide Library.](image)

Figure 6.10 Turtle sightings during 2009 – 2011 by location (left) and by species (right).

Source: After Eco Koh Tao (2010) and Marine Conservation Koh Tao (2011a)

There has been little information about whale sharks primarily due to the difficulty in conducting field research. Researchers estimated that whale sharks spend the majority of their lives in depths below 980m. The trade of their meat, oil and fins has led to the declining numbers of shark worldwide (Eco Koh Tao, 2010; Green Fins, 2010). Fishing for whale sharks was banned in Thailand under Section 32 (7) of the Fishing Act B. E. 2490 in 2000. Internationally, there are a number of relevant policies protecting the whale sharks including the CITES Appendix II 2002; the Convention of Migratory Species (CMS) Appendix II 2004; the United Nations Convention on the Law of the Sea (UNCLOS)
Annex I (Highly Migratory Species); and the Convention of Biological Diversity (CBD) (Shark Trust, 2012).

Around Koh Tao, whale sharks have been sighted year round on popular dive sites including Chumpon Pinnacle, Southwest, Shark Island, No Name, and Twins. For whale shark sightings report, the required information includes time and date of encounter, approximate duration of encounter, sighting location, length of whale shark, depth, male/female, behaviour, scars/marks, photographs taken and the observers’ name. To date, whale sharks have been reported to have 30-120 minutes encounter, 4-18 m in length, sighted at 20-40 m depth, and most have no marks or scars (Marine Conservation Koh Tao, 2011a).

6.5.4 Rubbish and Waste Management

6.5.4.1 Underwater and Beach Clean-ups

Clean-up is one of the Project AWARE campaigns to promote environmental awareness amongst PADI divers around the world. Although PADI does not usually fund the cleanups, they offer packages and support to the organizers with advice and standards to follow (Flumerfelt, 2000). On Koh Tao, both underwater and beach clean-ups have been organized by the SKT since 2008 with the participation of volunteers from dive operators, community members as well as tourists. Each month a clean-up is hosted in a different location around the island. The participants can reach up to 12 dive operators and sometimes with more than 150 divers in the water (Eco Koh Tao, 2010). At the end of the day the collected rubbish is sorted and weighed. Plastic products are most abundant when sorted by count, whilst ropes and nets make up the majority by weight. Other substances found include glass bottles, tires, electrical appliances, foam and other household utensil (Marine Conservation Koh Tao, 2009b) (Figure 6.11).

6.5.4.2 Say ‘NO’ to Plastic and Foam Campaign

Rubbish overload is the greatest tourism impact on Koh Tao, as perceived by the residents (refer to Chapter 3). Since 2009, the SKT has encouraged residents, dive operators, hotel/resort accommodations, and tourists to reduce solid waste on the island (Tawaen, 2009). The campaign includes: reducing the use of plastic and Styrofoam; buying products with recycled content; and using microorganism to decompose organic waste. This campaign had an influence on the major suppliers of plastic bags to Koh Tao, resulting in the conversion to bio-degradable bags. Dive operators and tourist accommodation help raise public awareness through education booklets, campaign posters, T-shirts, cloth and canvas bags, and activities in public events (Informant 9 and Informant 12, personal communication, November 2010).
According to informants, some of the tourist accommodation and dive operators provide free reusable cloth bags for tourists during their stay on Koh Tao but some reusable bags are available to purchase. A few dive operators teach their customers how to refuse plastic materials in Thai, for instance, “I don’t want a plastic bag” “I don’t want a straw” “I want a glass not a plastic cup”. Supermarkets ask customers if they would like to have a plastic bag and a few of them sell it at 50 satang (0.02 USD). Water refill stations are available around the island for anyone to refill their water bottles instead of buying a new one. Furthermore, tourists can refill their shampoo, conditioner and body cleanser at Avalon, the Thai herbal extract business, located in Mae Haad beach. Figure 6.12 presents a few examples of campaign posters gathered from various dive operators, tourist accommodations, and restaurants on Koh Tao.

In addition to the local efforts, the IUCN Thailand Program implemented a one-year participatory waste management project for healthy coral reefs on Koh Tao (during the data collection period of this research). The project was funded by Chevron Thailand Exploration and Production Ltd., aiming to improve waste management practices on the island through a participatory process of key stakeholders. The activities involved field survey, excursion to other well-managed sites, education
and campaign, and establishing local regulations in relation to wastewater treatment and rubbish management. This project was expanded and is still on-going. The evaluation report has yet to be finalized.

Figure 6.12 Campaign posters gathered from various dive operators and tourist accommodations regarding ‘Say No to Plastic Campaign’ on Koh Tao.

Source: Author

6.5.4.3 Effective Microorganisms (EM)

The use of Effective Microorganisms (EM) has been successfully adopted by most of the Koh Tao hotel/resort accommodation and restaurants (Informant 11, personal communication, November 2010). EM is a combination of various beneficial naturally occurring micro-organisms. It contains photosynthetic bacteria, lactic acid bacteria and yeast. According to Koh Tao EM users, the potential benefits of EM include the recycling of kitchen waste and turning it into valuable organic material; turning disease-inducing soil to disease-suppressing soil; fertilizing flowers and plants; cleaning floors and swimming pools; treating wastewater and septic systems; and killing odour in toilets and on dive boats. The EM solution can be made at home from waste fruits and vegetables, EM molasses, and fresh water. The mixture of the three ingredients has to be made in the correct ratio in a container with a lid. The local-made EM products not only results in cost savings, but also takes the pressure off the island’s waste disposal service (Marine Conservation Koh Tao, 2009b).
6.5.5 Environmental Education and Awareness

6.5.5.1 Marine Resource Management (MRM)

Marine Resource Management (MRM) is Koh Tao’s distinctive specialty course approved by PADI aiming to improve environmental awareness and promote appropriate behaviors to divers visiting coral reefs. This in-depth professional development program is a 5-day course involving daily classroom and in-water training. It focuses on the ecology of coral environments as well as the local, regional, and global threats. In addition to the theoretical nature of coral reefs, it endeavors to provide practical experience in managing coral reef restoration, including data collection, reef restoration techniques, and developing education and awareness campaigns. No special prerequisites are required to enroll in the program (Big Blue Conservation Koh Tao, 2012; Crystal Dive Koh Tao, 2010; Eco Koh Tao, 2011). Based on the dive operators’ experience, participants had various levels of experience in SCUBA diving, but most notably, they were enthusiastic to become eco-friendly divers (Informant 10, personal communication, January 2011).

Apart from the MRM, there are similar courses offered for SCUBA dive tourists such as the Reef Conservation Program and the Centre for Oceanic Research and Education (CORE) Environmental Training Course. The Reef Conservation Program is available from one day up to four weeks. It is designed not to teach students how to dive, but how to interact with the marine environment in a positive way or so called ecological friendly. Through this course, students will become proficient in coral reef ecology and restoration techniques, and will be offered opportunities to participate in the existing Koh Tao conservation activities (New Heaven Dive School Koh Tao, 2011). Recently, CORE offered the Research Dive Courses and Environmental Training in collaboration with one of the island’s dive operators (Buddha View Dive Resort Koh Tao, 2011). Each of the programs mentioned above offers distinctive course structures; however, they have similar aims to encourage and promote a strong environmental awareness and understanding amongst new divers as well as other dive professionals.

According to the interviews with selected dive operators, there were over 250 students doing the marine conservation course in 2010. The informants stated that they preferred Koh Tao to be seen as the place to acquire knowledge regarding marine conservation, not only to learn how to dive. Currently there are five dive operators offering the course and internship for up to six months. Participants in these courses in the past few years included marine biology students, tourism and hospitality students, marine science students, and environmental studies students both bachelor and master degrees from across the world. Before completing the course, students are required to choose the topic they are interested in and then produce education materials about it. These
materials involved poster, article, and pamphlet (Informant 8, personal communication, January 2011).

6.5.5.2 Young Environmentalist Program

The Young Environmentalist Program is based on a philosophy that “if we give them a fish, they will survive for that day, but if we teach them how to dive, they will be able to make a living for the rest of their lives” (Marine Conservation Koh Tao, 2011c). Every weekend since 2008, a few dive operators have organized swimming courses as well as dive introduction programs for the local children as their first step in getting involved in coral reef conservation. This environmental and educational program is organized by the Secret Garden Conservation in cooperation with the local government, primary and nursery school. It was expected that knowing how to dive would provide children an opportunity to enjoy the beauty of the environment and motivate them to protect it. This group, together with the SKT Education Branch plays a significant role in the local education. Environmental education was included into the primary and secondary school curriculum. It has potential to create future careers in the dive industry, and also reduce the influx of skilled professionals from outside (Marine Conservation Koh Tao, 2011c).

This project is based in Mae Haad but volunteers can apply online from any part of the world. The volunteers have their orientation program in Bangkok before departing to Koh Tao. Their shared accommodation is provided, but without living allowance. These volunteers are involved in a number of activities such as environmental research and surveys, beach clean-up along with Secret Garden weekly activities, such as educating children outside their school time. Volunteers dedicate one or two hours a week to play with the children, to forward their skills, and to pass on some good conservation behaviours. The volunteers meet with the project coordinator regularly to learn basic marine ecosystems, discuss the assigned project and potential activities for children, as well as write a weekly diary of their experiences to pass on (information gathered from various internet sources). Figure 6.13 illustrates examples of some activities conducted in this program.

6.5.5.3 The Community Communication Channel

Koh Tao Post was first published in 2009, aiming to disseminate information and knowledge as well as to exchange attitudes towards social, environmental, educational, and cultural issues amongst the Koh Tao community members (Informant 19, personal communication, November 2010). This local newspaper targeted 80% residents and 20% outsiders (tourists and neighboring islands). Its primary goal was to promote a participatory process in sustaining the Koh Tao long-term diving destination (Koh Tao Ozone Co. Ltd, 2011). The bilingual (English-Thai) newspaper was issued fortnightly, and
CHAPTER 6

contained interviews with various stakeholders relating to local social and cultural issues; socially and environmentally responsible practices for dive businesses; knowledge of coastal and marine environments; entertainment and tourism; the Save Koh Tao activities; and event calendar (see example in Figure 6.14). Informant 8, Informant 17 and Informant 19 (personal communication, November 2010 to January 2011) stated that after the production cost, all funds are dedicated to the SKT conservation projects and activities.

Figure 6.13 An outdoor lecture on environmental conservation (left); Children participating in the swimming class in the Young Environmentalist Program (top centre and top right); Activities for children (bottom centre); Volunteers meeting (bottom right).


In addition to the local newspaper, the SKT and the SKTMB have created an online social network pages named ‘Save Koh Tao’ and ‘Marine Conservation Koh Tao’ as another communication channel. As of May 2012, there are 306 members in Save Koh Tao group and 1,342 members in the Marine Conservation Koh Tao group. Members of these online social networks are from different nations and states across the world, including people who have been to the island, people who live there, people who work in similar conservation projects elsewhere, and potential visitors to Koh Tao. The online webpage allows the SKT and the SKTMB to disseminate their projects and publicize the up-to-date activities calendar. It acts as a platform for members to exchange knowledge and experience relating to SCUBA diving and conservation efforts; and also provides an opportunity to post pictures or videos of particular incident or unusual sightings around the island (Personal Observation) (Figure 6.15).
In order to effectively improve tourist behavior towards environmentally and socially responsible tourism appropriate to Koh Tao, the SKT has recently published a ‘Guide for Koh Tao Guests’ booklet. The booklet includes a brief description about the SKT; how to join the Group; the conservation calendar; current environmental and social projects; messages from locals and residents; Do's and Don'ts; wildlife guide; map of Koh Tao; historical background of the island; geography and climate; important numbers and contacts; and a list of sponsors/partners (Marine Conservation Koh Tao Facebook Page, 2012). The best way for environmentally concerned tourists to get involved in local activities is to talk to the representative of the SKT in order to obtain the most up-to-date schedule. All conservation activities and community movements are presented in the Marine Branch Meetings at 7pm on the 5th of every month. The meetings perform as another communication channel for the SKT participants and also a platform to exchange ideas for the public (Informant 8, personal communication, January 2011).
Figure 6.15 A few examples of posts on the Save Koh Tao and the Save Koh Tao Marine Conservation Facebook Pages, showing shared information, incident report, and upcoming event update.

Source: Save Koh Tao Facebook Page (2012) and Marine Conservation Koh Tao Facebook Page (2012)

6.5.5.4 Festivals and Dissemination Materials

According to Informant 17 (personal communication, January 2011), Koh Tao Underwater World Festival was first held in 2003 in order to raise money for the SKT, and to increase environmental awareness amongst tourists, businesses as well as residents. Organizing the Festival and getting people actively involved were a great challenge for the first attempt. Effective planning, sufficient financial resource, staff, including clear roles and responsibilities of participants were the lessons learned for the second Koh Tao Festival in 2005. Since then the Festival has become an annual event, which was attended by more than 10,000 visitors over the 2 day period. The main goals were to promote the island, increase environmental awareness and marine education and to present to the world an international island community living and working in harmony. In 2005, 28 dive centres on Koh Tao and 722 divers from 40 nations gathered at Mae Haad beach to participate in the underwater activities. Their attempt broke the previous record of 592 divers in Durban South Africa in 2001, and they have become the new official Guinness World Record holders for “Most people SCUBA diving simultaneously” (PADI Asia Pacific, 2007). Activities in the Festival include a parade;
turtle and giant clams release; mooring buoys survey, maintenance and replacement; land and underwater clean-ups; education booths and workshops (e.g. how to make EM, how to make natural products such as shampoo, conditioner, cleaning solution and insect repellent); traditional food contest; kids corner; recycled-material beauty contest; game and raffle; and live music. Furthermore, Koh Tao organizes a film festival to go along with the day time environmental activities. Local businesses, dive operators, and individuals are encouraged to submit a movie that is made and using footage filmed on Koh Tao. The film is expected to deliver messages, and knowledge and awareness to the audiences (Marine Conservation Koh Tao, 2009b). All money raised through the event goes directly towards the three Branches of the SKT (Marine Conservation Koh Tao Facebook Page, 2012). A few snapshots from the Koh Tao Festival can be seen in Figure 6.16.

Figure 6.16 The Say No to Plastic Campaign parade (top left); Education booth (top right); Live concert (bottom left); Recycled-material Beauty Contest (bottom centre); and Save Koh Tao merchandise booth (bottom right).


Apart from the annual Festival, there is a wide range of dissemination materials to promote dive tourism and local conservation efforts, including the website of the Save Koh Tao and the Marine Branch, websites of individual dive operators, websites of travel agencies around the world, travel magazines, booklets, brochures, and the SKT merchandise souvenirs. The SKTMB website provides background information about the conservation group, current projects, volunteer opportunities,
previous monthly meeting presentations, and a list of dive operators actively involved in the SKTMB projects. The day-to-day operations and management of the SKT, together with updates on local dive operators and Koh Tao community can be followed on their Facebook Pages. Moreover, materials such as mini-booklets and brochures have now paid greater attention to sustainable approaches, rather than focusing only on travel information, marketing, hospitality service and coral reef experience. These recent materials contain basic knowledge of coral reef ecosystems, eco-friendly dive tourism, codes of practices for divers, local conservation efforts and volunteer opportunities (field observation).

6.6 COMMUNITY PERCEPTION TOWARDS THE LOCAL PARTNERSHIP

Most informants showed positive attitudes towards the local partnership, particularly on the opportunities it has offered. The SKT provides space for people to discuss about issues facing their lives as well as their businesses. The informants indicated that the SKT provides an opportunity to bring stakeholders together and enable action in concert. A high proportion of informants perceived that the SKT has been successful in clearly articulating its objectives. It was seen as independent, objective, open and transparent. A majority of informants felt that the SKT members shared a similar goal and motivation to improve environmental and social states of the island. Comments regarding these aspects included:

They have clear objectives for managing natural resources, especially coral reefs. I know who is responsible for each branch of the SKT and what activities they do.

(Informant 18, personal communication, January 2011)

They have mutual understanding and heading to the same direction to improve the environmental quality.

(Informant 5, personal communication, January 2011)

According to the interviews, residents were satisfied with the roles and responsibilities of the SKT in managing the island. All members have a good understanding of each other’s roles and responsibilities. However, the Land Conservation Branch and the Education Branch were hardly mentioned by the informants, as compared to the Marine Branch. This indicates the strong focus of the SKT on SCUBA dive tourism and the management of coastal and marine resources.

One of the SKT members reported that every individual member has to pay membership fees of 5,000 to 10,000 THB annually, depending upon his/her capability or willingness to pay. This is often influenced by the business stability. In addition to the fees, they support monthly and annual
activities through manpower, materials (e.g. chairs, tables, beach umbrellas and tents), transportation, meeting rooms and conference venues, meals, and accommodations for external experts invited by the SKT. The members do not receive direct benefit, apart from the improved social and environmental conditions on the island in general.

The participation in the activities conducted by the SKT was completely on a voluntary basis. Any action taken by participants was in their own time and convenience. This voluntary nature of the partnership was seen as supportive as well as obstructive to the long-term management outcome. Of those who believed that it was the most effective mechanism to manage the Koh Tao coastal zone, these are a few examples from the interviews:

Voluntary-based is suitable for Koh Tao because we are busy with our own businesses.

(Informant 1, personal communication, January 2011)

People work together to save Koh Tao because they want to, nobody forces them to, ... and you see it results in huge power and influence over resource management.

(Informant 11, personal communication, January 2011)

Most informants were satisfied with the unconstituted body of the SKT as it provides a relaxed atmosphere for them (participants). This aspect was commented by one of the informants as:

There are no obligations to speak; we can consider the issues on our merits, not necessarily represent official positions of our dive operators.

(Informant 10, personal communication, January 2011)

However, some of the informants expressed concern regarding the uncertain and unequal commitment from the participants to become actively involved. It is felt by informants that the voluntary nature of the SKT has led to limited involvement, especially when most of the residents have their own businesses. As voluntary members, any action taken by participants was in their own time (or that of their employers), which can restrict availability and commitment. The following statements support the degree of involvement and the discontinuity of participation:

Last year (2010) there were only 4-5 foreigners joined me for land cleanups where the previous 2 years there were tons of people, so it’s kind of up and down.

(Informant 8, personal communication, January 2011)

I find it very hard to join the meetings myself because I have a resort, a ferry company, a restaurant and a dive shop to take care of, so I can only help in
manpower by sending some of my workers to participate in the conservation activities.

(Informant 1, personal communication, January 2011)

The reasons why people don’t participate are probably because they have limited time or they are not financially stable. You need to have passion and social responsibility. ... When I helped in building check dams in the land conservation project, I had to leave my business for a month and let my employees work on my behalf... how many people are willing to do that?.

(Informant 17, personal communication, January 2011)

The reduced participation in the SKT activities in year 2010 was the most common complaint. According to informants, most of the tourism businesses on the island suffered an economic crisis. Informant 8 (personal communication, January 2011) reported that Koh Samui had 40% drop in visitors and Koh Tao had almost the same fluctuation of people. Interviews with a restaurant owner and a general manager of a selected dive operator revealed that there were a lot of tourists visiting the island on a regular basis, but with less money to spend. These tourists tended to seek lower budget accommodation which subsequently affects the luxurious ones. A few comments relating this issue are:

Food and restaurants and dive shops are doing alright but the expensive resorts are very difficult.

(Informant 12, personal communication, January 2011)

The euro was down, dollar was down so people come here and the travel budget was just broken into half.

(Informant 9, personal communication, November 2010)

According to the above statements, the main obstacle to attend the SKT activities in 2010 was likely to be the fact that people had to take care of their business in response to the economic crisis. However, a few comments from the interviews indicated that there was often the same group of people participating in every activity. Concurrently, there was the same group of people that never assisted in any means. The statements supporting this argument include:

Key persons who put so much effort are always the same faces. When things go wrong, they feel discouraged and have not much motivation left to carry on.

(Informant 10, personal communication, January 2011)

People who protect, keep protecting; and people who destroy, keep destroying.

(Informant 2, personal communication, January 2011)
It is always us. We want to see new faces too.

(Informant 17, personal communication, January 2011)

Having no support from the community makes it so hard … it’s actually discouraging.

(Informant 8, personal communication, January 2011)

The comments mentioned above include a lack of support from the Thai community on the island. Most of the underwater clean-ups has been conducted by foreigners (dive masters, dive instructors, dive tourists). Similar to the monthly Marine Branch Meetings, nearly all of participants were foreigners. As indicated in the interviews with foreigners, every meeting has been very useful and contained a lot of information. Such comments were not provided by Thai informants as none of them (interviewees) has participated in these meetings.

Although Koh Tao is a culturally diverse society suitable for any nationalities, the entire presentation and discussion in English can be difficult. In this particular case, language can be seen as another barrier to disseminate information and convey messages. Comments from both the Thai and foreigners in relation to this matter are:

Most of Thai people here can speak English but not all of us can read and understand the whole discussion.

(Informant 7, personal communication, January 2011)

There are only a few Thai divers on the island and only a few of which have enough knowledge in marine conservation, especially when it’s in English.

(Informant 13, personal communication, January 2011)

For foreign community I can communicate with them. We can educate them but when it turns to Thai people - that’s when it’s difficult. We do great projects which benefit everybody but they don’t know what we are doing. They don’t come to the meetings because the presentations are in English.

(Informant 8, personal communication, January 2011)

According to the interviews, there has never been an attempt to conduct the presentations in both languages due to two major reasons: 1) the strength of the Marine Branch relied on foreigners and 2) the Save Koh Tao group meetings were already conducted in Thai language. Often, Thai residents did not attend the Save Koh Tao Marine Branch meetings and foreign residents did not attend the general Save Koh Tao meetings. However, there were a few key persons from the Thai community with a good command of English who participated in regular meetings and conveyed messages between the two communities.
In comparing the meetings of the SKT and the SKTMB, the interview results demonstrated significant differences. Participants in the Marine Branch meetings indicated that the meetings occurred every month regardless of who was busy or how many people could attend, whereas participants in the Save Koh Tao meetings indicated that the meetings occurred only when everybody could attend. In addition, the Marine Branch meetings were open for public, whilst the SKT meetings were exclusive with the invited participants. Microsoft PowerPoint was used as a media to present information in the Marine Branch meetings. All presentations were saved and uploaded in PDF format on the SKTMB website (www.marineconservationkohtao.com). Based on the interviews, these differed from the SKT meetings, where simple public speaking technique was used, and all meeting minutes were kept in hard copy. The summary of all meetings were available in Thai and could be obtained on request.

The only one comment regarding the monthly meetings of the SKTMB was an inactive involvement of some dive operators. On the other hand, there were a few critical comments on the SKT meetings in terms of the participants’ interests, an equal right to express the views, levels of participation, and the structure of the meetings. These comments were as follows:

They should include all sectors including taxi car, taxi boat, fishermen, small retail shops ... not only the big and wealthy businesses, because those people partially cause destruction of natural resources and have major income from tourism industry too. Every opinion should be listened and treated equally.

(Informant 18, personal communication, January 2011)

The meetings are unstructured. They become a talking forum and lose sight of its real aims. In some cases, they end up being ineffective.

(Informant 10, personal communication, January 2011)

...yes, they invited us but most of the time we just sit there and listen to them, they never asked for our opinions.

(Informant 3, personal communication, January 2011)

I wish we could contribute something to the Save Koh Tao or at least were considered as an important stakeholder in managing Koh Tao too.

(Informant 4, personal communication, January 2011)

We want to be a part of the Save Koh Tao too, but they never make us feel that we are needed.

(Informant 5, personal communication, January 2011)

Despite a lack of sufficient communication between the two communities on a regular basis, they worked together effectively in big events such as the Koh Tao Underwater World Festival. During the
preparation for this yearly event, more communication amongst the two communities occurred. All projects conducted by the SKT (all three branches) throughout the year were presented in the Festival in the form of posters, booklets, pictures and films. This event helped promote tourism on Koh Tao, educate tourists and in turn create better understanding within the communities itself (Informant 17, personal communication, January 2011). Figure 6.17 illustrates community involvement (Thais and foreigners) in the local conservation activities throughout the year.

Figure 6.17 Community involvement in the mooring buoys installation workshop (top left); Preparation for the Festival (top right); Participation in the Global Warming Adaptation Workshop (bottom left); and Planting grass for erosion control (bottom right).


Although it appeared that there were a number of aspects to take into consideration for improvement, as indicated in the interviews with residents and also external experts, the outcome of the local partnership and cooperative effort is perceived to be more than 80% successful. A few examples of positive comments in terms of the SKT's capacity to involve a greater number of participants are:

The Save Koh Tao can get people getting together do something. With Save Koh Tao group we can get 150 people tried to plant grass and 80 divers in underwater clean-ups.

(Informant 8, personal communication, January 2011)
The dive operators that the Marine Branch is working with have made huge differences, it starts from nobody knows about marine conservation to now three dive operators have solid daily conservation program where they teach students just about marine conservation from 1-4 weeks.

(Informant 10, personal communication, January 2011)

Informants indicated that the SKT provided ground for enhanced knowledge and awareness, and improved environmental states of the island. They strongly believed that the environmental quality has been better mainly because of the work of the SKT. The interview results demonstrated the trust in the SKT. To them, the SKT has shown good achievements in improving appreciation of coastal and marine issues, promoting sustainable tourism concept amongst tourism businesses, as well as educating Koh Tao’s next generation. Comments below support their trust in the SKT:

Previously we had no idea about it (the need to protect natural resources and environment), but then the Save Koh Tao made us understand the importance of the healthy environments.

(Informant 2, personal communication, January 2011)

The Save Koh Tao has done a lot for Koh Tao. The environment is improving, especially marine environment.

(Informant 7, personal communication, January 2011)

We used to eat giant clams and turtle eggs. When I was six or seven, there were a lot of them. We played with turtle eggs; we just threw them to each other. Nobody told us that we needed to protect them … Now there are only a few mother turtles laying eggs on the beach. We have learned from the Save Koh Tao and we'll never do that again.

(Informant 9, personal communication, November 2010)

Apart from the trust in the capacity to deal with the existing issues and deliver the goals to sustainable dive tourism development, the informants also demonstrated the trust in the SKT’s treasurer. As indicated in the interviews, two major reasons contributing to their trust to the account management of the SKT were: 1) all income and expenditure were recorded and publicized regularly and 2) the SKT treasurer was the highly respected person in the society [elected by the committee] and also believed to be the richest entrepreneur on the island. The community and individuals who were involved in the SKT activities honour this person with full trust. Previously, the yearly income and expenditure were reported in the local newspaper; however, it has now been posted on the online social network. Figure 6.18 presents the SKT account summaries on the Koh Tao Post and the Facebook Pages.
Figure 6.18 The account reports between March 2008 and January 2009 in the local newspaper (left); The income report from the 2012 Koh Tao Underwater World Festival on Facebook Page (right).

Source: Koh Tao Post issue 1 (2009) and Save Koh Tao Facebook Page (2012)

Most informants believed that the SKT has driven the island to its current state with the limited budget, and it would continue to do so. Hence, the short-term financial resource was not seen as problematic. Rather, the insecure financial future of the conservation group and the inequitable contributions from participants tended to pose significant concerns.

Another important finding from the interviews was that residents had greater trust in the SKT than the local government. They believed in the effectiveness of the SKT in identifying problems, getting people together, delivering good outcome and improving issues Koh Tao has been facing. In their
perceptions, these were far beyond the local government’s capacity. They felt that the local government lacked knowledgeable personnel and did not have sufficient capacity to deal with the problems. A few statements supporting this aspect include:

The Save Koh Tao is like a centre of the community where people can hold on to – without them, there will be no improvement.

(Informant 7, personal communication, January 2011)

People were looking at the Save Koh Tao group more than the local government. Yes of course it is good but if the Save Koh Tao continues that momentum so there is no reason for local government to try harder.

(Informant 8, personal communication, January 2011)

The local government officials are not knowledgeable, unable to prioritize problems, fail to allocate budgets in accordance with priorities, never implement effective plans or management schemes… and they cannot enforce anything.

(Informant 6, personal communication, January 2011)

The local government got funding support from the Tourism Authority of Thailand and you know how they used it … they built that stupid turtle monument with a big clock right in the middle of the road. It obstructs drivers from seeing cars coming, and nobody ever sees time from that clock. Plus, it’s written You’re Welcome instead of Welcome to Koh Tao … What a waste!.

(Informant 10, personal communication, January 2011)

Informants suggested that the local government should coordinate with the SKT group and provide more support to the SKT activities through manpower or funding contribution. They believed that the enhancement of the local government’s capacity in terms of sufficient knowledge, budget and staffing, adequate arrangements for enforcement, together with the involvement of other environmental-concerned individuals can lead to the future development of sustainable tourism on the island.

6.7 CHAPTER SUMMARY

This chapter provides an understanding of effective elements in building consensus to establish local partnerships in the management of coastal and marine resources in the SCUBA diving destination. The data in this study was conducted through secondary sources (mainly the SKT websites and reports), and through in-depth interviews with key informants. The results showed how significant the local initiatives have been in influencing the community awareness and understanding in terms of the economic and social linkage to the marine resources; the existing impacts from dive tourism and
associated development; the unsustainable resource use; and the responsiveness that a new system had to be developed.

The effort of Koh Tao community is a classic example of what can be achieved by a small island community through hard work, commitment and a tremendous joint effort. Although the ultimate success of these endeavours will only be proved over time, the positive aspects of these projects can be considered as the inspiration for active involvement in the island’s future. The next chapter will integrate the results from Chapter 3 to Chapter 6 and discuss the main findings of this study as compared to the previous relevant studies from elsewhere. In addition, Chapter 7 provides practical recommendations to the governance of the dive tourism based on the findings from this study.
CHAPTER 7
PATHWAYS TOWARD SUSTAINABLE DIVE TOURISM

This chapter presents a synthesis of results from the previous four chapters. The chapter begins with the importance of the dive tourism industry to the Koh Tao community, followed by the perceived negative impacts of dive tourism, the issues facing the dive operating businesses, and the role of dive operators and SCUBA divers in tourism as well as in the economic and ecological sustainability of coral reefs. Practical management strategies applicable for Koh Tao are proposed in the final section as a way forward to sustainable dive tourism.

7.1 IMPORTANCE OF THE DIVE TOURISM INDUSTRY TO KOH TAO

Unlike Belize in the Caribbean (Diedrich, 2007), Maldives in the Indian Ocean (Zulfa & Carlsen, 2011) and Palau in the Pacific (Poonian, Davis, & McNaughton, 2010; Vianna et al., 2011) where fishing and agriculture exist along with SCUBA dive tourism, the dive tourism industry on Koh Tao has become dominant over other land-based and marine-based industries. The results from this study (refer to Chapter 3) together with the previous study by Kornitsaranukul (2001) indicated the increased significance of the dive tourism industry to the Koh Tao community. The number of residents involving in tourism and deriving the majority of their income from it has almost doubled within the past ten years (78% in 2011 as compared to 42% in 2001). Moreover, this study found a rising number of skilled foreigners living on the island and working in the dive tourism sector during the last decade. This study provides an example of how the presence of tourism development can influence the importation of financial and social capital.

According to the 2006 TAT statistic records, Koh Tao gained national revenue from the dive tourism of over 2,000 million THB (66 million USD). Apart from the direct income, the tourism development has improved the well-being of the island’s residents, promoted higher standards of living, created employment and conditions of economic and social progress in the coastal communities. There was an increase in employment that was directly related to dive tourism such as tour guide and managerial positions; or in supporting industries like food production, retail suppliers, or transportation. Infrastructure including roads and other public spaces were developed and improved both for tourists and residents through increased tourism activity. In addition, a large number of international visitors encouraged the learning of new languages and cultural exchange between the two parties. One of the most important findings from this study was the influence of the high dependence upon the dive tourism on the conservation of natural resources, particularly coral reefs.
and marine wildlife which were capital assets of the tourism industry. Due to the fact that the economy of Koh Tao was exclusively centred on reef-based tourism and that tourism has triggered a number of changes in the coastal community, it is imperative for Koh Tao to sustainably manage its resources in order to sustain the long-term diving destination, and at the same time maximize benefits for the local residents.

### 7.2 NEGATIVE IMPACTS OF DIVE TOURISM

From the community perspective, the existence of physical-ecological, socio-demographic and economic impacts on Koh Tao was a result of the dive tourism activities and associated development. These negative impacts have been widely documented in various tourism destinations throughout the world over the last few decades (e.g. Beekhuis, 1981; Bohdanowicz, 2005; Buckley & Pannell, 1990; Diedrich, 2007; Dyson, 2010; Garrod & Gössling, 2008; Ismail & Turner, 2008; Kokkranikal et al., 2003; Roupheim & Inglis, 1997; Wilkinson, 1996; Wong, 1993). On Koh Tao, the residents' major concerns included the high cost of living, the high dependence on tourism, pollution, damage to coral reefs and marine life, degradation of aesthetic value, as well as an increase in accidents, drugs and crime. The study found that the physical-ecological and economic impacts were commonly recognized by the host community. However, the socio-demographic consequences were more likely to be noticed by the residents who did not work in the tourism industry, suggesting that the economic reliance on tourism might result in overlooking such impacts. Moreover, the study found that the severity of tourism impacts was perceived differently depending upon the characteristics of people. This finding is relatively similar to the studies by Byrd et al. (2009), and Getz and Timor (2012). In their studies as well as in this study, the existing impacts were prioritized according to the individual knowledge, interest, experience, and personal involvement in the particular issues.

Based on the fact that many local entrepreneurs on Koh Tao had more than one business, it is difficult to define how the prioritization of impacts was formed related specifically to a restaurant owner, a dive shop owner, or a resort owner. Despite various attitudes and interests of stakeholders, it was evident that tourism-induced pressure has contributed to substantial (may be irreversible) environmental degradation and social consequences to the coastal communities.

#### 7.2.1 Physical-ecological Impacts

The results from this study showed a significant trend of ongoing tourism growth on Koh Tao, which required the infrastructure and transport arrangements to support it. Tourism development has
largely been unplanned and spontaneous. This phenomenon is not different to other coastal tourism destinations; for instance, Candi Dasa in Bali, Indonesia (Hussey, 1989), Batu Ferringi in Penang, Malaysia (Tan, 1992), Fiji, Sanur Kua and Nusa Dua, and Maldives (UNESCAP, 1995), Hurgharda and Sharm-el-Sheikh in the Red Sea (Hall, 2001). Unplanned development, along with an increased number of both residents and visitors exerted a strong pressure over water resource use, energy use, and landscape transformation for infrastructure and tourism facilities. In fact, it was a major reason leading to visually unpleasant coastal structures, especially when viewed from the sea shoreward. The installation of modern tourism facilities and infrastructure were not compatible or in harmony or on a scale with the traditional buildings and were constructed too close to the shoreline. These structures often exacerbate erosion and necessitate the construction of protective structures, which often affect the coastal dynamics and led to further erosion (Wong, 2003).

It might not be feasible to totally eliminate the structures that have already been built. However, planning new construction can be controlled, and yearly maintenance and repair of the existing ones can be encouraged. As suggested by the studies related to landscape and architectural design (Environmental Research Institute Chulalongkorn University and the Bumi Kita Foundation, 2007; Kornitsaranukul, 2001), these problems can be mitigated as early as the design phase. The structural blueprint should correspond to the surrounding environment, available materials, as well as local culture.

Apart from the above impacts, an accumulation of waste and litter was seen as another important issue. Given a lack of control of the number of tourists along with the limitation of available space on the island, it was difficult for Koh Tao to effectively accommodate an increase of sewage load and solid waste. According to previous studies (DMCR, 2010; Ratanamanee et al., 2004; TISTR, 1994), waste production on Koh Tao has increased at a faster rate since 1990s. The daily waste production was reported at 527 kg in 1994, 4.6 tons in 2004, and 5.6 tons in 2010. Unless a control mechanism is introduced, the production of solid waste can rise up to 10.4 tons/day in 2021 and the wastewater production can reach 5,000 m$^3$/day in 2014. The results from the survey suggested that the collection of waste was more difficult in the monsoon season due to road damage. The amount of waste was found to be much higher in Mae Haad as compared to other areas. This indicated that the amount of waste produced was associated with the number of tourism facilities and tourists visiting the area. Thus, in order to minimize the accumulation of waste, it is important for Koh Tao to control the sources of pollution, improve drainage and the road system, and increase the availability of waste containers at the tourist accommodations, dive operators, restaurants, including public areas.
7.2.2 Economic Impacts

The small size and remoteness of Koh Tao has made the island reliant on imports from the mainland. All products including clothes, food and beverage, fruit and vegetable, household utilities, medicine, construction materials, diving gears, and vehicles were imported. Although it is surrounded by water, the lack of a local fishery has contributed to costly seafood cuisine. This high dependence on imports has not only led to the loss of self-dependency, but also a leakage of money to the nearby regions. As perceived by residents, the high cost of living was the most affected economic impact of the dive tourism development. In previous time, the goods, products and services for locals were available at a lower price compared to tourists. This pricing system was however in practice only until the late 1990s (Jamulitrat, 1999). The increase in visitor numbers, together with the higher income of residents has encouraged price standard adjustment. Since then, the costs of products and services, including transportation were raised in accord with the tourist standard. Subsequently, the higher cost of living has contributed to the money-economy growth, and at the same time led to the materialistic consumption of the local residents.

7.2.3 Socio-demographic Impacts

From the residents' perspective, the socio-demographic impacts of dive tourism (i.e. increase in drugs, accidents and crimes, crowding-out of locals, changes of residents lifestyles, abandonment of traditional activities, conflicts, and irritation of local population) were not as significant as the physical-ecological and the economic issues. Interestingly, these socio-demographic consequences were mostly reported by the residents who did not work in the tourism sector, but in the education, monetary, health or government sector. The results represented the influence of economic reliance on tourism to the perception of tourism impacts. From these findings, it can be assumed that residents who did not derive the majority of their income from tourism were likely to be more sensitive to the socio-demographic issues, whereas, residents who were dependent on tourism were more likely to recognize only impacts that had a direct effect on the operation of tourism business, or had potential to hold back the growth of dive tourism. In considering the results of this study, these issues might be overlooked and not necessitate the urgent need for control; however, the cumulative impacts can be problematic for the long-term future of the dive tourism industry.

7.3 COMPLIANCE OF DIVE OPERATORS TO ENVIRONMENTALLY SUSTAINABLE PRACTICES

This study not only investigated what type of practical action dive operators were taking towards environmentally sustainable management, but also explored the factors that influenced the adoption
of environmental responsible practices. The results from Chapter 4 indicated that the majority of dive operators on Koh Tao have complied with the codes of conduct for marine tourism providers as guided by the CORAL, the International Coral Reef Action Network (ICRAN), Project AWARE, Green Fins, the GBR, and the International Centre for Ecotourism Research. The most challenging issue as perceived by the dive operators was the minimization of wastewater and solid waste, followed by the use of alternative or clean-burning energy source, and the safe distance between boats and marine life. Based on the literature, there are a number of reasons that obstruct or facilitate the dive operating business to the adoption of such practices. In this study, factors affecting the marine tourism providers’ compliance to the codes of conduct included environmental knowledge and awareness, economic benefits, competitive advantage, and influence of relevant stakeholders.

7.3.1 Issues of Concern

As marine tourism associated with near-shore and coral reef environments has grown in recent years, sewage disposal from small vessels has become a significant concern within the tourism industry (Harriott, 2002). Similar to most of the island states and territories (Kokkranikal et al., 2003), the deposition of waste onto the island or the surrounding reefs caused by dumping sewage in the sea was a common problem. In the case of Koh Tao, the disposal of waste overboard was a result of the high cost and limited availability of better treatment systems and the limited dumping space on the island. However, the survey showed that a proportion of dive operators were able to appropriately respond to these issues. Based on the results from this study, the dive operator owners and/or managers were the key player(s) in implementing practical actions. In other words, the compliance of dive operators to the codes of conduct was greatly associated with the decision of the dive operator owner or mostly manager. This indicates that the knowledge, awareness, interests, values, and attitudes of the owner or manager should be given attention and taken into consideration in tourism planning and management.

One of the most common comments from dive operators in relation to the disposal of waste in the sea was that the waste from boats had no effect on the environments because it could be diluted and dispersed by wave actions and currents. This matter has been addressed in ‘a practical guide to good practice in the marine recreation sector’ by ICRAN (2005), suggesting that the impacts of untreated water discharge depend upon the flow characteristics of the water body and the proximity to sensitive marine features. Raw sewage overboard can cause a number of potentially harmful pollutants to the marine environment and human populations, unless the operation is performed in the open sea areas far away from land (ICRAN, 2005; UK Marine SAC, 1999). The limited information regarding the distance from the island where the untreated waste was released has
made it more difficult to conclude whether or not this action affected Koh Tao’s environments. Nevertheless, an increase in the number of visitors and changes in consumption patterns would imply increased waste disposal problems and ecological hazards.

The second most challenging issue for the dive operators related to the use of fuel for boat operators. Approximately half of the dive operators on Koh Tao relied on the fuel imported from the mainland, while the remainder used biodiesel produced on the island as an alternative or clean-burning energy source. According to the Coastal Preservation and Development Foundation (CPAD), biodiesel was introduced to Koh Tao in 2006 by CPAD and CU Biodiesel, an organization from the University of Colorado at Boulder. Used vegetable oil was collected from various sources on the island and processed into biodiesel. This biodiesel blend was usable for the compression-ignition (diesel) engines without major modifications (CPAD Foundation, 2006). As of 2004, over 8,000 litres (2,113 gallons) of diesel fuel were consumed every month by medium to large sized dive centres. In addition to this, there was a need for fuel supply to the power generators, well pumps, and long-tail boats. Given the rapid increase of marine tourism providers and visitors, this demand for fuel seemed to rise accordingly. In order to cope with the costly and unstable fuel price, and reduce impacts caused by burning and improper storage of diesel fuel on the island, it is important for Koh Tao to promote the use of an alternative or clean-burning technology among the marine tourism providers. If the import of diesel fuel can be reduced and replaced by the local-made biodiesel, it will not only help protect the fragile economy of the island, but also reduce toxic discharge into the marine environments. Concurrently, boat maintenance and responsible boat care should be undertaken on a regular basis.

The environmentally unsustainable practice towards marine wildlife was another challenge facing the boat operators. Although whale sharks are considered harmless and non-aggressive towards humans (Davis et al., 1997), positive encounters between divers and whale sharks in the water have been promoted by the Shark Trust, the Australian Department of Conservation and Land Management, PADI and the Project AWARE Foundation. These best practices for wildlife interaction include: do not attempt to touch, ride, or chase a whale shark; do not restrict normal movement or behaviour of the shark; maintain a minimum distance of three metres from the head and four metres from the tail of the whale sharks; no flash photography; and do not use underwater motorized diver propulsions near a whale shark. These guidelines are for both the safety of the divers and for the safety of the sharks. The findings from this study indicated good interactions between divers and whale sharks, but the difficulty for boat operators is in keeping safe distance from them. The reason behind this was a lack of information on the migratory patterns and breeding behaviour of whale sharks, which subsequently restricted boat captains to keeping an appropriate distance. However, as
reported by the dive operators, no collision has occurred since the swimming with whale shark activity started.

7.3.2 Influential Factors to the Adoption of Good Practices

Although the study showed that dive operators were aware of the environmental, economic and social consequences of their activities, the implementation of actions towards improved performance was still only beginning. In many developing countries, the authorities and planners fail to incorporate the sustainability principle into tourism planning and management partly because tourism operators perceive no commercial benefits in its implementation (Townsend, 2008). For this reason, it is imperative for coastal tourism researchers to investigate issues hindering the compliance to sustainable tourism practices and the reasons behind these issues. According to previous studies by Ayuso (2006) and Tepelus (2005), tour operators implement different types of actions depending upon a complex series of factors such as size of business, knowledge and awareness, ownership structure, management commitment, corporate organization, and market positioning. In the case of Koh Tao, the results from dive operators provided an insight into factors affecting the decision-making processes to comply with the codes of conduct. These issues are summarized in Table 7.1.

Table 7.1 Issues perceived as drivers and facilitators (or barriers) to the adoption of environmentally responsible practices.

<table>
<thead>
<tr>
<th>Drivers</th>
<th>Facilitating or obstructing factors</th>
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<tbody>
<tr>
<td>Recognition of environmental commitment</td>
<td>Knowledge of dive operator owner, manager, and staffs</td>
</tr>
<tr>
<td>Personal knowledge and awareness of dive operator manager</td>
<td>Interest of customers</td>
</tr>
<tr>
<td>Pressure of other competitive operators</td>
<td>Involvement of dive operator employees</td>
</tr>
<tr>
<td>Pressure of customers</td>
<td>Budgets and human resources</td>
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<tr>
<td>Estimated cost savings</td>
<td></td>
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<tr>
<td>Public image and competitive advantage</td>
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Source: Author, Adapted from Ayuso (2006) and Tepelus (2005)

The results suggested that the local Thai entrepreneurs had insufficient understanding of the sustainable tourism concept. This limited conceptual understanding of business sustainability and responsibility can be seen as one of the reasons for the low level of implementation of existing voluntary environmental practices. The relevance of dive centre managers' knowledge and
awareness, perceptions and values was revealed as a key player in decision making processes and the selective adoption of environmental practices in dive operating businesses.

Apart from the environmental concern of managers, dive operators adopted voluntary environmental practices in response to the pressure of environmental issues exerted by the general public, and based on competitive advantages (cost savings and image improvement), economic benefits (lower costs and/or higher revenues and profits), and influence of relevant stakeholders (customers and tour operators). According to Tepelus (2005) and Cooper (2008), customers’ environmental concern and their recent developed characteristics (e.g. increasingly knowledgeable, discerning, seeking participation in local development projects) can also be a motivator for tour operators to adopt environmental strategies. Specific information on tour operators’ involvement in local socio-cultural issues, or efforts for natural resource conservation can contribute to the creation of a unique holiday product, which may also differentiate itself from many look-alike tour operators available in the destination.

Similar to other cases around the world (Bergin-Seers & Breen, 2005; Breen & Breen, 2008), a lack of budget was reported as the major reason for not pursuing business improvement activities as a core part of the operations. According to the small dive businesses, setting aside funds for environmental and social activities was extremely difficult. Cost cutting competition has multiplied the difficulties of complying with the codes of conduct. Unless this issue is properly addressed, the resulting cost cutting will ultimately affect critical safety and service standards of the dive tourism (Ziegler et al., 2011). Limited knowledge of owners and employees, participation of staff, interest of customers, and resistance to organizational changes were also seen as important barriers. By overcoming these issues and improving environmental performance, not only will it contribute to marine conservation and economic development, but also increase attractiveness to companies seeking responsible suppliers.

7.4 SCUBA DIVERS’ ROLE IN THE ECONOMIC AND ECOLOGICAL SUSTAINABILITY OF CORAL REEFS AND THEIR SATISFACTION IN SCUBA DIVING

7.4.1 Underwater Behaviour of SCUBA Divers

Similar to other studies in the Red Sea, the Caribbean, the GBR, the Mediterranean, and Southeast Asia (Burke et al., 2002; Miller, 2005; Mundet & Ribera, 2001; Shafer & Inglis, 2000; Tabata, 1992; Wilks & Davis, 2000), there was a wide range of demographic characteristics of the Koh Tao divers, in terms of countries of origin, certification level, histories in the coral environments, and commitment of the activity (refer to Chapter 5). The study found that Koh Tao divers selected dive tourism
providers based on the price of dive package and the reputation of dive operators. The public image of dive operators was perceived as a guarantee for the quality of the service provided. Environmental performance of the dive operating businesses was however unlikely to influence their decisions on the operator selection. This finding of tourists’ limited environmental concern was not surprising; rather, it was similar to the study in the GBR by Coghlan and Prideaux (2007). In their study, there was only one respondent (1000 sample size) that identified eco-certification as a reason to choose their dive operator to travel with.

The underwater behaviour of SCUBA divers associated with the coral damage was examined in this study by using the post-trip self-assessment questionnaires. Unlike in St. Lucia (Barker & Roberts, 2004) and the Republic of Palau (Poonian et al., 2010) where divers contributed greatly to coral damage, the findings from Koh Tao indicated a relatively positive trend towards environmentally responsible behaviour underwater of divers. A significant number of divers have reported little or no contact with corals, sediment, or marine life; although a large proportion of Koh Tao divers have recently started diving and have limited personal interest towards the environment.

The study revealed that divers had a high level of buoyancy control and moderate contacts with corals and bottom sediments. Most contacts were caused by fin kicks, followed by hands, knees, legs and tank, respectively. These are comparable to the findings in the Red Sea (Prior et al., 1995; Zakai & Chadwick-Furman, 2002) and Australia (Harriott et al., 1997; Rouphael & Inglis, 2001). The impacts are usually a result of individuals or groups trying to gain control, get a closer look, and fight an underwater current. Most contacts on Koh Tao coral reefs were unintentional, indicating the possibility for future improvement. Based on Barker and Roberts (2004), unintentional contacts can be reduced by good swimming technique, good buoyancy control, or proper education.

One of the interesting findings from this study was that accidental contacts with coral reefs were mostly caused by women, whereas the intentional contacts were mostly caused by men. Gender differences in self-reporting of socially unacceptable actions and/or differences in ability to handle heavy diving equipment and currents may have contributed to this situation rather than the concern toward marine environments. Nevertheless, the finding is consistent with other studies of the environmental attitudes and behaviour of male and female recreationists. As suggested in the studies, men tend to be more adventurous and more likely to take risks than women (Hudgens & Fatkin, 1985), less likely to follow instructions (Sirakaya, 1997; Vredenburgh & Cohen, 1993) and have a greater propensity towards irresponsible behaviour (Rutter and Giller, 1984 cited in Rouphael & Inglis, 2001). In particular to the context of dive tourism, Vredenburgh and Cohen (1993) discovered that male divers are more likely to ignore pre-dive instruction on safety and
environmentally benign behaviour than female divers. For this reason, male divers cause greater impacts than their female counterparts. These findings from Koh Tao can be useful for future responsive pre-dive educational briefings to particular focus on male divers and also for dive leaders to pay more attention to this group of divers underwater.

7.4.2 Experience and Satisfaction in SCUBA Diving

The study discovered that the satisfaction of divers in diving experience is influenced not only by the biophysical attributes at dive sites, but also the associated peripheral factors surrounding it (e.g. dive leader, services, weather, relation to other divers). It is important to note that the divers' satisfaction towards dive briefings and staff presented outstanding scores as compared to other aspects. As indicated in the survey, the pre-dive briefings provided by dive leaders involved safety procedures, topography of dive sites, anticipated hazard, weather condition, as well as environmental aspects in order for divers to comply with the codes of conduct. Dive leaders, as perceived by divers, were knowledgeable, helpful and friendly as [or even better than] they expected. These two standpoints might be one of the major factors affecting the divers’ underwater behaviour, resulting in the low level of contact with the Koh Tao coral reefs. These findings are supported by previous studies elsewhere, indicating that dive briefings (Medio et al., 1997) and close underwater supervision (Barker & Roberts, 2004) play an important role in reducing coral damage caused by divers.

According to Shafer et al. (2000), corals are the most influential attribute to visitors’ enjoyment with their reef experience. This might not be the case in Koh Tao. The survey results demonstrated that divers were happy with their dive experience in the coral settings and would like to recommend Koh Tao to others, even though they evaluated their satisfaction scores towards coral quality and coral diversity relatively low. Based on these findings, it can be assumed that corals are not always the most influential factor to divers' happiness; and the lower-than-expected biophysical attribute of dive sites alone does not necessary decrease divers’ satisfaction. Rather, it is a complex array of divers’ perceptions of the dive itself and associated peripheral experiences surrounding it that play significant role in how diving is experienced and evaluated.

In relation to the unsatisfactory ratings, features detracting divers’ holiday experience involved weather condition, underwater visibility, overcrowding, environmental impacts and the partial loss of the laid back image. The low visibility underwater can be explained by the unusual high intensity of rainfall, a long duration of high waves and strong current on Koh Tao during the study period. As stated by Martin and Belén (2005), good weather is the natural resource which has received relatively little attention but plays an important role in reef tourism. The study of reef tourism resilience on the GBR by Coghland and Prideaux (2009) is supportive to this aspect, suggesting that
poor weather has a direct effect on satisfaction scores as it reinforces the likelihood of seasickness, cold and wet conditions, reduced colourfulness of reefs, and reduced water visibility. However, this factor is not something that the management in the tourism destination can control. The best offer Koh Tao can give may be the advance warnings of weather forecast in public areas or at tourist accommodations.

With regards to a lack of restriction on the number of visitors allowed at a given point in time, Koh Tao was not different from Lakshadweep in India (Kokkranikal et al., 2003). However, in Lakshadweep, there were limitations of transportation and accommodation capacity which can act as a self-regulating mechanism. On Koh Tao, the availability of tourism products and services seemed to be unlimited. More tourism infrastructures have been constructed every year in the past two decades. The overcrowding of tourists was not only reported by the divers at the surrounding dive sites, but also by the non tourism related residents on the island. Having too many divers at one dive site was identified as unsatisfactory experience in Koh Tao diving. Therefore, to maintain visitors’ satisfaction and at the same time minimize impacts on coral reefs, setting limits on diver numbers at frequently visited dive sites is necessary.

As indicated in other studies (Curtin et al., 2009; Uyarra et al., 2009), environmental impact is one of the key features influencing divers’ satisfaction and their decision to revisit the tourism destinations. In this study, divers noticed the environmentally unsustainable practices of dive operators, as well as the existing land-based and marine-based tourism impacts. In this sense, it can be assumed that the decision of divers to revisit Koh Tao is vulnerable to a certain degree. Although most divers were satisfied with their dive experience and stated that they would like to return Koh Tao in the future, it does not mean that Koh Tao is a perfect diving destination. The information provided by divers as discussed in this section may be used as a starting point for Koh Tao to consider what needs to be improved and what quality experience needs to be maintained in order to sustain the long-term diving tourism industry.

### 7.5 THE MANAGEMENT OF DIVE TOURISM IMPACTS

As discussed in the previous sections, residents, dive operating businesses, and dive tourists were the major contributors to the existing impacts of dive tourism on Koh Tao. For this reason, the management responses must focus on the values, influence and interests of these key stakeholders (Miller & Auyong, 1991; Miller et al., 1999). Based on the results from each stakeholder, the management interventions most appropriate for Koh Tao are 1) environmentally sustainable operations of dive operating businesses; 2) infrastructural carrying capacity; and 3) physical and
biological carrying capacity. Limitations such as the number of tourists (both on-land and at dive sites), the number of new tourism infrastructures, the design and location of new buildings, and the number of tourism products and services that Koh Tao can sustain in a particular year should be established. These parameters will help make the tourism income more environmentally sustainable. Taking into consideration the human dimension or the socio-economic aspect of the dive tourism system in Koh Tao, the practical recommendations for the governance of the dive tourism are:

7.5.1 Multi-stakeholder Partnerships and Collaboration

To maximize tourism benefits and minimize duplicated effort and conflicts within a complex and multifaceted tourism industry, it is imperative for multiple stakeholders to work together in collaboration (Bramwell & Lane, 2002; Greer, 2002). Collaboration and participation are needed to address the overall concepts of development, including transportation, housing, social development, environmental conservation and natural resources management. As many sectors share the coastal areas and affect the dive tourism industry, it cannot operate in isolation. The partnerships must work together throughout the process; from planning, decision making, problem solving, project implementation, and evaluation (Andriotis & Vaughan, 2003; Hall, 1998; Inskeep, 1991; Okazaki, 2008). In the case of Koh Tao, it was not the local government, but the dive operating business, that played a leading role in bringing partnerships together. The local partnerships consisting of dive operators, wealthy tourism businesses, and concerned residents have contributed greatly to the socio-economy and environment of Koh Tao. However, the results indicated a need for greater active involvement of non-tourism related residents, small tourism businesses, as well as greater support from the local government. Additionally, the language barrier and insufficient education and awareness among the local Thais must be overcome. It might be the time for Koh Tao to establish a stronger partnership between Thais and foreigners, and between local government and industry, to ensure effective channels of communication for tourism planning and development. To do this, a proper coordinator position [rather than relying on the voluntary basis] may be formulated through the SKT. Proficiency in Thai and English, along with the interpersonal skills and integrity are crucial for a good coordinator. This role will not only help create better understanding, but also reduce the workload from the core partners. The mutual understanding among the community members and the collaborative programs can lead to an increased involvement. This can be challenging and time consuming but will ultimately make a huge difference to successful projects, plans and tourism products.
7.5.2 Self-regulation

With limited support from the local government, the lessons learned from Koh Tao indicated that the industry self-regulation was the most appropriate option to move tourism sustainability forward. Self-regulation is a bottom-up approach (Middleton & Stabler, 1997) involving codes of conduct, social and environmental standards, and auditing and monitoring systems under the agreement and cooperation of the industry (UNCSD NGO, 1999). Approaches can be varied depending upon the management focus (dive sites, divers, or dive operators) and specific conditions of the tourism destination. These approaches would not be mutually exclusive. The pressure from high-use dive sites can be reduced by limiting the periods of usage (Tratalosa & Austin, 2001), shifting use to artificial sites (Zakai & Chadwick-Furman, 2002), or limiting the number of boats at particular dive sites (Ziegler et al., 2011). In the case of Koh Tao, alternative dive sites have been promoted, but resting heavily used dive sites (i.e. Twin Rock, White Rock, Green Rock, Japanese Garden, Chumpon Pinnacle and Southwest Pinnacle) or limiting the number of boats has yet to be implemented. However, strict management of access to and use of dive sites is critical, thus, as noted by Hasler and Ott (2008), this has to be coordinated with the relevant stakeholders.

In addition to the management focus on dive sites, Chapter 6 presented a wide range of existing self-regulation management projects on Koh Tao which involved divers (MRM), and dive operators (EMP). As discussed earlier, the projects received full support from the core partners and a number of dive operators but wider cooperation was limited. The major obstacle for the implementation of such management actions, as revealed in the study, was the cost cutting competition among the dive operating businesses. Because there were no set prices for dive courses on Koh Tao, the dive operators had to compete for customers. To decrease competition, as well as to enable the introduction, legitimization and acceptance of accreditation programs, Hiwasaki (2006) suggested that partnerships and cooperation among dive leaders and snorkelling guides are the most effective solution.

As the most important marine tourism provider in the dive tourism industry, dive operators should adopt sustainable management practices which emphasize tourism development and activities that are ecologically sustainable, environmentally educative, locally beneficial and generate visitor satisfaction (Musa, 2002). Products and services that offer environmental benefits not only provide a competitive advantage, but may also be the most effective and long-term link between the private sector and sustainability. Environmentally conscious divers, who are willing to discriminate between dive operators based on their conservation ethic, can facilitate these voluntary actions. Generally, this type of diver has greater capacity and willingness to pay for higher standards. Therefore, costs
of environmental-friendly products and services should not present a disadvantage. In turn, the competition towards responsible operations will allow dive operators to develop an environmental market niche which may also pressure other operators to follow (deGroot & Bush, 2010). However, if such initiatives are to succeed, effective training, education and extra support are required.

7.5.3 Education and Awareness

The results from this study demonstrated the importance of education as the foundation of marine tourism sector best practice. Environmental education and awareness building is necessary to ensure that all stakeholders understand tourism development, the impacts that it may cause (Bianchi, 2004; Hall, 2008), as well as the importance of sustainability and integrated management of tourism (Graci & Dodds, 2010). Education must be encouraged for the host communities, dive leaders and staff members, snorkelling tour guides, and SCUBA divers. This will allow for the environmental and ethical awareness, values and attitudes, skills and proper behaviour needed for sustainable development (Hiwasaki, 2006).

**The host communities:** As suggested in Beger et al. (2004), a community’s willingness to participate in management is greatly influenced by their understanding of coastal and marine environments and sustainable development. Education has long-term effects, especially if children are targeted (Dyson, 2010). Therefore, the environmental education and sustainability related issues should be added into the Koh Tao local school curriculum. This scientific information however needs to be translated into an easy understandable format and relevant to the island’s setting. Education activities can be conducted as short-term practical activities, lessons and workshops, or resource assessment training. In fact, Koh Tao has the potential to be an ideal ‘natural laboratory’, where lectures and practicals can be held in any setting from the mountain to the sea. In the Koh Tao context, participation in existing conservation activities such as the beach and underwater cleanup, grass planting, and participation in the annual Festival evidently helps raise awareness of sustainable use of natural resources.

**The dive staff:** Being in direct contact with SCUBA divers, educating them how environmentally sustainable diving functions, and having influence on their behaviour underwater have made the environmental education of dive guides and dive instructors one of the most influential factors to conserve the ecological and the aesthetic qualities of dive sites (Barker & Roberts, 2004; Hasler & Ott, 2008). An improved operator training program can result in increased motivation to environmental practices (Ayuso, 2006), an enforcement at dive sites (Pierce, Méndez-Jiménez, Collins, & Rosero-Caicedo, 2010), and knowledge sharing of dive leaders and boat captains with their customers (Powell & Ham, 2008). The SKT Ecological Monitoring Program Instructor
Workshop, affiliated through PADI, exemplified local initiated dive training programs that highlight the potential consequences of poor tourism practices and facilitate the conservation of local resources.

**SCUBA divers:** Although dive tourists are likely to be knowledgeable about environmental problems, they may not know how exactly their actions are impacting the visited environments and how they can contribute to sustainable tourism (Priskin, 2003). Medio et al. (1997) and Townsend (2003) found that pre-dive briefings are the best and most effective form of interpretation and education in a boat diving environment, particularly with the illustration by pictures or videos (Barker & Roberts, 2004; Medio et al., 1997; Townsend, 2003; Townsend, 2008). Pre-dive briefings or educational briefings that explain the vulnerability of coral reef ecosystems and the relationships between tourism and conservation can lead to a significant increase of tourist knowledge and awareness (Townsend, 2003), increase of environmentally and socially responsible action (Derraik, 2002), and dramatic and statistically significant decrease of contacts with coral reefs (Medio et al., 1997; Townsend, 2003), which ultimately raise the carrying capacity of a given reef area (Hawkins et al., 2005). Lück (2003) found that personal interpretation by well-trained staff is the most effective method of delivering environmental interpretation. Apart from this, the dive group size needs to be small enough in order for the briefings to be effective and for the dive leaders to perform their underwater supervision adequately. The findings from Chapter 5 indicated that unintentional contacts with corals were mostly caused by females, whereas intentional contacts were caused by male divers. In order to control such behaviour underwater, more explicit pre-dive warnings including extra-care practices during the dive should be given to male divers compared to female divers.

Given the fact that the catamaran is the major mode of transportation between Koh Tao and the mainland, environmental interpretation illustrated with pictures or video on board can be considered as an alternative education channel. Based on the researcher's experience, there were large and small TV screens on each of the catamarans to Koh Tao. In approximately ten trips that the researcher travelled to and from the island, the screens were used either for marketing, or entertaining purposes. With the cooperation of the catamaran operators, this may be seen as an opportunity to introduce basic knowledge about coral reefs, dive sites surrounding Koh Tao, and the existing conservation projects. As demonstrated in the survey, a number of tourists were not aware of the local conservation effort. Thus, information on how tourists can participate while staying on the island may be included. Since boat transport is the only form of travel to Koh Tao, this can ensure the accessibility of information to the audience. The benefits of interpretation on the reef is confirmed by a study on the GBR, Australia by Madin and Fenton (2004). Their study indicates that environmental interpretation does indeed alter tourists' understanding of conservation and marine life issues. If the interpretation is delivered well, the tourist will also be more satisfied with the tour.
operator, potentially leading to positive word of mouth recommendations (Wearing, Edinborough, Hodgson, & Frew, 2008).

### 7.5.4 Good Governance and Accountability

To ensure that tourism is sustainably developed, there is a need for good governance which manages the commons as a collective resource rather than benefiting the individual. This is often linked to leadership because charismatic leaders have the capability to influence various stakeholders to participate and support sustainability initiatives and to raise awareness of the benefits of environmental and social integration into policy issues (Graci & Dodds, 2010). Strong leadership that supports the community and gives the community a clear direction will often facilitate solutions. In the case of Koh Tao, the close-knit social relationship among the locals can facilitate the local leadership to mobilize people through requirement, respect and trust. Given the high level of education of the Koh Tao residents, promoting awareness of conservation should not be too difficult. To achieve this, policies should be adopted to make environment and development education available to people of all ages. The local government, as a regulator, should consider the establishment of local regulations and enforcement to ensure sustainable tourism development in terms of infrastructure and facility development, land-use planning, attractions development, as well as the protection of natural and cultural resources. Consultation processes with relevant stakeholders from outside is another key issue for the effective outcomes to be achieved. The involvement of an external organization, such as an international conservation group, NGOs, or academic institutes, can also provide financial support which is crucial to make it possible to enforce regulations and maintain control over reef activities (deGroot & Bush, 2010).

### 7.6 CHAPTER SUMMARY

This chapter summarizes the major findings from this study and points out both the similarities and differences between the results interpreted here and that from other studies. Issues facing the dive tourism industry are identified and management interventions to overcome the barriers are recommended. In the next chapter, the components of the reef-based SCUBA dive tourism will be presented from a holistic point of view, indicating the interrelationship between natural and human dimensions. The management and governance frameworks of ICM and STD will be analysed as to whether or not they are applicable in the dive tourism context. In addition to this, the significance of findings from this study which makes the original contribution to the knowledge will be drawn. The limitations of this study will be discussed and the directions for future research will be outlined.
CHAPTER 8
A MANAGEMENT FRAMEWORK FOR REEF-BASED SCUBA DIVE TOURISM

This chapter brings together all the scholarly elements developed throughout the study, a summary of research findings, and in particular their importance and implications to knowledge. The findings are analysed and interpreted in aggregate to provide a holistic picture of reef-based SCUBA dive tourism. The final chapter presents the reflection on the research aims and unique contribution to the literature of the management dilemma of dive tourism in the context of ICM and STD. Additionally, limitations of the study in terms of scope, methodological restrictions, and practical realities are discussed, along with directions for future research.

8.1 A HOLISTIC UNDERSTANDING OF REEF-BASED SCUBA DIVE TOURISM SYSTEM

According to Cox, Johnstone and Robinson (2004), to obtain an explicit understanding of the dependence of dive tourism on coastal and marine environments, a coherent framework identifying all the significant components of the system and their interactions is required. This study addressed all aspects of sustainability (economic, environmental and social) at the destination, both natural and social science components of the dive tourism system, and multiple stakeholder perspectives in dive tourism development. The integrative results from this study provide a holistic understanding of the natural and social science components of the dive tourism system (see Figure 8.1). The schematic diagram shows the complexity and dynamism of interrelationships between the physical environment and the human environment identified and discussed throughout the thesis. It also demonstrates the distinctive roles of key stakeholders in dive tourism as well as their contribution to dive tourism impacts, practices and sustainability. All of these factors need to be incorporated if the impacts of dive tourism are to be sustainably managed.

The major dive tourism stakeholders including host communities, dive operators, and SCUBA divers have multiple interests and interact with each other with heterogeneous attitudes and perspectives. Their practices contribute to the tourism impacts (biophysical, economic, and socio-demographic) in different ways. In the case of Koh Tao, these stakeholders facilitate and also hinder a sustainable approach. Based on this study, the major barriers to sustainable dive tourism in Koh Tao can be classified into: 1) the lack of government support; 2) the lack of policy and regulations in relation to tourism development; 3) limited environmental knowledge and awareness; 4) limited natural, human and financial resources; and 5) limited participation of stakeholders.
Figure 8.1 A holistic picture of the reef-based SCUBA dive tourism system.

Source: Author
A number of scholars have proposed effective management policies to overcome these barriers. However, given the particular circumstances of each destination, there is no perfect planning or policy process which can be easily translated from one coastal tourism management jurisdiction to another. Each locale needs to select the appropriate strategies for its own development requirements (Hall, 2001). In the particular case of Koh Tao, the complexity of issues facing the dive tourism industry has made the implementation of economic, regulatory and institutional approaches nearly impossible. The lack of connection with the government, together with the high economic dependence on the tourism industry and the pressure of tourism impacts were major driving forces for the need for self-sufficiency and self-regulation. In this circumstance, voluntary management instruments appear to be the most appropriate management strategy.

The existing management practices or the local initiatives not only contribute to the protection of natural resources but at the same time equip the communities with the necessary knowledge and awareness. Increase in environmental knowledge and awareness can lead to the environmentally sustainable practice of all stakeholders which can subsequently result in the improved environmental quality and the high level of tourists’ satisfaction. The uncertainties confronting reef-based tourism are, however, not restricted to the threats facing coral reef ecosystems. The reef-based dive tourism sector is also affected by socio-economic and political disturbances such as economic recessions, health concerns, political stability, technology, as well as national and local level issues including the regulatory environment (Gössling & Hall, 2006; Hall, 2008). Therefore, to ensure that the Koh Tao dive tourism industry is resilient to the changing world and does not grow at the expense of the health of the coral reef, the development of tourism must be community-oriented and resource-based or asset-led, rather than that controlled by purely market forces (Owen, 1991). Given the majority of residents are well-educated and have positive attitude towards a sustainability approach, a greater success of sustainable tourism in Koh Tao can be expected. The implication of this holistic picture of reef-based SCUBA dive tourism is that in future planning of tourism, greater efforts need to be made to incorporate community representation into the decision-making processes even though the diversity and complexity of social construction can be a great challenge (Burns & Holden, 1997).

8.2 A MANAGEMENT FRAMEWORK FOR REEF-BASED SCUBA DIVE TOURISM

ICM has been referred to by many specialists in the field as the best approach for the management of coastal resources in a sustainable way (Harvey & Caton, 2003). Although ICM programs are flexible enough to adjust to the social, economic, cultural, ecological and political settings of sites and able to accommodate various perceptions, needs and priorities (Thia-Eng, 2006), they do not
necessarily apply to every setting and circumstance. The study of Koh Tao showcases what can happen when there is a lack of political will and the policy and management failure of the public sector in relation to tourism development in a destination where the local economy is exclusively centred on the reef-based tourism industry. In reviewing the key elements of ‘integration’ in the coastal management literature, it is evident that the management and governance framework of ICM is not applicable to the study site. In referring to the ICM principles illustrated in Figure 8.2, intersectoral (horizontal) integration, intergovernmental (vertical) integration, and international integration are very weak or not existent. The intersectoral integration is not possible due to the dominance of the tourism industry over other land-based or marine-based sectors. This does not allow for an opportunity to integrate with other sectors. In Koh Tao the NGOs seem to have an influence in the management of natural and social resources. Nevertheless, there is a lack of connection with local, provincial and national governments which makes the intergovernmental integration impossible. Apparently, dive tourism has a number of international involvements as the industry depends on imports from outside in terms of products and labour force, but this does not translate to international integration.

Although SCUBA diving is a marine-based activity, from the management perspective it must not ignore the influence of land-based tourism sectors such as accommodation, restaurants and transportation. Any practices of the tourism facilities on land can impact the natural capital of the dive tourism industry. In this context, spatial integration or integration between the land, ocean and coast is imperative. Since tourism involves multiple stakeholders with different behaviours, attitudes, knowledge and management practices, to understand this complexity the integration of natural and social sciences and management is very important.

From the perspective of STD, the Koh Tao dive tourism has contributed to an increase in quality of life among the host communities and attracted tourists from across the globe. However, the economic and environmental sustainability of this reef tourism destination seems to be questionable. The island is characterized by substantial economic leakages because of high dependence on imported goods and the tendency of the industry to employ foreign labour, especially in dive instructor positions. This can affect the long-term viability of the dive tourism. In response to this, the dependence on skilled expatriates may be reduced by promoting training of local residents. Despite the lack of government support, the study shows that Koh Tao dive operators can be the driving force to move the sustainability agenda forward. This may happen because the majority of tourism entrepreneurs on the island are local residents, thus the destination’s livelihood is considered as not only the source of income but also their community.
Chapter 8

Figure 8.2 A continuum of sustainability showing a paradigm for the management of reef-based SCUBA dive tourism.

Source: Author, Diagram designed after Pearce (1997)
The leadership of dive operators together with the unique reciprocal relationship between Thai locals and skilled expatriates has filled the vacuum that the government failed to involve. Community driven management interventions have demonstrated positive outcomes in Koh Tao communities including improved environmental quality, increase in tourism revenue, sustained tourist satisfaction, and increased knowledge and awareness among the community members. However, without the involvement of the government, exclusive reliance upon the local initiatives may not be sustainable. In this context, Reed (1997) suggested that the governments’ role has to change from the controller and regulator to the neutral arbiter, coordinator, partner and educator.

According to Imran, Alam and Beaumont (2012), there are several studies in tourism research which indicate the importance of a holistic and integrated approach to the success of tourism sustainability. However, there are very few studies that actually clarify the meaning of the term ‘integrated’ and discuss the elements of the ‘integration’. In response, this study develops a management framework which identifies the various domains of integration necessary for the complex nature of reef-based SCUBA dive tourism system. These include science-management integration; spatial integration and stakeholder integration. As discussed throughout the thesis, these key elements of ‘integration’ in dive tourism management should not be considered separately, rather each of which should be recognized as overlapping and interacting with the others. In addition to the above three elements, the greater promotion of voluntary management strategy and community-oriented or resource-based approach should be considered. As confirmed by Richards and Hall (2000), place-based communities being central to the holistic concept of sustainability can have the potential to embrace and integrate environmental, economic, political, cultural and social consideration which are necessary to achieve the long-term viability of the tourism industry in general, as well as the dive tourism industry in particular.

8.3 LIMITATIONS OF THE STUDY

There are limitations that need to be acknowledged and addressed regarding the present study. One limitation of the research is the lack of long records of historical photography, electronic media, and even newspapers. It also lacks the quantitative data of physical environment qualities and the historical data on the number of tourists. This restricts the ability to compare the perceived tourism impacts with scientific measurement data.

The researcher being a Thai national is beneficial to the study in terms of understanding and encouraging the discussion among both the Thai and non-Thai community members to be as open as possible. However, the researcher also encountered difficulty conducting interviews. Perhaps due
to the small size and close-knit relationship between the Koh Tao communities, in some cases people were hesitant to divulge information to the researcher, particularly on sensitive topics, such as conflicts among locals, the illegal practices, or criticisms of other dive operating businesses. They were in fear that this information might later be used against them. Thus, information gathered in the study is to some extent limited to the willingness of informants to disclose.

In terms of the limitations of the survey, the questionnaire with dive operators and SCUBA divers was available only in English. By design, it would limit the respondents to people that could read and write proficiently enough in English. As it turned out, some tourists or dive operator managers could not understand English well enough to complete the questionnaire [because Koh Tao offers at least 15 different languages for dive tours, hence English is not always appropriate].

Another limitation lies in the fact that participation in the questionnaire was voluntary. Therefore, only those with an interest in describing their expectation, experience, and evaluation in relation to the topic participated. As the data collection period was in peak dive tourism season, a significant number of people, particularly the dive operators, were unable to fill out the survey. The questionnaires were sent only once with no repeat due to financial limitations and time constraints. Nevertheless, the questionnaire survey provided a good summary of touristic impressions.

Despite the unique needs and the geographical, environmental and socio-cultural characteristics of each tourism destination, the island of Koh Tao shares characteristics of small island developing states (SIDs), other independent nations, as well as those representing developed and developing nations. Thus it is hoped that this research can offer insight into a wide range of situations that island tourism destinations may face. However the extent to which some site specific findings can be generalized beyond the case study area may be more difficult.

8.4 RECOMMENDATIONS FOR FUTURE RESEARCH

Several aspects discussed in this study present opportunities for future research. If the sustainability of Koh Tao dive tourism is to be moved forward, better understanding of the following areas need to be developed: 1) the leakage of tourism revenue; 2) attitudes towards the application of a user fee system; and 3) the consequences of the recent change in local administration in terms of governance of the dive tourism. Investigating phenomena on Koh Tao at different times throughout the year rather than a snapshot of a short duration may also be interesting.

As Koh Tao is highly dependant upon imports for tourism goods and products, there is a concern over leakage of tourism revenue to nearby regions and other countries. In addition to the expenditure
for imports, money can be drained out due to tax payments, and profits and wages paid to the skilled expatriates. In order to ensure that the majority of money spent on tourism remains in the local economy and has favourable effects on the host community, an insight into hidden costs to tourism in future studies may be developed.

One of the interesting findings from this study is the different perceptions of options for management of Koh Tao dive tourism among the three key dive tourism stakeholders. Dive operators and SCUBA divers perceived the application of user fees one of the most suitable management strategies for Koh Tao. However, a large proportion of residents disagreed with this economic management approach. Given the contrast in perceptions, further investigations are needed to determine why residents were not supportive to such strategy, would there be a potential to raise revenue through diving user fees, or how the application of a user fee system would affect the biophysical, social and managerial settings of Koh Tao.

As presented in the introductory chapter of this thesis, the Koh Tao administrative status was a subdistrict (TAO) within the Koh Phangan district, Surat Thani province. However, on 21st September 2012, the Koh Tao administrative status was changed to a district and separated from Koh Phangan. This transformation may affect Koh Tao in terms of budget allocation from the central government, and capacity of local government to regulate dive tourism development. The role of the new administrative arrangement and its influence on the management of dive tourism can be seen as an opportunity for future studies to explore.

8.5 CONCLUSION

The case study of Koh Tao showcases how the presence of reef-based SCUBA dive tourism development can influence the importation of financial and social capital, and impact on the coastal and marine environments. Several scholars have proposed the management and governance frameworks of ICM and STD as the way forward in accommodating increasing pressures from tourism development in coastal zones. However, this study demonstrates that these two internationally accepted management approaches are not always transferable. The findings from this study indicate that each locale must select or adapt appropriate strategies for its own needs. In places like the GBR in Australia or the Florida Keys in the United States where strong governance structures are in place, ICM and/or STD can be easily translated. In Koh Tao, the unique characteristics and complexities including the dominance of dive tourism over other sectors and the lack of governance structures have made the application of either ICM or STD in the management of dive tourism a great challenge. The study concludes that issues confronting reef-based SCUBA dive
tourism management have to be analysed from a holistic perspective in which ecosystems are integrated with human society, including its cultural, social, economic and institutional variables. In other words, this study demonstrates the importance of an explicit understanding of all the significant components of the dive tourism system and their interactions. An understanding of the natural and social science components of the dive tourism system from a holistic point of view will help in decision-making processes to modify and adapt the management frameworks such as ICM and STD to best fit the local conditions, and to subsequently move towards a sustainability agenda for reef-based SCUBA dive tourism.
APPENDIX I: QUESTIONNAIRE FOR RESIDENTS

Introduction

This research investigates practices, consequences and management of reef-based SCUBA dive tourism on Koh Tao. The primary aims are to provide a holistic understanding of the dive tourism system and to recommend management strategies which take into account the needs of stakeholders, minimize tourism impacts, maximize benefits to the local population and sustain ecosystem goods and services.

Please answer all questions as best you can from your knowledge, feelings and experiences. The information gathered in this study will assist with the management and governance of reef-based SCUBA dive tourism both locally and in other areas.

Information regarding individual participants is strictly confidential. No names, addresses or any other identifying information is recorded so your responses in this questionnaire cannot be traced to you. Your participation is entirely voluntary and you may withdraw from the study at any time.

For any questions or complaints about this research please contact either:

Panwad Wongthong or Professor Nick Harvey
University of Adelaide
Adelaide, SA 5005, Australia
Adelaide, SA 5005, Australia
panwad.wongthong@adelaide.edu.au nick.harvey@adelaide.edu.au

Please keep the completed questionnaire until the collection period or return it to the researcher when possible.

_____________________________________________ Thank you for your participation __________________________________
SECTION I: DEMOGRAPHIC DATA

Q1 – What is your gender? □ Male □ Female

Q2 – What is your age? □ 20-29 □ 30-39 □ 40-49 □ 50-59 □ 60 and over

Q3 – Which of the following best describes your living arrangement?
□ Unmarried □ Married with ___ children
□ Single parent with ___ children □ De facto with ___ children

Q4 – What is the highest level of education you have completed?
□ Completed high School
□ Completed diploma/vocational school
□ Completed college or university
□ Completed post-graduate or professional school degree

Q5 – Which of the following describes your occupation the best?
□ Professional □ Manager/Administrator □ Entrepreneur
□ Laborer/Production □ Agricultural worker □ Fisherman
□ Government official □ Student □ Retired
□ Other ________________

Q6 – What village do you live in? □ Sairee □ Mae Haad □ Chalok Baan Kao

SECTION II: INVOLVEMENT IN THE DIVE TOURISM

Q1 - How long have you lived in Koh Tao?
□ Less than 5 years □ 5-9 years □ 10-19 years □ 20-29 years □ 30 years and over

Q2 – Please briefly describe and name the coastal zone you most frequently use and a brief overview of the activities you undertake while being there (e.g. beach relaxing, swimming, fishing)

The name of the coastal zone: __________________________________________________________

The brief overview of activities you undertake there:____________________________________

________________________________________________________________________________

Q3 - Do you work in an industry that benefit from tourism? (e.g. hotel/resort, harbor/port, bar and restaurant, retail shop, supermarket, transportation, tour operator, dive school, etc.)
□ Yes – please state_______________________________________________________________
□ No

Q4 - Does anyone in your immediate family work in an industry that benefits from tourism?
□ Yes – please state the relationship to you ____________________________
and industry he/she works in _________________________________
□ No
SECTION III: PERCEIVED ADVERSE CONSEQUENCES OF DIVE TOURISM

Q1 – Do you agree that dive tourism activities and tourist facility development cause negative impacts on coastal communities and the environment?

□ □ □ □ □

Strongly agree Somewhat agree Somewhat disagree Strongly disagree I don’t know

Please expand your reasons in space below.

________________________________________________________________________________

________________________________________________________________________________

Q2 – In your opinion, which of the following are consequences of coastal tourism in Koh Tao? Please answer all.

<table>
<thead>
<tr>
<th>Physical-Ecological Impacts</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncontrolled development (e.g. buildings, marinas)</td>
<td></td>
<td></td>
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<tr>
<td>Traffic congestion</td>
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<tr>
<td>Overburdened infrastructures</td>
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<tr>
<td>Unsustainable waste production</td>
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<tr>
<td>Unsustainable pressure on sewage system</td>
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<tr>
<td>Unsustainable use of energy resources</td>
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<tr>
<td>Pollution of fresh water</td>
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<tr>
<td>Marine pollution</td>
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<td>Air pollution</td>
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<tr>
<td>Noise pollution</td>
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<tr>
<td>Visual degradation of landscape</td>
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<tr>
<td>Forest clearance</td>
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<tr>
<td>Biodiversity (e.g. loss of habitats, disturbance to endangered species)</td>
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<tr>
<td>Damage to natural and cultural heritage</td>
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<tr>
<td>Erosion</td>
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<td>• soil erosion</td>
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<tr>
<td>• coastal erosion</td>
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</table>

<table>
<thead>
<tr>
<th>Socio-Demographic Impacts</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abandonment of traditional activities</td>
<td></td>
<td></td>
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<tr>
<td>Crowding-out of locals</td>
<td></td>
<td></td>
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<tr>
<td>• all year</td>
<td></td>
<td></td>
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<tr>
<td>• seasonal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tourists-residents conflicts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overcrowding and occasional irritation of local population</td>
<td></td>
<td></td>
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</tbody>
</table>
Adjustment of residents to tourists’ life styles

<table>
<thead>
<tr>
<th>Increase in crime</th>
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</thead>
<tbody>
<tr>
<td>Increase in accidents</td>
</tr>
<tr>
<td>Increase in drugs</td>
</tr>
<tr>
<td>Increase in prostitution</td>
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</tbody>
</table>

**Economic Impacts**

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher cost of living for residents</td>
<td></td>
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<tr>
<td>Land-use conflicts between activities</td>
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<tr>
<td>Risen public costs and expenses for infrastructure development</td>
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<tr>
<td>Seasonality of employment and income</td>
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<tr>
<td>High dependence on tourism activities</td>
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<tr>
<td>Black market</td>
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<tr>
<td>Increased dependence on imports</td>
<td></td>
</tr>
<tr>
<td>Uneven distribution of economic benefits</td>
<td></td>
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</tbody>
</table>

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**SECTION IV: ATTITUDES TOWARDS DIVE TOURISM DEVELOPMENT**

**Q1** - Which of the following statements best describes how you feel about tourism in Koh Tao?

- □ I am happy with the way tourism is developing in Koh Tao and would like to see it continues to grow
- □ I am happy with the way tourism has developed in Koh Tao but would not like to see it grows any more
- □ I would like to see less tourism in Koh Tao
- □ I would like to see more tourism growth but in a different direction

**Q2** - Please briefly describe how tourism should be developed in Koh Tao in the future.

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

**Q3** - Do you believe we can solve all of the coastal issues mentioned above?

- □ Yes, all
- □ Mostly yes, but with some exceptions
- □ Maybe
- □ No, never

*Please expand on your reasoning with examples in the space provided:*

________________________________________________________________________________

________________________________________________________________________________

________________________________________________________________________________
Q4 – If entrance fees are applied to Koh Tao in the near future in order to support local reef management, at what cost per day you think is appropriate?

- □ 50 Baht
- □ 100 Baht
- □ 150 Baht
- □ 200 Baht
- □ 250 Baht and over
- □ Do not agree that entrance fees are necessary

Are you willing to participate in further in-depth interview of this study during December 2010 and January 2011? (One time only, about 10-15 minutes)

- □ Yes
- □ No

If yes, please provide your name and contact details:
Name:
Address:
Phone number:

Preferred day
- □ weekday
- □ weekend

Preferred time
- □ morning
- □ afternoon
APPENDIX II: QUESTIONNAIRE FOR DIVE OPERATORS

Introduction

This research investigates practices, consequences and management of reef-based SCUBA dive tourism on Koh Tao. The primary aims are to provide a holistic understanding of the dive tourism system and to recommend management strategies which take into account the needs of stakeholders, minimize tourism impacts, maximize benefits to the local population and sustain ecosystem goods and services.

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Please keep the completed questionnaire until the collection period or return it to the researcher when possible.

________________________________________ Thank you for your participation __________________________
SECTION I: DIVE OPERATORS’ PERFORMANCE

Q1 – In your opinion, does alternative and/or clean technology in tourism operational systems support long-term sustainability of dive tourism industry?

☐ Yes  ☐ No

*If yes, please list actions taken to use such technology in your company in space below.*

*If no, please expand your reasons in space below.*

Q2 – In your opinion, should sewage and wastewater be minimized from the boat before being discharged into the coastal and marine environment?

☐ Yes  ☐ No

*If yes, please list actions taken and methods used regarding Q2 in your company.*

*If no, please expand your reasons in space below.*

Q3 – In your opinion, does the introduction of garbage or solid waste into the coastal and marine environment affect long-term sustainability of dive tourism industry?

☐ Yes  ☐ No

*If yes, please list actions taken your company.*

*If no, please expand your reasons in space below.*

Q4 – Does your tourism operation provide tourists an opportunity of fresh seafood?

☐ Yes  ☐ No

*If yes, please list actions taken to avoid catching and serving rare, threatened or endangered marine species for seafood consumption.*

Q5 – In your opinion, does harvesting marine species from coral reefs and other marine environments to sell as ornamental souvenirs generate negative impacts?

☐ Yes  ☐ No

*If yes, please list actions taken to support good environmental practices and educate customer regarding potential negative impacts of activity mentioned in Q5.*

*If no, please expand your reasons in space below.*
Q6 – In your opinion, can impacts of snorkelling and scuba diving be reduced if dive tourism employees have proper environmental knowledge and awareness?

☐ Yes ☐ No

*If yes, please list actions taken to provide trainings, briefings or literature for your employees regarding good environmental practices for marine recreation activities.*

*If no, please expand your reasons in space below*

Q7 – In your opinion, does an environmental knowledge of tourists help reducing impacts of their activities on coral reefs and marine wildlife?

☐ Yes ☐ No

*If yes, please list the actions taken to provide an environmental code of conduct and/or environmental briefings and literature for tourists, in order to reduce the impacts of snorkelling and scuba diving on coral reefs and marine wildlife.*

*If no, please expand your reasons in space below.*

Q8 – In your opinion, does the use of mooring buoys reduce impacts of anchoring on coral reefs?

☐ Yes ☐ No

*If yes, please list actions taken to support activity mentioned in Q8.*

*If no, please expand your reasons in space below.*

Q9 – In your opinion, should boat operators keep distance of marine wildlife (e.g. turtles, whale sharks)?

☐ Yes ☐ No

*If yes, please list actions taken to guide the actions of motorized as well as non-motorized boat operators and tour guides when they come into contact with, or viewing distance of, marine wildlife.*

*If no, please expand your reasons in space below.*

Q10 – In your opinion, can human contact have any effects on corals and marine animals?

☐ Yes ☐ No

*If yes, does your company support ‘no-contact policy’ (i.e. no contact with corals and no handling or feeding of wildlife)*

☐ Yes ☐ No
If yes, please list actions taken for staff and clients to support such policy.
If no, please expand your reasons in space below.

Q11 - Does your company conduct refresher courses and buoyancy control orientation for new or out-of-practice divers and provide information on the importance of proper weighting and streamlining of gear?
   □ Yes  □ No

Q12 - Please list actions taken to protect and conserve biodiversity and promote sustainable reef tourism in Koh Tao (e.g. cleanups).

□ Never participate in any activities

Q13 – Are you participating in or being a member of any eco-friendly diving program (e.g. green fins)?
   □ Yes  □ No
If yes, please state the program and year participated.
   program __________________________ year ____________________

SECTION II: FACTORS INFLUENCING THE ADOPTION OF GOOD PRACTICES

Q1 – If you have not listed actions taken in any questions, please identify your reasons and expand them when necessary.
   □ limited budget  □ limited knowledge and awareness
   □ limited human resource  □ do not agree that those actions are necessary

Q2 - Which of the following statements best describes how you feel about tourism in Koh Tao?
   □ I am happy with the way tourism is developing in Koh Tao and would like to see it continues to grow
   □ I am happy with the way tourism has developed in Koh Tao but would not like to see it grows any more
   □ I would like to see less tourism in Koh Tao
   □ I would like to see more tourism growth but in a different direction

Q3 - Please briefly describe the direction you would like to see tourism develop in.
SECTION III: INFORMATION ABOUT YOU AND YOUR COMPANY

Q1 - How many tourists does your company service per day (in average)?
   During high season: _______ tourists per day
   During low season: _______ tourists per day

Q2 - What are the costs of dive programs for an individual per day?
   Cheapest dive: ____________ Baht per person per day
   Typical dive (in average): ____________ Baht per person per day
   Most expensive dive: ____________ Baht per person per day

Q3 - How long has your company been operating?______________________________

Q4 - What is your position? ______________________________________________

Q5 - How long have you been working here? _________________________________

Q6 – Where are you originally from? _______________________________________

Are you willing to participate in further in-depth interview of this study during December 2010 and January 2011? (One time only, about 10-15 minutes)

□ Yes  □ No

If yes, please provide your name and contact details:
Name:
______________________________________________________________
Address:
______________________________________________________________
Phone number:
______________________________________________________________
Preferred day  □ weekday  □ weekend
Preferred time □ morning  □ afternoon
APPENDIX III: QUESTIONNAIRE FOR DIVE TOURISTS

Introduction

This research investigates practices, consequences and management of reef-based SCUBA dive tourism on Koh Tao. The primary aims are to provide a holistic understanding of the dive tourism system and to recommend management strategies which take into account the needs of stakeholders, minimize tourism impacts, maximize benefits to the local population and sustain ecosystem goods and services.

Please answer all questions as best you can from your knowledge, feelings and experiences. The information gathered in this study will assist with the management and governance of reef-based SCUBA dive tourism both locally and in other areas.

Information regarding individual participants is strictly confidential. No names, addresses or any other identifying information is recorded so your responses in this questionnaire cannot be traced to you. Your participation is entirely voluntary and you may withdraw from the study at any time.

For any questions or complaints about this research please contact either:

Panwad Wongthong or Professor Nick Harvey
University of Adelaide University of Adelaide
Adelaide, SA 5005, Australia Adelaide, SA 5005, Australia
panwad.wongthong@adelaide.edu.au nick.harvey@adelaide.edu.au

Please keep the completed questionnaire until the collection period or return it to the researcher when possible.

_________________________________Thank you for your participation_________________________________
SECTION I: DEMOGRAPHIC DATA AND GENERAL INFORMATION

Q1 – What is your country of origin? (Please tick and write down the country)
☐ UK/Ireland ☐ North America ☐ South America
☐ Europe ☐ Africa ☐ Asia
☐ Australia/New Zealand ☐ Thailand

Q2 – What is your gender? ☐ Male ☐ Female

Q3 – What is your age? ☐ 20-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ over 60

Q4 – What is the highest level of education you have completed?
☐ Completed high School
☐ Completed diploma/vocational school
☐ Completed college or university
☐ Completed post-graduate or professional school degree

Q5 – Which of the following best describes your occupation the best?
☐ Professional ☐ Manager/Administrator ☐ Entrepreneur
☐ Laborer/Production ☐ Agricultural worker ☐ Government official
☐ Student ☐ Retired ☐ Unemployed
☐ Other_____________

Q6 – How much do you spend in this dive trip? (Approximately in THB)

Q7 – Please prioritize the following reasons supporting your choice of dive operator on Koh Tao by placing a 1, 2, 3, 4 or 5 (1 being the most important and 5 being the least important)
1. Attractive dive sites
2. Reasonable price
3. Dive operator's reputation
4. Personal recommendations
5. Coral friendly operator (good management practices)
6. Others:

SECTION II: PREVIOUS SCUBA DIVING HISTORY

Q1 – Have you dived in Koh Tao before this trip?
☐ Yes ☐ No If yes, how many other visits have you made? ______

Q2 – Have you dived at other coral reef locations in Thailand?
☐ Yes ☐ No If yes, where? __________________________

Q3 – Have you dived at other coral reef locations around the world?
☐ Yes ☐ No If yes, tick as many as apply
☐ Red Sea ☐ Caribbean ☐ Australia/New Zealand ☐ South East Asia
☐ East Africa ☐ Mediterranean ☐ Other Indian Ocean ☐ Other Pacific

Q4 – What is the approximate number of your total dives in coral reef environments?
☐ less than 10 ☐ 11-20 ☐ 21-50 ☐ 51-100
☐ 101-200 ☐ 201-500 ☐ 501-1000 ☐ 1001-5000
APPENDIX III

Q5 – What is the diving agency you certified from?
□ PADI □ NAUI □ SSI □ CMAS □ BSAC □ NASDS □ Other_______

Q6 – What is the highest SCUBA diving certification that you have completed?
□ Open Water □ Advanced Open Water □ Rescue □ Dive Master □ Instructor

SECTION III: LEVEL OF PARTICIPATION IN SCUBA DIVING

Q1 – Which of the following best describe your situation?
□ Recently started diving
□ No longer new to the activity but with limited diving and coral reef experience
□ Higher level-certifications and had established diving as a regular part of your leisure with moderate exposure to coral reef settings
□ Professional certifications (Dive Master or Instructor), highly engaged in the activity of diving with high exposure to coral reef settings

Q2 – At what level do you rate your coral reef knowledge?
□ Basic □ Intermediate □ Advanced

Q3 – Do you own and use an underwater camera?
□ Yes □ No

Q4 – Do you own and use a coral reef and/or fish guidebook?
□ Yes □ No

SECTION IV: DIVER BEHAVIOUR IN CORAL REEF ENVIRONMENTS

Q1 – Please answer the following questions honestly by marking Yes or No. Your answers are completely confidential.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
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<tbody>
<tr>
<td>IN THE WATER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Were you neutrally buoyant at all times?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Have you contacted/touched corals (include accidental contacts)?</td>
<td></td>
<td></td>
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<tr>
<td>If yes, a) Was it intentionally?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Please identify parts of your body that contacted the reefs: _________________</td>
<td></td>
<td></td>
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<tr>
<td>3. Have you (a) accidentally or (b) intentionally stirred up the sediment? Circle (a) or (b)</td>
<td></td>
<td></td>
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<tr>
<td>4. Have you taken anything living or dead out of the water?</td>
<td></td>
<td></td>
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<tr>
<td>5. Have you chased or tried to touch marine life?</td>
<td></td>
<td></td>
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<tr>
<td>6. Have you taken pictures and/or video underwater?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON DIVE BOAT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Did dive master/dive instructor give short brief before getting into water?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Were pre-dive talks offered by knowledgeable dive masters?</td>
<td></td>
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</tr>
<tr>
<td>3. Did the talks educate divers about special features of the sites and reinforce rules for divers such as: a) Maintain neutral buoyancy?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Maintain control of fins, gauges, and accessories?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) No touching, standing on, or collecting corals?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) No feeding or handling fish and other living organisms?</td>
<td></td>
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</tr>
</tbody>
</table>

4. According to your experiences, which of Q3 (a, b, c or d) could you not follow? Circle which
SECTION V: SATISFACTION OF REEF-BASED SCUBA DIVING

Q1 – Overall in your opinion, how would you rate coral quality at dive sites you have visited? (Please circle one number only)
very low quality 1 2 3 4 5 very high quality

Q2 – Overall, how would you rate coral diversity at dive sites you have visited?
very low diversity 1 2 3 4 5 very high diversity

Q3 - Overall, how would you rate underwater visibility at dive sites you have visited?
very low visibility 1 2 3 4 5 very high visibility

Q4 - Overall, how would you rate weather conditions (e.g. rain, current) in your dive trip?
very poor condition 1 2 3 4 5 very good condition

Q5 - Overall, how would you rate diversity of interaction with marine life at dive sites you have visited?
very poor 1 2 3 4 5 excellent

Q6 – Overall, how would you rate the information you received in the dive brief about your dive sites?
very poor 1 2 3 4 5 excellent

Q7 - Overall, how would you rate your staff satisfaction (regarding their knowledge, friendliness and helpfulness)?
very poor 1 2 3 4 5 excellent

Q8 – How would you rate overall satisfaction score of diving in Koh Tao?
very poor 1 2 3 4 5 excellent

SECTION VI: DIVERS PERCEPTION OF IMPACTS AND MANAGEMENT OPTIONS

Q1 – Please identify your dive site name(s) and dive operator in this trip.

_dive sites:_

_dive operator:_

5. Were mooring buoys used when possible?
6. Were anchors dropped onto coral reefs?
7. Is garbage well stowed, especially light plastic items and cigarette butts?
8. Is wastewater from the toilet directly released into the water?
9. Are engines well maintained to avoid release of petroleum products in reef areas?

SHORESIDE
1. As a visitor, are you encouraged to participate in local conservation efforts, particularly regarding the use of energy and fresh water? If yes, please give example

2. Are you informed about how you can donate or otherwise support local coral reef conservation initiatives? If yes, please give example

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175
Q2 – Do dive tourism activities and tourist facility development generate negative impacts on the coastal environment in Koh Tao?

□ Strongly agree □ Somewhat agree □ Somewhat disagree □ Strongly disagree □ I don't know

Q3 - What do you like/dislike about diving experiences in Koh Tao?
like:____________________________________________________________________________
________________________________________________________________________________
dislike:__________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

Q4 – Do you have any suggestions for developing and improving Koh Tao as a long-term diving destination?
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

Q5 – If entrance fees are applied to Koh Tao in the near future in order to support local reef management, at what cost per day do you think is appropriate?
□ 50 Baht □ 100 Baht □ 150 Baht □ 200 Baht □ 250 Baht and over □ Do not agree that entrance fees should be applied

Q6 – Would you return to Koh Tao for another vacation based on your current holiday experiences?
□ Yes □ No why? __________________________________________

Q7 - Would you recommend Koh Tao for a vacation to a friend, relative, co-worker, or acquaintance in the future?
□ Yes □ No why? ______________________________
APPENDIX IV: SEMI-STRUCTURED INTERVIEW GUIDE

SECTION I: ISSUES RELATED TO REEF-BASED SCUBA DIVE TOURISM

1. Reliance on the coastal and marine environments today vs. years ago.

2. Development of dive tourism on Koh Tao.

3. Consequences of dive tourism development: positive and negative.

4. The major causes and contributors to such issues.

SECTION II: THE CAPACITY OF KOH TAO TO BECOMING A SUSTAINABLE TOURISM DESTINATION

1. Strengths:
   a) What has worked well in Koh Tao?
   b) What are benefits of dive tourism on the communities?

2. Weaknesses:
   a) What could have gone better?

3. Opportunities:
   a) How Koh Tao can overcome weaknesses and build on strengths?
   b) What are the best alternative income-generating options and employment other than tourism?

4. Constraints:
   a) What reduces the range of opportunities?

SECTION III: EXISTING MANAGEMENT IN RELATION TO DIVE TOURISM

1. List existing management projects/activities in relation to dive tourism development and its adverse impacts.

2. List stakeholders involved in the management and degree of stakeholder participation in the existing management projects:
   a) Academic
   b) Funding contributions
   c) Action (both internal and external)

3. Your role and responsibilities in managing natural and social capitals of the dive tourism industry.

SECTION IV: SUCCESFULLNESS OF LOCAL COASTAL MANAGEMENT PARTNERSHIP

1. Objectives of the partnerships are clearly articulated. □ yes □ no
2. Voluntary partnerships are the most effective mechanism to manage Koh Tao’s coastal zone.
   □ yes □ no

3. There are clear roles and responsibilities in the functioning of the partnerships.
   □ yes □ no

4. In general, all members of the partnership have a good mutual understanding of each other’s roles and responsibilities.
   □ yes □ no

5. The partnerships have a membership with a wide range of interests/innovations.
   □ yes □ no

6. The member’s wide range of interests has frustrated progress.
   □ yes □ no

7. The environmental quality has improved because of the work of the partnership.
   □ yes □ no
   Example of clear proof and means of verification______________________________________

8. The social quality has improved because of the work of the partnership.
   □ yes □ no
   Example of clear proof and means of verification______________________________________

9. The economic quality has improved because of the work of the partnership.
   □ yes □ no
   Example of clear proof and means of verification______________________________________

10. The partnership has a clear sense of direction in the short-term.
    □ yes □ no

11. The partnership has a clear sense of direction in the long-term.
    □ yes □ no

12. Performance of the partnerships:

    1) Efficiency
       a) What has been the cost of achieving the partnerships’ objectives?
       b) What are the causes of any inefficiency?

    2) Relevance
       a) Is the approach responding to the problem?

    3) Coherence
       a) Does the contribution of lower level activities clearly aggregate up to achieve the higher goals of the partnerships?
4) Impact
   a) What are the effects of the project?
   b) Is the coastal zone now being more sustainably managed?

5) Sustainability
   a) Will the activities continue once funding is withdrawn?
   b) Do the members value the partnerships sufficiently to continue in a self-funded mode?

6) Effectiveness
   a) How far have the partnerships’ objectives been achieved?
   b) Are the partnerships an effective mechanism?
   c) What are their strengths and weaknesses?

13. Level of your satisfaction from participation (planning, decision-making, or activities).

14. If the partnership was starting again from scratch, how would you like to see it?

SECTION V: MANAGEMENT AND PLANNING

1. What does Koh Tao need in terms of management and planning?

2. Do you believe there is adequate legislation (rules and regulations) in place to deal with these potential conflicts?
   □ Yes □ No

3. The perception towards the nature of dive tourism development, sustainable tourism concept and coastal management framework.

4. Availability of resources (human and capital) for monitoring of reserve patrol, monitoring and surveillance.

5. Do you believe you are well informed into current developments in your coastal area and are able contribute to any future plans? (Please expand on your answer in the space provided)
   □ Yes □ No

6. Who do you feel is most and least responsible for initiating a response to improve any negative impacts of coastal development in Koh Tao? (Place a 1, 2, 3, 4 or 5 in the blank with 1 being most important responsible and 5 being least responsible)
   _____ Local Government
   _____ Provincial Government
   _____ National Government
   _____ Individual community members
   _____ Scientists

7. Who are the main actors or the key players in moving the sustainable agenda of the dive tourism forward?
SECTION VI: DEMOGRAPHIC DATA

1. What is your gender? □ Male □ Female

2. What is your age? □ 20-29 □ 30-39 □ 40-49 □ 50-59 □ > 60

3. Which of the following best describes your living arrangement?
   □ Unmarried □ Married with ___ children
   □ Single parent with ___ children □ De facto with ___ children

4. What is the highest level of education you have completed?
   □ Completed high School
   □ Completed College or university
   □ Completed post-graduate or professional school degree

5. Which of the following best describes your occupation the best?
   □ Professional □ Manager/Administrator □ Entrepreneur
   □ Labourer/Production □ Agricultural worker □ Fisherman
   □ Government official □ Student □ Retired
   □ Other ______________

6. How long have you lived in Koh Tao?
   □ Less than 5 years □ 5-9 years □ 10-19 years
   □ 20-29 years □ 30 years and over
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