Socio-economic drivers influencing sustainability in a social-ecological system

Insights from whale shark tourism in northern Quintana Roo, Mexico

Loïs Moriel Robles
Socio-economic drivers influencing sustainability in a social-ecological system

Insights from whale shark tourism in northern Quintana Roo, Mexico

Loïs Moriel Robles
loismoriel@hotmail.com

August 2009

A thesis submitted in partial fulfillment of the requirement for the degree of Master in Ecosystems, Governance and Globalisation
Abstract

Wildlife tourism is promoted as a livelihood alternative activity to extractive use, such as the case of whale shark interaction in Quintana Roo, Mexico. Whale sharks seasonally aggregate (from May to September) northeast Yucatan peninsula, where they annually attract about 20000 visitors.

This study analyzes the socio-economic drivers, influencing the sustainability of this recreational activity, through semi-structured (n=44) and in-depth (n=4) interviews to local stakeholders, tourists surveys (n=262), and a cost-benefit analysis. Results indicate that intermediaries put pressure on the optimization of the operation, as well as it decreases the economic return to local operators (licensees). Local operators are not aware of the real costs of operations, and additionally tourists are poorly informed of (1) the species, (2) the code of conduct (regulations) and (3) how to support local community’s development. In conclusion, those factors along with the lack of surveillance threaten whale shark tourism sustainability. Inclusion of all stakeholders in management and planning of wildlife tourism is necessary in order to obtain desirable practices, as well as investment in environmental education.

Key words: sustainability, whale shark tourism, intermediaries, operation, market access.
Acknowledgements

I don’t know if this is the end or the beginning of a journey, but I know that a lot of people have been part of this “complex adaptive” process and experience. Directly or indirectly, doesn’t matter!

Firstly, I’d deeply like to thank all PSTs from Holbox, Isla Mujeres, Chiquila and Cancun for the information provided during the interviews. ¡¡¡Muchísimas gracias!!! Les agradezco la generosidad, bondad y humildad con la que me atendieron e incluso abrieron las puertas de sus hogares. ¡¡¡Recuerden que no siempre el pez grande se come al chico, y que los cambios suceden!!! También me gustaría remarcar el trabajo tan importante que personas como Morelia realizan para mejorar la comunidad!

I’d also like to thank CONANP (Yum Balam and Isla Contoy) staff members for their support and insights provided on whale shark tourism! Thanks to Paco and Jaime!

Special thanks go to Juancho and my “sister” Sandra Otoch. Very very very special thanks go to Norma Betancourt, muchísimas gracias porque sin ti esto no habría sido possible! Special thanks also to Cintia and Cecilia! Gracias por su hospitalidad y las tortas de cochinita! I’d also like to thank Domino team! Rafael de la Parra, Oscar Reyes, Natalie Cárdenas and Montserrat Trigo ¡por su ayuda, por la información, los tips, y por compartir su conocimiento conmigo!

I specially thank to Dr. Rachel T. Graham from her insights and reflections on my work. Likewise, I would like to thank EGG coordinator, Dr. Miriam Huitric.

Moreover, I want to thank all my friends and colleagues!! Special thanks to Anna (!!!), Kaitlyn and Patricia. Mireia!!! Ho hem aconseguit!!! Gràcies per les classes “bunkeritzades” d’estadística.

Finalmente, me gustaría dedicar esta tesis a mi familia que me ha apoyado, aun sin entenderme, durante todo este tiempo. Mama, sabes que eres mi ejemplo a seguir!! Muchas gracias Papa por creer en mi!! Gracias Miguel! Gracias Ángeles por ofrecerme la mejor “base de operaciones” y por tu paciencia!! No puedo dejar de mencionar y agradecer enormemente la hospitalidad y el apoyo brindado a esta “simi-yucateca” por mi familia mexicana. Gracias a la familia Ortega García, especialmente a Carlos.

A todos, Muchas Gracias por ser parte de mi viaje (y mis locuras).
Table of Contents

Abstract ........................................................................................................................................... 2

1. Introduction ................................................................................................................................. 8
   1.1 Wildlife Tourism and Natural Resource Sustainability ......................................................... 8
   1.2 Whale Shark Tourism Industry in Quintana Roo ............................................................... 9
   1.3 Research Questions ............................................................................................................... 10
   1.4 Relevance of the research ................................................................................................. 11

2. Theoretical Framework ............................................................................................................... 12
   2.1 Summary of relevant literature ........................................................................................... 12
   2.2 Gaps in Knowledge ............................................................................................................. 14
   2.3 Theoretical Framework ....................................................................................................... 14
      2.2.1 Resilience and Optimization Paradigm ........................................................................ 15
      2.2.2 Vulnerability .............................................................................................................. 16

3. Study Case Description ............................................................................................................. 17
   3.1 Whale Shark ......................................................................................................................... 17
   3.2 Stakeholders ........................................................................................................................ 19
      3.2.1 Prestadores de Servicios Turisticos (PST) ............................................................... 19
      3.2.2 Intermediaries ............................................................................................................ 20
      3.2.3 Environmental Institutions ..................................................................................... 21
   3.3 Whale Shark Aggregation Area ......................................................................................... 24
   3.4 Study sites and socio-economic context ............................................................................. 25
      3.4.1 Quintana Roo ............................................................................................................. 25
      3.4.2 Local communities involved in whale shark tourism .............................................. 26

4. Methods ..................................................................................................................................... 30
   4.1 Epistemological background ............................................................................................... 30
   4.2 Research Design .................................................................................................................. 30
   4.3 Data Collection .................................................................................................................... 31
      4.3.1 Tourist Surveys .......................................................................................................... 31
      4.3.2 Semi-structured and in-depth interviews to PSTs ..................................................... 32
      4.3.3 In-depth interviews to environmental institutions and researchers ....................... 33
      4.3.4 Oral Presentations ...................................................................................................... 33
      4.3.5 Explanatory interviews to intermediaries ................................................................. 33
      4.3.5 Cost-Benefit Analysis ............................................................................................... 34
   4.4 Data Analysis ........................................................................................................................ 34
      4.6.1 Role of Intermediaries ............................................................................................... 35
4.4.2 Economic sustainability ................................................................. 35
4.4.3 Implications on the Natural Resource ............................................. 37
4.4.4 Implications for the Future of the Social-ecological system (SES) ....... 37

4.7 Critical reflection of the methods ....................................................... 38

5. Results ............................................................................................... 39

5.1 The Role of Intermediaries ............................................................... 39
5.1.1 Tourists Preferences for Tour Operators ....................................... 39
5.1.2 Commercial link between local operators and intermediaries .......... 41
5.1.3 Relation between local operators and intermediaries ...................... 43
5.1.4 Negotiation process between local operators and intermediaries ...... 43
5.1.5 Extra demands from intermediaries ............................................. 44
5.1.6 Extra activities ............................................................................ 45
5.1.7 Marketing strategies .................................................................... 46
5.1.8 Access to market .......................................................................... 48
5.2 Economic profitability by local operators .......................................... 49
5.2.1 Financing sources ........................................................................ 49
5.2.2 Tour price ................................................................................... 51
5.2.3 Cost-Benefit Analysis ................................................................. 51
5.3 Implications on the Natural Resource ............................................... 53
5.3.1 Boat crowding and tourist-whale shark interaction ....................... 53
5.3.2 Code of conduct ......................................................................... 54
5.4 Future of the SES perceived by stakeholders ...................................... 55

6. Discussion .......................................................................................... 57

Role of Intermediaries ........................................................................... 57
...Until the goose lays the last golden egg ............................................. 59
The Challenge to achieve Sustainability ............................................... 59
Future of the Socio-Ecological System ............................................... 60

8. References ......................................................................................... 61

Appendix 1 .......................................................................................... 71
Appendix 2 .......................................................................................... 75
Appendix 3 .......................................................................................... 76
Table of Figures

Figure 1 Organizational structure of SEMARNAT 20
Figure 2 Stakeholders diagram 24
Figure 3 Preferences for tour operators 39
Figure 4 Reasons behind tourist’s preferences for tour operators in Area 1 40
Figure 5 Reasons behind tourist’s preferences for tour operators in Area 2 40
Figure 6 Extra activities in Area 1 and in Area 2 45
Figure 7 Marketing strategies in Holbox 46
Figure 8 Marketing strategies in Chiquila 47
Figure 9 Marketing strategies in Isla Mujeres 47
Figure 10 Sources of capital for infrastructure in Holbox 50
Figure 11 Sources of capital for infrastructure in Chiquila 50
Figure 12 Sources of capital for infrastructure in Isla Mujeres 51

Table of Tables

Table 1 Tourism cooperatives in Holbox 27
Table 2 Commercial links between local operators and intermediaries 41
Table 3 Type of agreements between local operators and intermediaries 42
Table 4 Contact between local operators and intermediaries 42
Table 5 Evaluation of the relationship 43
Table 6 Extra requirements from intermediaries 44
Table 7 Contingency table of market access in Holbox 48
Table 8 Contingency table of market access in Isla Mujeres 49
Table 9 Tour prices 51
Table 10 Cost-benefit analysis 52
Table 11 Stakeholder perceptions on the future of the SES 57

Table of Maps

Map 1 Whale shark biosphere reserve 23
Map 2 Surface currents in the Yucatan cannel 24
Map 3 Local communities in Quintana Roo 25
### Acronyms List

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>APFFYB</td>
<td>Área Protegida de Flora y Fauna de Yum Balam</td>
</tr>
<tr>
<td>APIQROO</td>
<td>Administración Portuaria Integral de Quintana Roo</td>
</tr>
<tr>
<td>CBA</td>
<td>Cost-benefit Analysis</td>
</tr>
<tr>
<td>CONANP</td>
<td>Comisión Nacional de Áreas Naturales Protegidas</td>
</tr>
<tr>
<td>DGVS</td>
<td>Dirección General de Vida Silvestre Fondo Nacional de Fomento al Turismo</td>
</tr>
<tr>
<td>FONATUR</td>
<td>Integral Port Administration of Quintana Roo</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>INEGI</td>
<td>Instituto Nacional de Estadística y Geografía</td>
</tr>
<tr>
<td>INM</td>
<td>Instituto Nacional de Migración</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>NPA</td>
<td>Natural Protected Area</td>
</tr>
<tr>
<td>PROFEPA</td>
<td>Procuraduría Federal de Protección al Ambiente</td>
</tr>
<tr>
<td>PST</td>
<td>Prestador de Servicios Turísticos</td>
</tr>
<tr>
<td>SCT</td>
<td>Secretaría de Comunicación y Transportes</td>
</tr>
<tr>
<td>SECTUR</td>
<td>Secretaría de Turismo</td>
</tr>
<tr>
<td>SEDETUR</td>
<td>Secretaría de Turismo del Estado</td>
</tr>
<tr>
<td>SES</td>
<td>Social-Ecological System</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Program</td>
</tr>
<tr>
<td>WTO</td>
<td>World Tourism Organization</td>
</tr>
<tr>
<td>WTP</td>
<td>Willingness To Pay</td>
</tr>
</tbody>
</table>
1. Introduction

1.1 Wildlife Tourism and Natural Resource Sustainability

World Tourism Organization (WTO) predicts an increase of 1.6 billion tourists by 2020, of which more than 20% accounts for ecotourism and nature-related forms of tourism (UNWTO 2009\(^1\)). In particular, wildlife oriented tourism\(^2\) has exponentially increased over the past 20 years (Duffus and Dearden 1990, Higginbottom and Scott 2008), generating approximately a revenue of US$ 47 to $155 billion each year, worldwide (Wildlife Tourism Australia in Rodger et al. 2007). This type of recreational activity has recently been promoted by resource managers as an economic alternative for nature conservation, while benefitting local communities (Dearden 1991, Orams 2000, Amir and Jiddawi 2001, Garrod 2003, Corkeron 2004, Topelko and Dearden 2005, de Lacy and Whitmore 2006). It is perceived as an opportunity to diversify livelihoods of local communities (Mowforth and Munt 1998) and to develop social infrastructure (Archabald and Naughton-Treves 2001), as well as it reduces pressure on natural resources in comparison to the conventional extractive use for food or for sport (Duffus and Dearden 1990, de Lacy and Whitmore 2006). Furthermore, wildlife tourism fosters education and awareness about conservation among people (Orams 1996). Interacting with wildlife is not only a gratifying activity for tourists, but also it expands visitor’s knowledge on the species and it prompts to adopt friendlier attitude towards nature through changes in tourist’s behavior and choices (Orams 1995).

However, literature has broadly argued on the implications of wildlife tourism for the sustainability of the natural resource. Impacts both, in the short term and the long term, ranging from changes in behavior to increased mortality or breeding success, have been identified in marine megafauna (Green and Geise 2004).

Local community highly depends on the status of the natural resource for their economic wealth. However, the fact that local communities are not usually involved in the planning and management of tourism activities (Garrod 2003) and the lack of

---


2 Wildlife tourism is described as the engagement with wildlife wherein the focal organism is not purposefully removed or permanently affected by the engagement (Duffus and Dearden 1990). It involves travel to observe and interacts with the animals in their natural habitats (de Lacy and Whitmore 2006), as well as it involves a wide range of activities; such has observation, photography, feeding, touching or swimming with the animals (Liu et al. 2004).
research on the social and the ecological realms as a whole system are underlined as the main handicaps for sustainability\(^3\) (Rodger, Moore and Newsome 2007). Nevertheless, there are socio-economic factors affecting notably the sustainability of wildlife tourism, which are tourism-location specific such as the influence of external drivers and the economic profitability of the activity. Therefore I am using the whale shark tourism as a case study to understand the complexity of a social-ecological system, to establish a framework to discuss wildlife tourism management, and finally in order to contribute to the knowledge of this recreational activity (Kin 2003).

1.2 Whale Shark Tourism Industry in Quintana Roo

This thesis presents a case study of whale shark tourism developed in northern Quintana Roo, Mexico, in the communities of Holbox, Chiquila, Isla Mujeres and Cancun. Fishermen and water recreationists had been interacting with this species, also known as Dominó, for nearly 30 years.

But, local stakeholders discovered in 2001 its economic potential, as part of the portfolio of recreational activities that is offered in Quintana Roo (a worldwide known tourism destination). Local operators carried out informal tours with friends, family and a few tourists. In this period, local stakeholders observed disturbing behaviors such as tourists who touched whale sharks, caught a ride on their dorsal fins or on the mouth of the fish (Researcher, pers. comm.). Therefore, in 2003, local guides, captains and tour operators from Holbox and Chiquila as well as environmental institutions \(^4\) decided to regulate the activity in the course of a workshop (Yum Balam Flora and Fauna Protected Area staff member, pers. comm.). Since then, Wildlife General Directorate (DGVS) issues annual licenses to local operators to take tourists out on whale shark tours, from late May to mid September. In 2005, local operators from Isla Mujeres and Cancun joined the activity.

\(^{3}\) The concept of sustainability has evolved from an ecological perspective towards a more interdisciplinary context, where social, political and economic drivers are included (Davis et al. 1997, Holling et al. 1998, Folke et al. 2002, Farrell and Twining-Ward 2004, Gonzalez et al. 2008). In the context of this thesis, sustainability is defined as the process that promotes social and economic development and wealth without compromising the resource base, and its functions (Walker and Salt 2006).

\(^{4}\) In the course of this study, environmental institutions are those organizations or government bodies in Mexico, at local, regional and national scale, with a legal mandate on policies and management strategies regarding whale shark conservation (Ostrom 1999).
Recently, the activity has evolved from a low scale-livelihood alternative for fishermen from towns located close to the whale shark aggregation area, towards a mass tourism industry where intermediaries have become a key element in the socio-economic system (Cepeda 2008, COBI 2007). Thus, intermediaries are linked to international travel wholesalers in Cancun, Playa del Carmen and Riviera Maya who pre-sell the whale shark tours up to six months in advance (Moriel 2008). At first, intermediaries were represented by small dive shops, which were already fraternized with the local operators in Holbox. However, the situation has changed as the presence of intermediaries has increased. At the present, intermediaries are represented by a wide range of companies and individuals, reaching from hotel receptionists to international tour operators or travel wholesalers. The fact that the commercial chain has increased, induces greater pressure from intermediaries on local operators since intermediaries work as tour operators for travel wholesalers. In addition, intermediaries demand local operators to lower the fares (COBI 2007). As result, there is an uneven distribution of benefits, local operators have started showing economic dependency from the intermediaries to defray costs of operation, and social conflicts developed.

Influences from intermediaries focused on the optimization of the activity by reducing search time and increasing pressure on the local operators to have powerful engines, guaranteeing the interaction or reimbursement, and demanding interpreters who are not accredited as guide by the Tourism Secretariat (SECTUR). Therefore, the pressure on the natural resource has increased, such as non-compliance of the code of conduct or injured animals by boat collision. In the future, those actions may lead to irreversible impacts on the whale shark population and in turn, on the local communities’ wealth.

1.3 Research Questions

In the light of this socio-ecological system, this thesis focuses on the analysis of socio-economic drivers influencing whale shark tourism in northern Quintana Roo, as well as the implications for the sustainability of the natural resource and the dependent social system. Moreover, the thesis explores local stakeholders’ current necessities and potential windows of opportunities in the future.
Those aims are relevant to provide deeper understanding of the system’s dynamic and to achieve more effective management of the natural resource. Those objectives are accomplished using resilience\(^5\) and vulnerability as scope. Therefore, the following four research questions are addressed. Two of them focus on the socio-economic drivers influencing directly on the social system, and the last two on the sustainability of the whole social-ecological system.

**R.Q.1:** How do intermediaries influence the sustainability of the recreational activity, particularly concerning the operation?

**R.Q.2:** Is the whale shark industry economically profitable for the local operators?

**R.Q.3:** What are the implications of the recreational activity on the natural resource?

**R.Q.4:** How do stakeholders perceive the future of the social-ecological system?

### 1.4 Relevance of the research

The relevance of this research is centered on applying, for the first time, resilience and vulnerability framework to test the sustainability of wildlife tourism. Moreover, the Mexican Atlantic whale shark aggregation is the ideal scenario for this purpose, since it is the largest worldwide reported (Reyes-Mendoza in Cardenas-Palomo 2008b), where tourism is more intense, but economic benefits for local operators is lower (Ziegler et al. 2008\(^6\)).

Another relevant motive behind this research is the little information published on the potential impacts from tourism on whale sharks, whereby changes in migratory and feeding patterns may occur (Graham 2004, Norman 2005, Quiros 2007), and whereas this recreation activity is promoted as an alternative and low-impact livelihood.

Finally, this thesis represents the first quantitative study on the importance of whale shark tourism in the Mexican Atlantic to its four stakeholder communities (see background).

---

\(^5\) Resilience will be tested by analyzing the optimization level of the tourism industry, in terms of infrastructure and its implications for exploitation of the natural resource, whereas vulnerability will be tested by determining local operator’s accessibility to the market.

2. Theoretical Framework

This chapter sets up the context for this research throughout a literature review on whale shark tourism, at a local and international scale, as well as the few information generated regarding the role of intermediaries in natural resource exploitation. Then, it indicates the gaps in knowledge at the moment, and how this study contributes to the sustainability’s research community. Finally, relevant theories and concepts to the study are described, as the justification of how and why those scopes are preferred, and how they are linked to wildlife tourism sustainability.

2.1 Summary of relevant literature

In Quintana Roo, tourism industry developed parallel to the initiation of several research projects to analyze the socio-ecological system, ranging from habitat characterization, population studies to tourism impact (Proyecto Domino, *com. pers*). Regarding socio-economic studies, Diaz-Amador (2005) analyzed the cross-scale institutional arrangements for whale shark management and conservation in Chiquila and Holbox. She concluded that institutional arrangements in the area are heterogeneous and developed in a reactive manner. Deterioration of trust in Holbox and low initial financial capital in Chiquila were identified as the main forces ensuing in how whale shark tourism industry is managed. In addition, Cepeda (2008) determined the relation among the natural capital, financial capital and the community’s welfare with special focus on whale shark tourism. Willingness to pay was estimated in USD$352 for international tourists and USD$213 for national tourists. COBI (2007) carried out a diagnosis of the activity to evaluate the feasibility of implementing the Green Globe 21 certification for the whale shark tourism as a conservation strategy. Disloyal competence, lack of marketing strategies and major economic turnover towards intermediaries are the major threats to provide a quality tourism service and social benefits for the local communities. Cárdenas-Palom et al. (2008c) assessed the potential impact of the tourist activity on the behavior of the whale shark. Results indicate that whale sharks stop feeding when boats block or impede animal’s trajectory or when tourists enter abruptly into the water.

At the international scale, several studies have been conducted on tourism related to whale shark encounters in Ningaloo, Australia. The study performed by Davis et al.
(1997) evaluated tourists satisfaction grade and expenditures. They concluded that there is a fine line between the industry being sustainable or having a negative impact on the species. Therefore, integrating ecological, experiential and economic components into management is highly desirable. Later, Davis and Tisdell (1998) determined tourists’ willingness to pay for the whale shark experiences and to contribute to the costs of management when a transparent process is granted. Hence, research, education and management costs are partially defrayed by participants. Norman (1999) monitored whale shark behavior, time of interaction and vessel distance. Results showed that injured individuals exhibited higher evading behavior occurrence, as well as, sharks manifested higher conduct change in the first five minutes of interaction. Mau and Wilson (2005) indicate that although tour operators’ logbooks have limited scientific validity to evaluate whale shark population and behavior, however including all stakeholders in the monitoring process allows managers to gain understanding of trends in the recreational activity and ultimately more effective whale shark conservation management. Presently, Mau (2008) have stressed the importance of maintaining a precautionary principle with regards to licenses since indentifying behavioral change is a slow process and to prevent the resource from becoming congestible\textsuperscript{7}.

In Donsol, Philippines, Quiros (2007) analyzed the compliance with the code of conduct, the interactions tourist-animal, and their ultimate impact. Results in her research evinced that tourist proximity had a significant effect on the change of the fish’s route.

In Seychelles, the study by Rowat and Engelhardt (2007) conclude that stakeholder’s participation in the ecotourism development and a monitoring network are key factors for whale shark tourism sustainability.

With regards to the role of intermediaries in nature-tourism systems, to my knowledge only Wearing and Mc Donald (2002) addressed the relationship between tour-operators and rural communities in Papua New Guinea in the development of community-based tourism. In the area of small-scale fisheries in Eastern Africa, Crona (2006) determined that intermediaries promote resource overexploitation by connecting fishermen to markets. Furthermore, she highlights the economic link between actors through credit extension. Finally, she hypothesizes about the potential constructive role of

\textsuperscript{7} When the natural resource has exceeded a certain level of use, consequently any increment in the number of users will reduce the benefits that it is currently providing (Rodríguez-Dowdell et al. 2007).
intermediaries in sustainable management of fisheries, and how they should be reckoned for fisheries governance.

2.2 Gaps in Knowledge

Although extensive research has been done on wildlife tourism, studies on whale shark recreation activity’s sustainability are recent and scarce. Hence, and given the limited information on their behavioral ecology and the long-term impacts from the activity on the fish population, no carrying capacity has been determined. So, managers have opted for using a precautionary principle\(^8\). However, the debate is focused on the necessity of reliable evidence and the mechanisms to implement this norm. Therefore, this study contributes to it by adding scientific foundation about this social-ecological system to promote pro-active management in the face of uncertainty (Fennel and Ebert 2004).

On the other hand, little research has been done on the role of intermediaries in natural resource exploitation, and in particular in wildlife tourism, and their influence on the sustainability of those tourism-nature systems. Thus, this research adds information about the role of this cluster and their performance in the whale shark tourism industry. Finally, it attempts to include this group of stakeholders into the governance of natural resources, since they are deeply rooted in the tourism industry developed in the state. It challenges their role in the social-ecological system to promote practices more sustainable.

2.3 Theoretical Framework

The concept of sustainable development was initially introduced in order to face current and future necessities. Originally, United Nations defined sustainability as the type of “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (UN, 1987). However, the concept of sustainability has evolved from an ecological perspective towards a more interdisciplinary context, where social, political and economic drivers are included the speech (Davis et al. 1997, Holling et al. 1998, Folke et al. 2002, Farrell and Twining-Ward 2004, Gonzalez et al. 2008).

\(^8\) Precautionary principle is a rising norm of environmental policy attested in a wide range of treaties and laws, at national, regional and international scales. It is avowed to be a mean and planning mechanisms for forecasting and monitoring eventual impacts on the ecological system (Fennell and Ebert 2004).
The objective is not only to maintain the resource base in the long-run, but to foster prosperous societies (Carpenter et al. 2001). Therefore, integrative point of view is needed.

Since sustainability cannot be tested *per se* in this particular case study, resilience and vulnerability theories are the frameworks applied. Both concepts are greatly considered in coupled human-environment systems research, since they acknowledge all components influencing the system, and how they are interconnected (Turner et. al 2003). Resilience and vulnerability are considered indicators of sustainability when there is lack of knowledge about certain aspects of the species, high uncertainty on the dynamics of the system, and cross-scale interactions occur (Folke et al. 2002 in Gallopín 2006). Therefore, considering the characteristic of this particular SES mentioned throughout this document, vulnerability and resilience provide the suitable framework for assessing sustainability.

### 2.2.1 Resilience and Optimization Paradigm

Since literature indicates that pressure from drivers at the social scale has implications on the wealth of the ecosystem, and vice versa (Folke et al. 2002, Petrosillo et al. 2006, Gibbs 2009). Therefore, in the light of this research, optimization paradigm can be used as a measure of resilience in the social-ecological system.

Originally resilience developed in ecological science as the capacity to undergo change and recover from it without crossing into an undesired state (Holling 1973). Social sciences started using the concept of resilience to refer the capacity of individuals or communities to undergo perturbations (stochastic and cumulative) as a result of social, political, economic or environmental transformations (Adger 2000). Likewise, the Institute of Development Studies pinpoints resilience as a critical element for sustainable livelihood (Scoones 1998).

Following ecological resilience approach and in the context of my research, resilience will be assessed in contrast to the optimization paradigm, which seeks for efficiency (Linkov et al. 2006). According to Walker and Salt (2006) choosing narrow set of variables to maximize them, when managing natural resources, it is counterproductive since it diminishes the resilience of the entire system in the long-run instead of being more efficient.

In this particular case study, optimization is approach differently. The concept refers to how the recreation activity is performed, which has a direct influence on the long-term
sustainability of the natural resource (and therefore the local communities depending on it).

In northern Quintana Roo, whale shark tourism initiated as an economic alternative to complement with fisheries in the local communities close to the aggregation. However, whale shark industry is becoming of greater importance socially and economically, up to the point of becoming the only relevant economic activity for much of the population, instead of increasing the activity portfolio for local operators (Tao and Wall 2009). Accordingly, a large number of local operators have particularly built (or transformed) their infrastructure in view of this activity (COBI 2007). Likewise, local operators’ perception has shifted from an “adventure tour” to a static activity in order to maximize the economic benefits in the short term, without considering the potential cascading effects in the long run (Berkes and Folke 1998). Therefore, this research tests how local stakeholders have optimized whale shark recreational activity both, in terms of operation and marketing (how the whale shark experience is sold and who is actually selling the tour).

2.2.2 Vulnerability

Researchers have traditionally perceived vulnerability as a flip side of resilience, so a vulnerable system is less resilient. But, some scholars acknowledge resilience as a component of vulnerability (Gallopín 2006), as it is commonly understood as a resulting condition from merged processes that diminish the capacity of the exposure entity to cope with the perturbation, recover and adapt (Zier vogel et al. 2006). According to Turnet et al. (2003), vulnerability analysis also relies on the ability of the communities to market their resources, develop marketing skills and obtain a reasonable price for their product (Turnet et al. 2003 and Ribot and Peluso 2003). This attribute is known as entitlement, which is usually used to refer property rights (Agrawal and Ostrom 2001). The relevance of using this vulnerability theory for studying natural resource sustainability relies on the integration of the social, economic and political context (Ribot and Peluso 2003).

In this case study, vulnerability is defined as the lack of access of local operators to tourism market, rather than to the degradation or the lack of access to the resource base (Ribot 1996). Local operators show dependency from intermediaries in order to attract tourists to experience the whale shark. Therefore, intermediaries obtain greater benefits than the licensees, whereas those make greater investments (Moriel 2008).
Intermediaries, through their decisions, shape the way the recreational activity is performed and, hence they represent an indirect impact on the species.

3. Study Case Description

This chapter provides detailed information to enhance the understanding of the case study selection. It comprises information about the species, the actors involved (both, in the recreational activity and in whale shark management), biophysical parameters of the aggregation area, as well as the socio-economic context to all local communities.

3.1 Whale Shark

Whale shark (*Rhincodon typus*) is the largest fish inhabiting tropical and subtropical waters, where temperature ranges from 21°C to 30°C (Compagno 2001). Recent studies indicate that this species can tolerate temperatures up to 15°C (Eckert and Stewart 2001, Turnbull and Randel 2006), and even extreme temperatures of 4°C during deep dives.

Its broad and flattened head, as well as its big mouth make this species easy to identify. Other distinctive patterns are the white spots on the dark skin (Last and Stevens 1994), which is the reason why in northern Yucatan peninsula is known as *Dominó*, due to the similitude with the pieces of the game (Remolina Suárez et al. 2005). In other countries of the Caribbean region, such as Cuba, the whale shark is known as *Damero*.

Literature classifies whale shark as a typical K species, for its slow growth, late sexual maturation (estimated at 30 years of age) and extended longevity (Taylor 1994). However, little information exists about their reproductive behavior, except for the discovery of a pregnant female harpooned in Taiwan. This event proved that whale sharks are lecithotrophic livebearer (Joung et al. 1996).

Whale shark is a filter-feeder organism that aggregates seasonally in certain places to feed along with food pulses (Taylor 1996, Clark and Nelson 1997, Colman 1997, Heyman et al. 2001, Last and Stevens in Stevens 2007). Whale sharks primarily prey on planktonic crustaceans such as copepods and euphausids (Jarman and Wilson 2004, Cardenas-Palomo et al. 2008a) and fish or coral spawn (Norman 1999, Heyman et al.
Nevertheless, literature also account for small fish (Duffy 2002, Wolfson and Notarbartolo di Scira in Stevens 2007) and squid (Stevens 2007) as part of their diet. Regarding feeding ecology, Stevens (2007) indicates that whale sharks are highly dependent on dense food aggregations, despite their filter screens being more efficient compared to other filter-feeder species such as basking shark. Food abundance is also pinpointed as a remarkable driver for determining their feeding strategy (Nelson 2004, Graham et al. 2006). In northeastern Quintana Roo, four feeding mechanisms have been identified: underwater ram, active surface ram, passive surface ram and stationary vertical suction (Cardenas-Palomo et al. 2008c). Active surface ram being the most common filter feeding strategy due to the large productivity in the area, whereas stationary vertical suction is the least common mechanism (Cardenas-Palomo et al. 2008c).

As other elasmobranchs, whale sharks are highly migratory species (Eckert and Stewart 2001, Eckert et al. 2002, Wilson et al. 2006, Hueter et al. 2008). Satellite tagging (total of 16 PSATs placed between 2003 and 2007) have shown that whale sharks in northern Yucatan travel to Western Gulf of Mexico, to the Strait of Florida and up to South Atlantic in Brazil (Hueter et al. 2008). Moreover, they demonstrated using the same PSATs that whale sharks perform deep dives (up to 1720m). So far, those deep dives do not appear to be related to foraging behavior or lunar phases. Species with high migratory patterns require for international protection and an integrative conservation management plan that portrays the species’ life cycle dynamics (Martin et al. 2007).

Researchers highlight the importance of profound understanding on migratory patterns and behavior of the whale shark, through mark-recapture, tagging campaigns and photo-ID (Meekan et al. 2006, Graham and Roberts 2007, Bradshaw et al. 2008, Holmberg et al. 2009).

Whale shark is considered a highly sensitive species to potential anthropogenic effects and over-exploitation (Bradshaw, et al. 2008), not only because of their migratory behavior, but also due to the fragility of their feeding grounds and their biological attributes (Taylor 1994, Colman 1997). In Quintana Roo, the main concern for whale shark conservation is uncontrolled tourism activity. According to literature (Norman 1999, Quiros 2007, Cardenas-Palomo et al. 2008c), there are evidences of animals changing their behavior or suspending their feeding activity when they are in close contact with tourists or in the case of injured individuals and when boats block their
route. This is relevant because whale shark tourism industry has intensively increased since 2003 (COBI 2007, Cardenas-Palomo et al. 2008c).

3.2 Stakeholders

3.2.1 Prestadores de Servicios Turísticos (PST)

Prestadores de Servicios Turísticos (PST) is a term that designates any person who offers any kind of tourism service. In the course of this research, PST will always stand for local operators, guides and captains that provide tourists with the experience to encounter and swim with whale sharks in northern Quintana Roo.

3.2.1.1 Local operators

Originally, local operators or boat owners were from Holbox and Chiquila. In 2005, local operators from Isla Mujeres and Cancun also began the non-extractive use of the species. Initially, local operators functioned as captains, while hiring a relative (brother, son, brother-in-law) as the guide. But as the whale shark tourism industry increased, local operators became micro-businessmen (some even hire permanent staff). In the case of local operators who own only one boat, the local operator remains working as the captain.

General Wildlife Directorate (DGVS) issues annual licenses\(^9\) to take out tourist willing to experience the whale shark, usually ranging from May 15\(^{th}\) to September 15\(^{th}\), to the local operators who legally fulfill the requirements established in the management plan. In order to obtain the licenses, local operators are organized into cooperatives, or as individuals (in the case of micro-businessmen or representatives of tourism corporations). So far, there are no restrictions in the number of licenses issued or who should own the license. However, environmental institutions agreed on maintaining a limit of 140 licenses\(^{10}\) as precautionary principle. Environmental institutions agreed also on prioritizing local operators born in those local communities in order to foster sustainable development at a local scale. Furthermore, DGVS has not set any restriction on the number of licenses that each local operator may hold. Therefore, the activity has

\(^9\) DGVS determine the number of tourists that each licensee can carry out according to the size of the boat. The number of tourists range from 6 to 10.

\(^{10}\) This agreement was not respected by DGVS that finally issued more than 140 (personal observations).
become monopolized by a few local operators in Holbox, Isla Mujeres and Cancun reinforcing social conflicts (COBI 2007, Cepeda 2008).

After each whale shark season, local operators must submit a report to DGVS with the information regarding the number of tourists (national and international), number of sharks encountered and price of the tour.

3.2.1.2 Guides

The main function of a guide is to see the tourists during the tour and to swim with the tourists while the encounter with the whale shark for safety and conservation reasons. The management plan dictates that a guide in the water per a maximum of two tourists is mandatory, as well as guides must hold the NOM-09-TUR-2002 certification, which attests them as specialized nature-oriented tourism guide by the Secretariat of Tourism. So far, there are no restrictions on gender or citizenship for obtaining the guide certification. All guides must be accredited by the Tourism Secretariat, after taking four compulsory courses (i) whale shark habitat, biology and ecology, (ii) group operation, (iii) first aid and CPR and (iv) snorkel and rescue (De la Parra 2008).

3.2.1.3 Captains

Captains do not take any compulsory course regarding whale shark biology, unlike the guides. However, captains must have in order their permits for maritime traffic (libreta de mar) from the Secretariat of Communications and Transports (SCT), as well as obtaining an extension for performing the whale shark tourism activity. Mexican constitution states that only people born in the country can hold the accreditation for maritime traffic.

3.2.2 Intermediaries

In the context of whale shark tourism, intermediaries are the individuals or firms that advertise, promote and sell the interaction with the fish, but they do not hold a permit from DGVS to perform the activity. Individual intermediaries (receptionists or sales agent) earn a commission (per tourist) from the local operator for selling the activity to tourists. Dive shops, travel agencies or tour operators subcontract local operators occasionally or periodically (certain amount of tourists or full boats several times a week during the whole season). Intermediaries can be local or from other sites in the Yucatan peninsula. At the beginning, small dive shops from Riviera Maya and Playa
del Carmen had contact with local operators in Holbox, who took them and their tourists out to swim with the whale shark sporadically. Later, when the whale shark tourism boosted up, travel agencies and tour operators began advertising and selling the activity. Recently, tour operators have contacted international tour operators (also known as travel wholesalers) to sell the whale shark experience. Therefore, intermediaries have accessed a wider market in an easiest and more efficient way putting more pressure on the species (Moriel 2008).

3.2.3 Environmental Institutions

There are several environmental institutions\(^\text{11}\) involved in the whale shark conservation in Mexico in general, and in Quintana Roo in particular.

### 3.2.3.1 Environment and Natural Resources Secretariat (SEMARNAT)

SEMARNAT is a federal agency dedicated to promoting the protection and conservation of ecosystems and natural resources in Mexico. As well as, to ensure the sustainability of goods and services that ecosystems provide to the Mexican population.

![Organizational structure of SEMARNAT](http://www.semarnat.gob.mx/queessemarnat/Pages/estructuraorganica.aspx)

---

\(^{11}\) In the light of this research, environmental institutions are government agencies in Mexico, at local, regional and national scale, which have a legal mandate to implement policies and management strategies regarding whale shark conservation (Ostrom 1999).
3.2.3.2 Wildlife General Directorate (DGVS)

DGVS is a federal agency created in 1996, which according to Chapter 6, Article 31st of the Internal Regulations of the Environment and Natural Resources Secretariat (D.O.F 21/01/2003) depends on the vice-secretariat of management of environmental protection. The aim of DGVS is to implement the policy to conserve and protect biodiversity in Mexico. In the case of whale shark tourism, DGVS is responsible for implementing the policy of sustainable non-extractive exploitation of the species. Therefore, DGVS is the competent body to issue annual licenses to the tour operators of the local communities where whale shark aggregate in Mexico. However, it is not based in any of those states, since it is a federal institution. DGVS communicates with PSTs through CONANP or SEMARNAT offices when it is needed (e.g. hand in the licenses or receiving the annual reports from local operators)\(^\text{12}\).

3.2.3.3 Federal Environmental Protection Agency (PROFEPA)

PROFEPA is a de-concentrated administrative body of SEMARNAT created in 1992, which implies it is independent from the secretariat at a technical and operational level (D.O.F. 2003). The objectives of PROFEPA are to enhance the level of compliance with the environmental regulations, as well as to enforce environmental laws in Mexico. In the case of the whale shark, PROFEPA is in charge of the operational monitoring, surveillance and control in the aggregation area. However, their reduced budget turns into a lack of staff and financial capital to afford continuous vigilance campaigns. Therefore PROFEPA’s presence in the area during 2008 was minimal.

3.2.3.4 National Commission of Natural Protected Areas (CONANP)

CONANP is a de-concentrated body from SEMARNAT since 2000, and its main objectives are to manage the Natural Protected Areas in Mexico, as well as poverty and marginalization alleviation in rural and indigenous areas in the NPAs and their zone of influence.

\(^{12}\) During the course of this thesis, the Whale Shark Biosphere Reserve was decreed on the 5th of June 2009, covering a total surface of 145.988ha. This action implies that the following season, in 2010, CONANP will be the only environmental body in Quintana Roo, accredited to issue licenses for the non-extractive use of the whale shark.
In northern Quintana Roo, whale sharks aggregate between Yum Balam Flora and Fauna Protected Area and Isla Contoy Natural Park. Since June 2009, Federal government decreed the Whale Shark Biosphere Reserve of the whale shark to foster the habitat and species conservation.

Map 1: whale shark biosphere reserve (www.dof.gob.mx).

However, field work and data analysis of this study was accomplished prior to the reserve’s establishment. Hence, it is important to introduce the former management agencies to understand the current situation. Yum Balam Flora and Fauna Protected Area (APFFYB) and Contoy Island National Park are two natural protected areas managed by the same environmental institution, the National Commission of Natural Protected Areas (CONANP). However, each area is a different entity, with different conservation priorities and dealing with different socio-economic drivers.

_Prestadores de Servicios Turísticos_ (PSTs) in Holbox and Chiquila departure from a NPA where there are daily controls in the main dock. Meanwhile, Isla Mujeres and Cancun are not part of any NPA; hence, local stakeholders have no daily contact any environmental institution. Thus, the link between CONANP and PST is stronger in the APFFYB. This is reflected in the number of subsidies granted, daily supervision of boats and tourists, and the compliance to the code of conduct (Solares 2005, Moriel 2008).
3.3 Whale Shark Aggregation Area

The seasonal presence of the shark occurs as a consequence of oceanographic patterns (see map 2), that provoke the upwelling of highly productive waters (200g C/m²/yr) (Cardenas Palomo 2008a). The subtropical underlying water mass originates at 220-250m depth in the channel between Cuba and the Yucatan peninsula, with a temperature of 22°C and a salinity of 36.8ups (Merino 1997). The upwelling extends along 400km from the north coast of the Yucatan peninsula, and 60km offshore triggering fisheries and potential recreational activities (Portilla-Casillas et al. in Soto 2003).

This body of water contains large amount of phytoplankton and zooplankton, particularly copepods, decapods, and fish eggs and larvae, which are the primarily diet of whale sharks in this region (Escamilla et al. 2001, Cárdenas-Palomo et al. 2008a). The aggregation covers a total surface of 121,491ha (Remolina 2005). Still, the zooplankton biomass defines two main areas for sightings: northern Cabo Catoche and northern Contoy Island (Cardenas-Palomo et al. 2008b).
3.4 Study sites and socio-economic context

3.4.1 Quintana Roo

The research is focused on the non-extractive use of the whale shark by PSTs from: Isla Holbox, Chiquila, Isla Mujeres and Cancun. All sites are located in the northern part of Quintana Roo state, southeast Mexico.

Map 3: location of the four local communities holding licenses for whale shark tourism in Quintana Roo.

Quintana Roo is characterized by the diversity of tropical ecosystems adapted to a dry/wet season oscillation of 6 months (Faust 2001), such as coral reefs (LaJeunesse 2002), tropical deciduous forests (Bray et al. 2004) or mangrove swamps (Navarrete and Oliva-Rivera 2002). The climate is warm, sub-humid with an annual rainfall of 700 to 1200mm and frequent hurricane episodes, which cause severe damage at both, the natural system and human settlements (Remolina 2003).

In the case of whale shark tourism, small boat harbor is closed during tropical storms or hurricanes. Hence, this has an economic effect on stakeholders benefitting from this recreational activity.

The state lies on a highly porous karst platform that filters most of the rainwater (Perry et al. 2002). Therefore, the subsoil of the Yucatan Peninsula is formed by underground rivers that discharge an estimated average of 8.6million m³/km of groundwater annually along the seashore (Back in Remolina 2003). All those geo-physical characteristics make the area suitable for the high occurrence of whale shark.
Regarding the socio-economic context, it is important to underline the variety of ethnic groups that coexist in the region. Historically Mayan communities occupied the state (Daltabuit and Pi-Sunyer 1990). However, since the tourism boom in 1970s, foreign population has increased up to a 10% of the total population (INEGI 2005\(^\text{13}\)). Foreign population is constituted by immigrants from other countries of Latin America, such as Cuba (1.7%), Venezuela or Argentina (4.8%), United States (28.4%), Canada and Europe, such as Italy, France, Germany (5.9%) and Spain (8.1%) (Pi-Sunyer and Thomas 2005, INM 2008\(^\text{14}\)). National immigration has also increased, up to a 100.680 residents (INEGI 2005).

Currently, Quintana Roo has become one of the most important tourist destinations in Mexico and in the Caribbean. In 2007, the state contributed with 4357.65 million dollars to the Mexican GDP, which is equivalent to the 33.77% of the tourism revenue. In 2008, the state was visited by more than 8 million tourists, who mainly stayed at resorts of Cancun and Riviera Maya (SEDETUR, Quintana Roo Tourism State Department). Tourists come from a wide range of countries, but mainly United States and Europe (particularly Holland, France, Spain, Italy, Germany and UK), as well as national tourists from other states of the Republic (Cepeda 2008).

This specialization has shaped the economy, society and ecosystems of the area, pushing the system towards undesirable states at the ecological scale (García-Frapolli et al. 2007).

### 3.4.2 Local communities involved in whale shark tourism

#### 3.4.2.1 Holbox

Holbox is an island separated from mainland by a sand bar partially submerged. The island is located inside the APFFYB, in the municipality of Lázaro Cárdenas (21°13’20”N, 87°22’46”W). Historically, it operated as refuge for people fleeing from the Caste War in the 19th Century. Later on, Holbox evolved into a fishermen town until 1938, when Ejido Holbox was allotted by the government to the local community, with a total surface of 8.864ha (Solares 2005).

In the late 1990s tourism became an economic livelihood alternative; but the tourism boom didn’t arise until 2003, when the whale shark tourism industry developed. This

\(^{13}\) Instituto Nacional de Estadística y Geografía, [www.inegi.org.mx](http://www.inegi.org.mx)

\(^{14}\) Instituto Nacional de Migración, [www.inm.gob.mx](http://www.inm.gob.mx)
event was fostered by the fact that Holbox and Chiquila were the only communities holding licenses for the non-extractive use of the species, and because of the weight of tourism sector in the state. Tourism has highly impacted the island at the social, economical and ecological scale. Hotel infrastructure has increased by 30% in the past 10 years (SECTUR\textsuperscript{15}), as well as migration (Cepeda 2008) and water pollution (Tran et al. 2002). In the following years, the state government and private investors project to increase urban development in the area.

In the case of whale shark tourism, local operators from Holbox hold licenses for the whale shark tour since 2003, and they are organized in 11 cooperatives (see table 1).

<table>
<thead>
<tr>
<th>Cooperative</th>
<th>Number of boats</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensueño del Caribe</td>
<td>24</td>
<td>Mixed</td>
</tr>
<tr>
<td>Laguna de Yalahau</td>
<td>14</td>
<td>Mixed</td>
</tr>
<tr>
<td>Punta Mosquito</td>
<td>12</td>
<td>Mixed</td>
</tr>
<tr>
<td>Boca del Limbo</td>
<td>7</td>
<td>Mixed</td>
</tr>
<tr>
<td>Isla Morena</td>
<td>7</td>
<td>Mixed</td>
</tr>
<tr>
<td>Bajo del Corsario</td>
<td>2</td>
<td>Mixed</td>
</tr>
<tr>
<td>Isla Pasión</td>
<td>2</td>
<td>Mixed</td>
</tr>
<tr>
<td>Principio del Caribe</td>
<td>2</td>
<td>Mixed</td>
</tr>
<tr>
<td>Cholenco Tours</td>
<td>4</td>
<td>Familiar</td>
</tr>
<tr>
<td>Cayo del Cocodrilo</td>
<td>2</td>
<td>Familiar</td>
</tr>
<tr>
<td>Pulperos del Caribe</td>
<td>2</td>
<td>Familiar</td>
</tr>
</tbody>
</table>

3.4.2.2 Chiquila

Chiquila is a small town of 1285 inhabitants and it is located in the municipality of Lazaro Cardenas and within the APFFYB, as well as Holbox. Historically, the local community fished and developed subsistence farming for their living; however fisheries became more important (Solares 2005). Nowadays, fisheries and transporting passengers to Holbox have become the main economic activities (Diaz-Amador 2005). Tourism industry has not become as relevant as in Holbox because of the lack of attractive sceneries and the lack of initial capital to invest in the activity, but it is growing in importance (Diaz-Amador 2005).

\textsuperscript{15} Secretaría de Turismo, \url{www.sectur.gob.mx}
Local operators from Chiquila hold licenses for the whale shark tour since 2003, and they are organized in two cooperatives: Cooperativa Miramar and Cooperativa Fraternidad Ambiental.

### 3.4.2.3 Isla Mujeres

Isla Mujeres is an island located in the namesake municipality, in northeastern Quintana Roo state. Isla Mujeres is situated in front of the major city of Cancun, with an extension of 7.5km long and 500m wide. Historically, fishermen moved to the island to catch sea turtles, groupers, sharks and sponges. Nowadays, the main economic activities in the island are fisheries (lobster, shrimp and conch) and tourism. The main tourist activities are carried out in the coral reefs inside the national park *Costa Occidente de Isla Mujeres, Punta Nizuc y Punta Sam*, and national park *Isla Contoy*.

With regards to whale shark tourism, local community holds licenses since 2005, although local community knew the species for over 30 years (Cardenas-Palomo et al. 2008c). According to the Tourism Department of the Municipality, whale shark tourism is expected to re-boost tourism again in the island, which currently nourished from day trips of tourists staying in Cancun and backpackers (Municipal Tourism Department *pers. comm.*).

### 3.4.2.4 Cancun

Currently, Cancun has become the major city of the municipality of Benito Juarez with a population rate that exceeds 500,000 inhabitants (INEGI 2005). Cancun development is due to tourism industry, which originated in the 1960s (Daltabuit and Pi-Sunyer 1990).

Originally, the Bank of Mexico and the government envisioned Cancun to become the first Tourist Integral Centre, within their strategic tourism development plan (Cothran and Cothran 1998). This idyllic area, located in northern Quintana Roo (21º09’38”N, 86º50’51”W), was characterized by 23km of paradise beaches and tropical forest (Torres 2002). Moreover, bankers and private investors executed other ambitious reforms that tourism development entails, mainly involving infrastructures such as roads improvements and international airport (Torres and Momsen 2005b). Finally, in the early 1970s the city became an exclusive and expensive tourist destination out of reach for Mexicans, and where foreign and multinational tourism clusters prevailed (Pi-Sunyer and Thomas 2005, Murray 2007). During 1980s, Cancun lost its exclusivity and
it became a middle class mass tourism destination, also called “sun-and-sand” tourists (Murray 2007). Later, Fondo Nacional de Fomento al Turismo (FONATUR for the Spanish acronym that stands for National Fund for Tourism Promotion) invested on diversifying tourism portfolio to reach more consumers besides “discount package” visitors (Torres 2002). Natural resources and cultural heritage became on the hotspot, as well as, tourism development extended towards the south in the Yucatan Peninsula (Playa del Carmen, Cozumel, Riviera Maya and the already rising Costa Maya). At the same time, tourism and urban development entailed key social and ecological changes. In-migration flux increased, mainly from surrounding rural areas to fulfill job positions in the tourism industry where little training is needed (farmers turned into bricklayers or waiters) (Cruz 2003). Economic disparity caused the stratification and polarization of the society (Torres and Momsen 2005). Untreated sewage (Torres and Skillicorn 2004), eutrophication of lagoon system (Merino et al. 1992), overexploitation of fisheries (Gonzalez-Cano 2007), soil conversion, mangrove logging and pollution have been underscored as the main anthropogenic impacts in the natural systems in Cancun (Zarate-Lomeli et al. 1999).

PSTs identify private yachts as a threat for whale shark conservation, because of their non-compliance to the protocol for individual users and the code of conduct while interacting with whale sharks established in the management plan (COBI 2007). Furthermore, this situation will aggravate due to the uncontrolled plan of realtors and the state government to enlarge Cancun’s marina, named Puerto Cancun (CONANP Isla Contoy pers. comm.). This ambitious port development will comprise a total surface of 327ha, a 330 boat capacity and space to accommodate 300ft yachts, according to National Fund for Tourism Development (FONATUR16).

16 Fondo Nacional de Fomento al Turismo, www.fonatur.gob.mx
4. Methods

This chapter portrays the ground, the steps followed to design the study, as well as the data sources and the methods used in order to obtain the results. Finally, a reflection is done on the limitations and validity of the methods used.

4.1 Epistemological background

Sustainability science is irremediably linked to complexity due to the diversity of components that are present in this concept. Moreover social-ecological systems, for instance tourism-nature systems are complex systems. Thus, a holistic approach is the base to understand the dynamic of such systems, where actions and consequences happen at different time and spatial scale, and to improve natural resources management (Berkes, Colding and Folke 2003).

This study is broad and integrative, since it includes all stakeholders ranging from tourists to local operators. Therefore, triangulation\(^{17}\) of methodologies needs to be employed (Funtowicz and Ravetz 2008). The methods used range from quantitative to qualitative in order to capture and incorporate as much information as possible about the potential social and economic factors undermining the whale shark population, upon which the recreational activity is based on. Qualitative data was reinforced with quantitative data in order to contrast information obtained from the interviews, as well as to improve the validity of this research (Flick 2007).

4.2 Research Design

Prior to field work, I identified key stakeholders through informal conversations with a former officer of CONANP, and a manager of a dive shop involved in the whale shark tourism industry since 2002. Once in the study site, I contacted a chief department of APFFYB and a researcher from Proyecto Domino\(^{18}\) in order to (i) get hold of the historical and social context leading to the current situation of whale shark tourism industry, (ii) identify potential threats for the species conservation, and (iii) reckon

---

\(^{17}\) Triangulation is the combination of different methods, theories, data and/or researchers in the study of one issue (Flick 2007: 143).

\(^{18}\) Group of researchers investigating whale sharks in the Mexican Atlantic. Their objective is to gather information on the species in order to foster more efficient management and sustainable tourism practices (De la Parra 2008).
management strategies regarding the aggregation. In the early stages of the field work, I contacted several PSTs in the main tourism activity hubs and conducted three conversational pilot interviews with local stakeholders, as well as constant informal talks with CONANP officers and PSTs to reckon the different threats and issues in the whale shark tourism industry that can affect the conservation of the species. Moreover, prior to data collection, the 2nd International Whale Shark Conference took place in July 2008 in Holbox. Hence, I used this event as a platform to introduce myself and arrange individual interviews with local stakeholders.

4.3 Data Collection

4.3.1 Tourist Surveys

A total of 262 interview surveys were carried out face-to-face to tourists in the main activity hubs. Questionnaires were conducted following the guidelines proposed by Burguess (2001). The reasons behind the tourist surveys were to explore systematically their compliance to the code of conduct19, to obtain a general profile of the visitors that come to the area for encountering whale sharks, and to quantify specific details on the operation and marketing of the activity (such as price of the tour, time to resource or number of interactions with the whale shark) in order to capture information on the level of optimization of the recreational activity and to detect potential impacts on the natural resource. Surveys (n=132) were collected from mid July to early August in the tourism dock Holbox, to gather information from tourists experiencing the activity through Holbox and Chiquila. No questionnaires were performed in Chiquila because of the low and irregular amount of tourists that departure from there. Moreover, PSTs often attract tourists in Chiquila but who are staying in hotels of Holbox, where they return after the encounter with the whale shark. To collect data from tourists taking the tour with PST from Isla Mujeres and Cancun, surveys (n=130) were collected from mid-August to mid-September in PEMEX dock, Isla Mujeres Cooperative dock and Playa Sol in Isla Mujeres, as well as in the Administración Portuaria Integral de Quintana Roo (APIQROO) docks of Punta Sam and Puerto Juarez.

19 Set of rules developed by PST, environmental institutions and researchers during a workshop in 2003. The code of conduct has become the only regulatory framework with regards to whale shark tourism in Quintana Roo (see appendix 3).
Before each survey, I introduced myself and the purpose of the research, and asked tourists for permission to conduct the questionnaire. Five-minute questionnaires were carried out from 11:30am to 3:00pm in the arrival docks, after the interaction with the whale shark. After the survey, tourist often reflected on how the tourist activity is carried out and the potential effects on the animals providing more information on how the whale shark tourism industry functions.

4.3.2 Semi-structured and in-depth interviews to PSTs

Semi-structured and in-depth interviews with local operators, guides and captains involved in whale shark tourism industry were conducted in order to allow two-way communication in a comfortable environment for the interviewee (Boyce and Neale 2006). Considering the participatory approach, I considered important to interview local operators, guides and captains given that they hold extensive knowledge on the behavior and dynamics of the SES (Gadgil, Berkes and Folke 1993). The combination of both techniques (in-depth and semi-structured interviews) allowed PSTs to explain their realities without me imposing pre-conceived thoughts or choices, but delimiting information within the topics under research (infrastructure, costs of operation, intermediaries, future of the social-ecological system) (Kvale 1996, Robson 2002).

Semi-structured and in-depth interviews were designed following Boyce and Neale (2006) and Robson (2002) guidelines. A total of 44 interviews with PST were conducted in Holbox (n=21), Chiquila (n=7), Isla Mujeres (n=14) and Cancun (n=2), from mid-September to mid-December, usually at their houses or workplaces. Those interviewees represent 87.5% of the local operators. All interviews were conducted in Spanish. PSTs were interviewed to gather specific information on the costs and benefits of the operation, but also in order to capture their perceptions on the pressure generated by the intermediaries and their role in the whale shark tourism industry. Moreover, PSTs were asked to reflect on the potential impacts of tourism industry on the whale shark, since they are in constant interaction with the animals. Firstly, I introduced myself and the aim of the thesis. Afterward, I assured local stakeholders anonymity and that the information collected during the interview would only be used for this purpose. PST preferred not to be recorded; thus, I took notes of their answers and informal language (Kvale 1996). The length of interviews ranged from 1 hour to 4 hours, resulting in 2 hour average.
4.3.3 In-depth interviews to environmental institutions and researchers

In-depth interview was the method preferred to obtain the expert opinions of the director of Yum Balam Flora and Fauna Protected Area, the vice-director and the director of Contoy Island National Park, all staff members of CONANP, as well as the research coordinator of *Proyecto Domino*. In-depth interviews were designed following guidelines proposed by Boyce and Neale (2006) and Flick (2007). This type of interview provided the basis for understanding the complete picture of the SES from a top-down perspective and the reason why whale shark tourism industry has evolved in this direction (Kvale 1996). Detailed information was gathered about the attitudes institutions have towards local operators and the threats they are facing, as well as how they are building capacities. All in-depth interviews were conducted in Spanish and recorded using an Olympus digital voice recorder VN-4100. Staff member of CONANP were specifically inquired about the process to obtain whale shark tourism licenses, the participation of the local community in the management and planning of the recreational activity, communication existing between them and PSTs, intermediaries’ presence and future declaration of biosphere reserve. Researchers from *Proyecto Domino* were asked about the state of the ecological system, the participation of the PSTs in monitoring whale shark population, the evolution of the whale shark tourism industry, potential impacts from tourism on the species and about ongoing research.

4.3.4 Oral Presentations

It is important to highlight that two oral presentations were done in October and November 2008, in Holbox (*Palapa Casa Ejidal*) and Isla Mujeres (*Sala de Cabildos, Palacio Municipal*), to show the preliminary results to the stakeholders and obtain more feedback from the discussion generated during the meeting. Local stakeholders were contacted through CONANP.

4.3.5 Explanatory interviews to intermediaries

It is important to mention that exploratory interviews with intermediaries (n=20) were carried out, but no robust data was obtained from them in order to analyze them statistically. Feasible explanations are (i) the competence existing among travel agencies, dive shops and tour operators to sell the tour and (ii) reluctance to provide
economic details on their operation and marketing strategies and (iii) the lack of expertise of intermediaries’ employees. However, interviews with the intermediaries were useful to complement the information about the social conflicts existing among the different areas, their perception of PST and the whale shark tourism industry, and the competence existing among travel agencies and dive shops to seize the market.

4.3.5 Cost-Benefit Analysis

Previous research estimated tourists willingness to pay (WTP) for travelling to the area where the activity takes place and the WTP for the tour (Cepeda 2008). However, this thesis is based on a cost-benefit analysis in order to detect if local operators are entirely aware of the profits and costs of operation for the whale shark activity. According to Grimble and Wellard (1997), economic analysis is used to determine how well or how poorly, this activity is planned and how it might turn out. Consequently, it illustrates the risk that local operators face in order to sustain economically the activity, and ultimately, the vulnerability of their livelihood.

During the semi-structured and in-depth interviews, local operators were asked about (i) the tour price (per person) when they sell the tour directly (distinguishing between national and international tourists), (ii) the price that intermediaries pay per person, (ii) the costs of operation including: gas, captain and guide salary, food and beverages, insurances, CONANP levies (only for Chiquila and Holbox since they are the only study sites located inside a NPA), administrative costs, maintenance, equipment and licenses (both from CONANP in the case of Holbox and Chiquila, and SCT for all four sites).

4.4 Data Analysis

In this section, the different methods used to analyze data obtained throughout surveys and interviews are described. It is important to notice that when talking about stakeholders, data is analyzed separately for each local community. This is because each local community has been through a different process with regards to whale shark tourism. Concerning the data obtained from the surveys, Holbox and Chiquila are considered as Area 1, whereas Isla Mujeres, Punta Sam and Puerto Juarez are labeled as Area 2. This is because of geographical proximity and similar characteristics of the locations.
However, when I refer to the natural resource, there is no distinction about communities but I speak of the whale shark aggregation as a whole.

4.6.1 Role of Intermediaries

For answering the first research question, information from surveys and interviews was analyzed using different strategies. Pie graphs were used to show the frequencies (in percentages) for each site and therefore the proportions of the variables. Frequency tables were used to summarize categorical data (Townend 2002). Information in the table differentiates between the observed frequency and the relative frequency (expressed in percentages) to give a glance of the relevance of each factor and variable.

Finally, Fisher’s Exact tests were performed, using R 2.8.1 software, to detect the association between two categorical variables, the number of tours that local operators had with how relevant is for each of them the relationship with the intermediaries in order to determine whether local operators have access to the market or not. Fisher’s exact test was chosen because the sample size was small in each study site. So, the approximation is more accurate than Chi test value, because the expected value for more than 20% of the categories was less than 5 (Crawley 2005). Those statistical tests were performed for Holbox and Isla Mujeres, but not for Chiquila. This is because only one of the interviewees in Chiquila had contact with a travel agency from Tulum; besides, he refused to answer any question regarding such link.

4.4.2 Economic sustainability

In order to answer the second research question, (i) the sources local operators used to get and maintain their infrastructure, (ii) average price tourists paid for encountering the whale shark and (iii) the total profits and costs of operations generated from the activity, are assessed.

The financing sources are analyzed using a pie graph to see the percentage (and thus importance) of each source, and who is the source, whether it is their own money or external capital.

During surveys, tourists were asked how much they paid for the whale shark tour. Afterward, the price average was calculated and inserted in a table, where the price for direct sale, the price for local intermediaries and the price for intermediaries from Cancun, Playa del Carmen or Riviera Maya were separated into different categories.
This is because each price of the tour is different, so the net benefit will vary in relation to each fare.

Then, the cost-benefit analysis (CBA) was calculated. All prices are expressed in US$. Firstly, I calculated the price of the gas needed per tour, multiplying the amount of gas per the price of the gas at that time in each study site. Then, I added the costs that local operators have per tour.

\[ \text{Costs per tour} = \text{gas} + \text{guide's salary} + \text{captain's salary} + \text{food} + \text{beverages} \]

Secondly, I calculated the total of marginal costs of operation, that is to say the annual costs the activity brings up, and should be repaid with the benefits obtained during the season in order to defray at least the costs of operation. The marginal costs were calculated including the compulsory insurances that boat owners have to purchase, the price of the equipment (divided by two years of amortization), money spend in licenses (including paperwork), and the annual costs of maintenance of infrastructure. The cost of major repairs, such as motor replacement, is not reflected because (1) the activity is recent, (2) it varies significantly from one to another boat and (3) prices fluctuate with the US dollar.

\[ \text{Marginal costs (annual)} = \frac{\text{Insurances + Licenses + Maintenance Cost + Equipment}}{\text{Amortization (2 years)}} - \frac{\text{Number of Tours (per season)}}{\text{Number of Tours (per season)}} \]

Then I added the costs per tour to the marginal costs of operation in order to calculate the total costs generated by the whale shark activity.

\[ \text{Total costs} = \text{costs per tour} + \text{marginal costs of operation} \]

Afterward, I calculated the gross profit per tour per boat depending on (i) the tour prices abovementioned and (ii) the number of tourists in a boat.

\[ \text{Gross Profit} = \text{Price per tour per person} \times \text{Total amount of people in the boat} \]

---

20 The Exchange rate from Mexican Pesos to US Dollar is calculated at 10.945:1, to Euro at 15.33:1, and British Pound is calculated at 19.3768:1. Those exchange rates were calculated during the data collection.
The number of tourists in a boat is determined by the size of the boat and then established in the license. But since most of the local operators take less number of tourists than their maximum capacity, the cost-benefit analysis was also calculated for the minimum amount of tourists that local operators consider necessary to go out on a tour (4 people in Holbox and 5 people in Isla Mujeres)\(^{21}\).

Finally, the total cost is deducted from the gross profit to determine the net benefit of the operation.

\[
\text{Net profit} = \text{Gross Profit} - \text{Total costs of operation}
\]

Later, the average net benefit was calculated for each site, per number of tourists in the boat, in order to summarize data.

4.4.3 Implications on the Natural Resource

To determine the implications of whale shark tourism industry on the species, statues from the code of conduct were taken as reference, since those regulations are indicators of tourism pressure (Quiros 2007).

Fisher’s exact test was used again to establish the association between the number of times swimming, the number of sharks encountered and the number of boats within 500m. This statistical analysis was calculated for the areas separately for Area 1 and Area 2.

4.4.4 Implications for the Future of the Social-ecological system (SES)

During interviews PSTs were asked to reflect on (1) how they envision the future of the social-ecological system, (2) on whether they think that is going to be a set price (standard), respected and approved by all PST, (3) how they think that the commercialization of the tour would be and (4) their necessities. After transcribing the answers, I used codes to identify concepts and then I compared the similarities and differences among the answers for each of the three study sites using procedures described in Malterud (2001), Punch (2005) and Flick (2007b). Then I used literature to classify the answers into top-down\(^{22}\) or bottom-up\(^{23}\) management strategy, and whether

---

\(^{21}\) Although boat owners indicate that 4 to 5 people are the minimum amount of tourists needed to defray costs (according to their calculations). There are boats transporting less than 4 tourists (pers. obs).

\(^{22}\) A "top-down" strategy is defined as the decisions planned and developed by an institution (regulatory body), decision maker, or an individual at high hierarchical levels of organization. Thereafter, this
if those factors enhance or jeopardize the sustainability of the SES (Turnet et al. 2003, Walker and Salt 2006).

4.7 Critical reflection of the methods

The study aims to have a holistic view on the social-ecological system; however, it is hard to obtain all stakeholders’ perception on the socio-economic drivers influencing the sustainability of the whale shark tourism. In order to facilitate the data collection and analysis, only key informants were approached. Even though this study is mainly concentrating on information obtained from interviewing local operators, greater number of interviews to guides and captains would have provided more details on the impact on the ecological system and the necessities in situ in the aggregation area. Indeed, greater number of interviews with intermediaries and other environmental institutions such as DGVS and PROFEPA would have been needed to complete the top-down perspective of the situation. In the case of Cancun, lack of contact information of tour operators was a limiting factor, aggravated by the size of the study site and the number of marinas where PSTs departure from. Only two interviews were conducted with local operators from Cancun, therefore no statistical analysis was performed. However, information about the operation in Cancun was gathered, and it will be integrated in the discussion. Although this study represents a good overview of the SES as a whole, deeper analysis should have been done on the interaction in situ and per se, because impacts are cumulative from daily basis misconducts. This also brings the limitation of time scale since this study was conducted in one year, whereas sustainability implies longer research. However, I conclude that this analysis can be equally helpful and a reference point for managers and users to improve in their performance.

resolution is disseminated to lower levels in the social-ecological system. In the case of whale shark tourism, PSTs are bounded by environmental institutions and intermediaries.

23 A “bottom-up” strategy is one where initiatives rise from lower hierarchical levels and disseminate up in the system. In the case of whale shark tourism, local operators, guides and captains may foster change through collaborative participation in the planning and management of the recreational activity.
5. Results

5.1 The Role of Intermediaries

5.1.1 Tourists Preferences for Tour Operators

The proportion of tourists that bought the tour through intermediaries in Holbox and Chiquila\textsuperscript{24} (52\%) is similar to the proportion of direct sale (49\%). On the contrary, in Isla Mujeres\textsuperscript{25}, it is consistently superior (72\%) over the direct sale (4\%). Another remarkable difference between both areas is that in Isla Mujeres, Punta Sam and Puerto Juarez, 24\% of the tourists surveyed did not know who they bought the tour to.

Those results reflect that the contact tourist-local community is mainly promoted through intermediaries. Moreover, tourists assume that PSTs are staff members of the travel agency or dive shop.

![Figure 3: relative frequencies of tourist’s preferences for tour operator or vendor in Area 1 (left) and in Area 2 (right).](image)

Tourists were also asked about the reasons to choose this particular operator or seller. Pie graphs show greater diversity in the answers from the tourists that arrive to Area 1 than Area 2.

The proportion of tourists booking the tour through their hotel, agency or dive shop, thus intermediaries is consistently different in the two areas, 24\% in Area 1 \textit{versus} 63\% in Area 2.

\textsuperscript{24} Intermediaries are classified according to whether they are based in Holbox or in other sites of the state, such as Riviera Maya, Cancun, Playa del Carmen or Cozumel.

\textsuperscript{25} Intermediaries in Isla Mujeres are classified according to whether they are travel agencies and dive shops, who act as operators of the whale shark tour and subcontract boat with license and the crew, or travel wholesalers (international tour operators such as Tui, Oad, Turavia, Veratour, etc.), who have become the main sale agents of the whale shark encounter in the tourism hubs.
Regarding recommendations, first impression or previous tourist-local operator relation, The following pie graphs indicate a moderate higher percentage of tourists who chose their tour operator directly, through someone’s recommendation, because of the good impression they got when they first met the operator or because they already knew the PST. 38% and 15% corresponding to Area 1 and Area 2. With regards to the price of the tour, only 5% and 6% of the tourists surveyed stated to choose the operator because it was cheaper.

Figure 4: relative frequencies of the reasons tourists asserted for buying the whale shark encounter in Holbox and Chiquila.

Figure 5: relative frequencies of the reasons tourists alleged for buying the whale shark tour in Isla Mujeres, Punta Sam and Puerto Juarez.

To sum up, there is higher influence of intermediaries in Isla Mujeres and Cancun than in Holbox and Chiquila, so far.
5.1.2 Commercial link between local operators and intermediaries

The table below evidences how in Holbox and Isla Mujeres, 100% of the licensees work with intermediaries to attract and secure a higher volume of tourists. Meanwhile, in Chiquila only one boat owner manifested having commercial links with a dive shop in Tulum. In the case of Chiquila, the representative of a cooperative said “first of all the quality of our boats is not as good as in Holbox, and secondly, we are not interested because of their high demands and they want to pay little” to explain the reasons behind the lack of commercial links with intermediaries.

<table>
<thead>
<tr>
<th></th>
<th>Yes Frequency</th>
<th>Yes Percent</th>
<th>No Frequency</th>
<th>No Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holbox (n=11)</td>
<td>11</td>
<td>100%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Chiquila (n=6)</td>
<td>1</td>
<td>16.7%</td>
<td>5</td>
<td>83.3%</td>
</tr>
<tr>
<td>Isla Mujeres (n=11)</td>
<td>11</td>
<td>100%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total (n=28)</td>
<td>23</td>
<td>82.1%</td>
<td>5</td>
<td>17.9%</td>
</tr>
</tbody>
</table>

In Holbox, 100% of the licensees declared having an agreement, mostly oral (63.6%) or tacit (27.3%). Tacit agreements are arrangement where both actors inferred certain clauses, without actually expressing them. Therefore, this may entail misunderstandings, as for example a guide in Holbox states: “it gets complicated when I already attracted fours tourists and the hotel directs me another three tourists to fill the boat. The problem is that not all tourists pay the same and all tourists have been promised different things”. Likewise a local operator in Holbox expresses his dependency on the intermediaries as follows: “I sell the tour by 800pesos, so I give the tourists extra activity, such as snorkeling or fishing, if agencies direct me one or two tourists, they gain because I offered their tourists the same tour as the tourists I attracted. However, one day this agency directed me five tourists, so I just took them to swim with the whale shark and we came back. When we arrived tourists complained with the agency because the travel agent assured them they would snorkel in the reef after the encounter, therefore the agency decided to pay me only 550 pesos per each tourist”.

On the contrary, in Isla Mujeres there is greater proportion of licensees (54.5%) who have a written contract with intermediaries, in comparison to Holbox (9.1%). This is probably since PSTs have longer experience negotiating with intermediaries in other tours such as fishing trips, snorkel on coral reefs or bird watching in Contoy Island.
Thereafter, oral agreements are the second largest type of agreement with 27.3% of the answers. In the case of Isla Mujeres, all oral arrangements are established between boat owners and commission agents or the receptionists from hotels. Hence, the agent directs the tourists with the PST who pays them highest commission.

Nevertheless, one licensee does not have any kind of agreement with the intermediaries. PST affirmed they don’t have agreement with the intermediary because “he helped us pay for the replacement of a motor, so the agency deducts the money we owe them from the money of tours they have already pre-arranged with us”. Another local operator explains “I didn’t have enough initial capital so this intermediary lent me the money to buy the boat and begin in the whale shark tourism industry. I pay this intermediary through the tours”.

Table 3: frequency table for agreements between intermediaries and licensees

<table>
<thead>
<tr>
<th>Local operator</th>
<th>Oral</th>
<th>Written</th>
<th>Tacit</th>
<th>NA</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Holbox (n=11)</td>
<td>7</td>
<td>63.6</td>
<td>1</td>
<td>9.1</td>
<td>3</td>
<td>27.3</td>
</tr>
<tr>
<td>Chiquila (n=6)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Isla Mujeres (n=11)</td>
<td>3</td>
<td>27.3</td>
<td>6</td>
<td>54.5</td>
<td>1</td>
<td>9.1</td>
</tr>
<tr>
<td>Total (n=28)</td>
<td>10</td>
<td>35.71</td>
<td>7</td>
<td>25</td>
<td>4</td>
<td>14.29</td>
</tr>
</tbody>
</table>

Local operators explained who (and how) launches the commercial association. 50% of the PSTs replied that intermediaries took the first step. Then, PSTs mentioned, equally (10.7%), the option “both” to refer that both actors were looking to establish the link and the option “previous relation” to refer that they already know personal or professionally.

18% of local operators do not maintain any type of contact with intermediaries, this situation mainly manifests in Chiquila. However, a cooperative has commercial links with an NGO that helps them marketing the recreational activity as part of Puerta Verde\textsuperscript{26} initiative.

Table 4: Contact between local operator and intermediaries

<table>
<thead>
<tr>
<th>Local operator</th>
<th>Intermediary</th>
<th>Both</th>
<th>Previous Relation</th>
<th>Other</th>
<th>No Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq.</td>
<td>%</td>
<td>Freq.</td>
<td>%</td>
<td>Freq.</td>
</tr>
<tr>
<td>Holbox (n=11)</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>72.7</td>
<td>2</td>
</tr>
<tr>
<td>Chiquila (n=6)</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>16.7</td>
<td>0</td>
</tr>
</tbody>
</table>

\textsuperscript{26} Community network for alternative tourism which tries to give a livelihood alternative to the villages in the center part of Quintana Roo state.
5. 1. 3 Relation between local operators and intermediaries

PSTs were solicited to grade their relationship with the intermediaries. PST stated in 46% of the cases that their relationship is good or very good. In case of Holbox, the relationship between local operators and intermediaries has existed for longer, with regards to whale shark tourism. Originally, small dive shops promoted the experience among a reduced amount of tourists interested in water recreational activities and marine fauna, and they still do. PSTs refer to this type of intermediaries as friends, whereas PSTs refer to big tour operators and travel agencies as coyotes or zopilotes²⁷. PSTs declared that intermediaries are only worried about the money and not about the quality of the service, since most of the agencies shifted to Isla Mujeres after 2005. The reason behind this change is the easier access to the licensees in Punta Sam or Puerto Juarez from main tourism hubs, according to what PSTs and intermediaries agreed upon. It entails less travelling time from Playa del Carmen, Cancun or Riviera Maya, where their clientele stays.

In contrast, 25% of the interviewees declared that their relationship with intermediaries is satisfactory or bad, because it is only commercial and that intermediaries tend to pay less than what they demand. As a PST in Holbox answered “the relationship with the intermediaries is good, we have a friendly relationship, but the negotiation is very poor”. In case of Chiquila, the 18% of the boat owners answered that their relationships is null.

<table>
<thead>
<tr>
<th></th>
<th>Excellent</th>
<th>Very Good</th>
<th>Good</th>
<th>Satisfactory</th>
<th>Bad</th>
<th>Absent</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Holbox (n=11)</strong></td>
<td>0 0 4 4 2</td>
<td>0 0 0 1 1</td>
<td>0 0 0 0 0</td>
<td>0 0 0 0 0</td>
<td>1 1</td>
<td>1 1 1 1</td>
<td></td>
</tr>
<tr>
<td><strong>Chiquila (n=6)</strong></td>
<td>0 0 0 0 0</td>
<td>0 0 0 0 0</td>
<td>0 0 0 0 0</td>
<td>0 0 0 0 0</td>
<td>1 1</td>
<td>1 1 1 1</td>
<td></td>
</tr>
<tr>
<td><strong>I. Mujeres (n=11)</strong></td>
<td>1 9.1 0 0 0</td>
<td>5 45.5 4 1 1</td>
<td>9 32.1 6 21.4 1</td>
<td>1 3.6 5 17.9 2</td>
<td>1 1 1 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (n=28)</strong></td>
<td>1 3.6 4 14.3 9</td>
<td>6 32.1 6 21.4 1</td>
<td>5 17.9 5 17.9 2</td>
<td>1 1 1 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. 1.4 Negotiation process between local operators and intermediaries

Local intermediaries (such as receptionists, commission agents or other local operators who have exceeded their boat capacity) direct tourists to local operators

²⁷ Both terms are derogative because coyotes and vultures are scavengers. PSTs use this simile to indicate that this type of intermediaries only care about the money and ignore the quality of the service.
punctually once they attract tourists. In this regards, a guide explains “they come and say: I have a trip of so many people to such a price. They usually offer 500 pesos per tourist”.

Intermediaries from Cancun, Riviera Maya, Playa del Carmen or Cozumel contact annually boat owners to schedule a meeting. Intermediaries ask licensees for their permit, pictures of the boats and insurances. Then, both, intermediaries and local operators state their fares and the conditions of the deal. Intermediaries, prior the season, tell local operators the number of boats they will have full with tourists each week. However, PSTs explained that in some cases intermediaries don’t sent as many people as said, especially if the agreement is oral and only concerns the tour per se.

Most of the times, PST accept low fares offered by the intermediaries, because local operators lack of the marketing skills to lure tourists. Moreover tourists locate in other areas of the state. Regarding this, a boat owner says is Isla Mujeres: “we don’t have the means to attract tourists from Playa del Carmen and Riviera Maya, they have greater volume of vacationers, or other PST will accept it and go out on tours while I will stay inland”.

5.1.5 Extra demands from intermediaries

When local operators were asked about whether or not intermediaries asked for an extra requirement, 68% of the PSTs answered affirmatively. They mention as extra requirements (i) the way to the docks were shuttles arrive with tourists from Cancun, Playa del Carmen, Riviera Maya or Cozumel and (ii) interpreter.

On the contrary, 28.57% of the PST answered no because (i) there is no contact such as in Chiquila, or (ii) the intermediaries have other businesses besides selling WS tours or (iii) PST won’t accept paying commissions as it is the case in Holbox or Isla Mujeres. A PST in Holbox said “no, I don’t have deals with coyotes because they want to pay very little, I work only with friends. If I want to lower them the fare, I do, but they don’t force me”, whereas in Isla Mujeres another boat owner states “we have less number of trips, because we don’t want to lower the fare. Once they are full with people, then intermediaries contact us. We get the leftovers, but we get the price we ask for”.

<table>
<thead>
<tr>
<th>Table 6: extra requirements from intermediaries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Holbox (n=11)</td>
</tr>
</tbody>
</table>
5. 1.6 Extra activities

In order to complete the overview on the operation of the activity, tourists were asked whether or not they had an extra activity besides encountering the whale shark. It is important to underline that due to the highly productivity of the waters during late spring-summer (Merino 1997 and Cardenas-Palomo 2008), other species of megafauna is observed such as sea turtles (*Chelonia mydas* and *Eretmochelys imbricata*), mantas and rays (*Manta birostris* and *Rhinoptera bonasus*) and several species of dolphins and pilot whales (Remolina-Suarez 2003). Thus, captains stop the boats so tourists to observe and interact with those animals, this is what PSTs label as “pluses”, however, tourists are not charged additionally for those activities.

Tourists taking the tour from Holbox or Chiquila replied affirmatively in a 45% of the surveys, while the remaining 55% of the respondents said that they returned to the dock after swimming with the whale shark. This is because the tourists that contract the tour through agencies in Rivera Maya or Playa del Carmen must return to the hotels about 5 to 6pm, and it takes 2 to 3 hours drive from Holbox.

In Holbox, 85% of local stakeholders declared using “pluses” to lure tourists into the whale shark tour and compete with the two big companies who have stronger connections with the intermediaries. Meanwhile, in Isla Mujeres most tourists did extra activity because intermediaries offer them to the tourists and to the international tour operators in order to increase the price of the tour.

![Figure 6](image-url)
However, in Isla Mujeres, Punta Sam or Puerto Juarez, 97% stated they did at least an extra activity besides the encounter. Extra-activities are part of the negotiation between intermediaries and local operators. Generally, PSTs take tourist to snorkel in *Ixlache* or *La Cadena*, where they give tourists ceviche or they take them to eat lunch to Isla Mujeres (buffet).

5. 1.7 Marketing strategies

When PST were asked about the strategies they use to attract tourists in Holbox, they either answered through intermediaries (29%), passively (14%) or both (43%). Passive strategy implies that the tourist is the one asking the boat owner in their sale’s point, which represents only investing in publicity such as pamphlets or signs. Travel agencies, dive shops, receptionists, sales representative and other PST exceeding their boat capacity are considered as intermediaries. It is important to highlight that 95% of the PSTs in Holbox affirmed trying to lure directly or through a guide or captain (who works for them) tourists in the “*Caleta*” by announcing and asking tourists once they get off the ferry.

![Figure 7: marketing strategies employed by PSTs in Holbox to lure tourists into the recreational activity.](image)

In Chiquila, 100% of the PSTs catch the attention of tourists once they get off the bus to cross into Holbox and then PSTs provide them with information about the tour. This community nourishes from “*fletes*” (boats crossing to Holbox) (Diaz-Amador 2005, COBI 2007), which they use to offer the tourists a better fare or to convince them with their explanations. According to a boat owner in Chiquila, another strategy is to wait for

---

28 *Caleta* is the main dock in Holbox, where all the ferries from Chiquila arrive.
those tourists that travel by their own and arrive after 10am to the dock for crossing to Holbox to book a tour since the latest boat departures around 10am. One of the cooperatives is involved in “Puerta Verde” initiative that is commercialized by a local NGO.

![Figure 8: marketing strategies PSTs from Chiquila use to attract tourists.](image)

Finally in Isla Mujeres, 93% of the PSTs affirmed that the main strategy to gain tourists is through intermediaries, either a receptionist that charge a commission per person or through travel agencies and dive shops that rent the boats with permits (including guide and captain). On the other hand, 43% of the PST interviewee, mentioned also appealing tourists through publicity they have in their offices (cooperatives) or other businesses (restaurants, dive shops or rental cars). Tourists see the publicity and enter to get information about the whale shark encounter.

![Figure 9: marketing strategies that PSTs in Isla Mujeres employ to attract tourists](image)
5. 1. 8 Access to market

In the table below, the presence of intermediaries is contrasted to the number of tours local operators carried out. In Holbox, although the presence of intermediaries is high, the relevance of commercial association with intermediaries is diverse. The percentage of local operators with intermediaries’ relevance below 50% and above 60% is 45.5% in both cases. On the other hand, 9.1% claimed that the relevance level is between 50 or 60%. The number of tours ranged from 20 to 107.

<table>
<thead>
<tr>
<th>Intermediaries Relevance</th>
<th>Number of Tours</th>
<th>0 - 40</th>
<th>40 - 80</th>
<th>80 - 120</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-20%</td>
<td></td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>30-40%</td>
<td></td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>50-60%</td>
<td></td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>70-80%</td>
<td></td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>90-100%</td>
<td></td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>11</td>
</tr>
</tbody>
</table>

Fisher’s Exact Test allows to refute the null hypothesis of no association (p= 0.4). Therefore, in Holbox the number of tours local operators had during whale shark season 2008 is linked to how strong their commercial relationship with intermediaries is.

In the case of Isla Mujeres, 7 out of 11 of the PST that had more tours during season 2008 had a highly dependence on the intermediaries (90-100%). However, none of the local operators had more than 80 tours. This implies not going out in a tour all working days during whale shark season, established from May 15th to September 17th as established by DGVS. This is due to the fact that Isla Mujeres is not recognized yet as a destination for interacting with the whale shark, but they mainly receive visitors from Riviera Maya or Playa del Carmen, according to the General Directorate of Tourism in Isla Mujeres. For those tourists, it is another tour within the range of possibilities that the state has to offer for excursions.

Nevertheless, the municipality celebrated the first Whale Shark Festival to closure the season, “this event is expected to boost Isla Mujeres as a whale shark encounter destination, in addition to lure tourists to stay in hotels of the island. Therefore, the economic income will stay within the island” states an officer from the General Directorate of Tourism.
Table 8: contingency table showing market access in Isla Mujeres

<table>
<thead>
<tr>
<th>Intermediaries Relevance</th>
<th>Number of Tours</th>
<th>0 – 40</th>
<th>40 – 80</th>
<th>80 – 120</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-20%</td>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>30-40%</td>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>50-60%</td>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>70-80%</td>
<td></td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>90-100%</td>
<td></td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>6</td>
<td>5</td>
<td>0</td>
<td>11</td>
</tr>
</tbody>
</table>

Fisher’s Exact Test confirms the null hypothesis of no association (p = 1). Hence, for local operators in Isla Mujeres, the number of whale shark tours gained during season 2008 is not linked to their commercial relationship with intermediaries. However, the fact that no operator performed more than 80 tours last season, it disguises the relevance of intermediaries for the whale shark tourism industry in Isla Mujeres.

5.2 Economic profitability by local operators

5.2.1 Financing sources

It is important to mention that all PST from the three study sites affirmed they use their own money to purchase infrastructure (basically boat, equipment and engines). So, the graphs below reflect whether they only use their own money or if they combined it with other financing options.

In Holbox, we can observe that 55% of the PST used only their own money, which comes from other small businesses (markets, restaurants...), from ejido29, and from their own savings from other activities as fishing. Equal proportion of PST asked for private loans (18%) than for subsidies (18%). “CONANP and UNDP granted the subsidies in order to improve boat conditions (motors and equipment), publicity and training”, states a CONANP officer. Only one of the PST asked for a bank loan. This low percentage is due to the high interests and on top that there is no bank in town, this would imply travelling to Cancun or Merida for each transaction.

---

29 Ejido is a land tenure system founded in Mexico after the Revolution in 1910. Although initially, the property could be sold (only inherited), the Mexican government (with Carlos Salinas de Gortari as a president) eliminated the constitutional rights (Brown 2004).
In Chiquila, 100% of the PST used their savings to invest in the whale shark industry. Besides their own money, 50% obtained financial support from CONANP and UNDP to fit the boats out. Other 33% of the boat owners requested a loan with a trust, through the fishing cooperative they are members of. Finally, one interviewee obtained the financing from both, subsidies and trust.

In Isla Mujeres, most part of the boat owners (64%) used only their own money (other businesses or legacy) to start in this tourism activity. As well as in Holbox, 18% of the interviewees affirmed obtaining the initial capital from a private loan. The rest of PST obtained a fisheries trusts (9%) or because they associated with a shareholder (9%).
Figure 12: sources of financing from PST in Isla Mujeres

5. 2. 2 Tour price

During the questionnaires, tourists were asked about how much they paid for the whale shark tour. The prices are illustrated in the table below, according to the different fares (see data analysis). All prices are expressed in US dollars.

<table>
<thead>
<tr>
<th>Table 9: Tour prices paid by tourists (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price A</td>
</tr>
<tr>
<td>Holbox</td>
</tr>
<tr>
<td>Chiquila</td>
</tr>
<tr>
<td>Isla Mujeres</td>
</tr>
</tbody>
</table>

Prices vary considerably in relation to if it is a direct sale or if it is an outsider intermediary. This is because of the marketing chain. Prices are higher in Isla Mujeres than in Holbox, but in both locations the price has no changed with regards to the prices PSTs agreed from the beginning (80US$ in 2003, and 125US$ in 2005 for Holbox, Chiquila, and Isla Mujeres, respectively). The maximum price paid per a whale shark tour in Holbox corresponds to a tour contracted through an intermediary from Playa del Carmen, which included airplane from Playa del Carmen to Holbox. It is important to notice that the minimum price paid in each study site is below the base price.

5. 2. 3 Cost-Benefit Analysis

The number of passengers in a boat range from 6 to 10 (plus two crewmembers). So the more tourists in the boat, the better because the costs remain the same but the income per tour increases, so the net benefit also increases. However, the CBA has been calculated considering the minimum amount of tourists that PSTs actually take on the tour. The benefits are calculated according to the different tariffs that PST have. In
Holbox, benefit A corresponds with the direct sale to international tourists, while benefit B corresponds either to price for national tourists or the price that intermediaries pay. In Isla Mujeres, benefit A corresponds to direct sales to international tourists, while benefit B corresponds to the direct sales to national tourists or local intermediaries (such as receptionists form hotels in the island). Finally, benefit C corresponds to the prices that pay the intermediaries from Cancun, Playa del Carmen or Riviera Maya. In the case of Chiquila, the tariffs vary according to the number of people paying for the boat. From 1 to 4, tourists pay per boat from 3000 to 4000 pesos, while when they are 5 or more, the price is varies from 650 to 800 pesos.

<table>
<thead>
<tr>
<th></th>
<th>Tourists</th>
<th>Benefit A (US$)</th>
<th>Benefit B (US$)</th>
<th>Benefit C (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isla Mujeres</td>
<td>5</td>
<td>106</td>
<td>-21</td>
<td>-96</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>229</td>
<td>76</td>
<td>-14</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>351</td>
<td>174</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>474</td>
<td>271</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>596</td>
<td>368</td>
<td>231</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>719</td>
<td>465</td>
<td>313</td>
</tr>
<tr>
<td>Holbox</td>
<td>4</td>
<td>-83</td>
<td>-128</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>-11</td>
<td>-67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>61</td>
<td>-7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>132</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>203</td>
<td>114</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>276</td>
<td>175</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>348</td>
<td>236</td>
<td></td>
</tr>
<tr>
<td>Chiquila</td>
<td>1-4</td>
<td>-357</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>-382</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>-313</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>-244</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In Isla Mujeres benefit A would be the ideal situation, since all PST win even if they take 5 tourists. However, the amount of direct sales is very low because (1) tourist do not recognize Isla Mujeres as a destination for whale shark encounter yet, (2) tourist do not stay in hotels from Isla Mujeres, they rather stay in other parts of Quintana Roo and take a day trip to visit the island and shop (General Directorate of Tourism in Isla Mujeres), (3) as seen before PST have not been dedicated to the marketing of the tour, but to its operation.

It is important to highlight that licensees from Isla Mujeres own mostly boats that can take 10 people on the tour, except some smaller boats from the cooperatives. However,  

---

Cost-benefit analysis in Holbox and Isla Mujeres was calculate considering the average of minimum amount of tourists necessary to do the tour, however some local operators declared doing the tour with only 2 or 3 tourists.
those boats take at the most 9 people, because one of the spaces is occupied by the interpreter requested by the intermediaries.

In Holbox, there is greater diversity of tariffs, which can foster the tour marketing. However, because there are larger amount of boats and not enough tourists, it is common that boats take only 4 or even less people to a tour. If this situation continues for the entire season, the activity turns unsustainable economically.

In Chiquila, the situation is critical since the PST cannot recover the marginal costs as the number of tours is less than in Holbox or Isla Mujeres. However, since there is less competence among the two cooperatives, the tariffs are very similar among all PST.

I compared the benefits obtained in table above to the minimum wage in Quintana Roo which is 54.8 pesos (equivalent to 5US$) earned per day according to the Tax Administration Service (www.sat.gob.mx 2009). When PST capture more than seven tourists a tour, the net benefit exceeds greatly the minimum wage of the state. However, to see the profitability of the tourism industry, I compare local operators to a micro-business, since they are self-employed, the activity is less profitable. The benefits are good, but not enough for replacing an entire motor\(^{31}\), and keep the positive balance, because if we compare the gain with the cost of repair the balance is disproportioned. Moreover, some of the PSTs affirmed that they still paying the cost of initiating in the recreational activity. PSTs agreed that the average of initial capital approximately needed in Chiquila is US$10000, in Holbox US$ 30000, and in Isla Mujeres US$ 65000.

5. 3 Implications on the Natural Resource

5. 3. 1 Boat crowding and tourist-whale shark interaction

Fisher’s Exact Test indicates that in both study areas (p<0.001) the null hypothesis of no association can be rejected. Hence, the number of whale shark-tourist interactions is related to the number of sharks encountered and the number of boats within a 500m radius. It is important to highlight that the code of conduct establishes a minimum of 100m distance between boats. So in those situations where there were more than 5 boats around, captains would be infringing the security distance. The

\(^{31}\) A replacement can cost from 34,560US$ to 97,200US$, when the motor is 60-90hp and 250hp, correspondingly, four stroke and new engine. The price may vary according to the brand and if it is new or second hand.
average amount of boats around a whale shark is 4 to 5 boats, according to PST. However, there are punctual situations at the beginning and at the end of the whale shark season where the ratio is higher “the last day of this season we only encountered one shark, so we had so share the fish among 20 boats. We were lucky it didn’t sink” says a guide from Holbox.

In Isla Mujeres, Punta Sam and Puerto Juarez the number of sharks encountered increased sharply during this season due to the existence of another feeding ground that named “Agua Azul”, “located about 15 to 20 miles northeastern Isla Mujeres, fostered mainly by the gyre of the Yucatan current, which helps concentrate fish eggs” according to a local operator from Isla Mujeres. Few information exists regarding this particular area, however tourists constantly mentioned encountering aggregations close to hundred. Moreover, Cardenas-Palomo et al. (2008) reported a sighting of 200 individuals in 2005 apparently associated to anomalous temperature.

Finally, results manifest that the average amount of times that tourists interact with the same individual is primarily below 5 in both areas.

5.3.2 Code of conduct

5.3.2.1 People interacting

According to the code of conduct only a maximum of two tourists and a guide are allowed to swim with the whale shark simultaneously. However, tourist surveys show that in 24 occasions more than 3 people interacted at the same time with the whale shark. According to PST this kind of regulation offence occur mostly with boats from Punta Sam and Puerto Juarez as a result of a nonexistent constant and effective vigilance. A captain in Isla Mujeres says “PSTs watch that other PSTs don’t allow more tourists than permitted interacting at the same time with the animals, because sometimes when PSTs find a school of whale sharks it is easier for the guides to allow all tourists to swim with the fish so they finish earlier working”. The situation worsens after storms since whale sharks are not feeding at the surface “therefore, it is harder for the PST to find them, but they already have the commitment towards the tourists and the intermediaries who guarantee 100% the interaction” explains a boat owner in Holbox.

5.3.2.2 Guide presence

In both areas, 100% of the tourists surveyed affirmed that the guide was always present in the water during the interaction. However, PSTs report that in certain cases
the guide accompanying the tourists during the encounter is the translator or extra guide stipulated by intermediaries. This is particularly noteworthy in Punta Sam and Puerto Juarez, because of the lack of vigilance and the presence of bigger agencies marketing the whale shark experience. The problem is that in most of the cases, those guides are not accredited by SECTUR.

5. 4 Future of the SES perceived by stakeholders

Regarding the future of the ecological system, PSTs insisted on the necessity of having constant and effective vigilance, as well as establishing a penalty table. Local operators claim the table should differentiate among who is disobeying, grade of offence, and penalty because only licensees are punished, hitherto. In this regards a local operator declares “there should be a penalty table in the management plan because each offense must have a value. In this way, if I incurred in any error, I know how I will pay the consequences, thus I will think about the consequences first. It also avoids authorities to withdraw our licenses if it is the first time we don’t comply with the rules. Moreover, it is important to distinguish among different users in the penalties, so we are all responsible for our individual actions and there is greater control”. So far, PSTs establish informal in situ vigilance, called participatory vigilance, to report rules offences. However, this initiative has aggravated social conflicts among PSTs because it is a small population and most local stakeholders are relatives. Moreover, a local operator from Isla Mujeres asserts “it is not our job, we are PSTs. We are not cops! So if PROFEPA did its job, we would not have to worry. We fulfill with all the requirements they ask us to obtain the licenses because it is our job, then they should do the same”. Another local operator states “we cannot guard because the rest of PSTs don’t take us seriously. Sometimes, we have highlighted actions that were wrong in the aggregation area, but it became a piece of gossip. This is because we are not the authority, for example we have taken photos of offenses but then the PSTs say it wasn’t the day or it wasn’t the area”. If the lack of vigilance persists, 14% of PSTs agreed that observation would be preferable to the tourist-animal interaction to therefore reduce pressure on the whale shark population. Two thirds of the PSTs noticed punctual change in the behavior of the animals and injured animals by boat propellers are commonly encountered. In this regard, a local guide from Isla Mujeres explains “when they hear the noise from the
engines, they sink and it is harder to operate”. Moreover, in Holbox a local operator with 8 year-experience added “when tourists bother whale sharks they either sink or swim faster, those are their mechanisms to escape from us”.

Besides lack of vigilance, PST identified other drivers operating top-down, which will likely affect the sustainability of the whale shark tourism: (i) lack of transparency in the process of granting licenses, (ii) urban development that involves marinas (uncontrolled users), and (iii) the high number of existing licenses.

Regarding bottom-up strategies, PSTs highlight the necessity to receive further training. According to PST, training courses organized by CONANP have been very helpful to make guides aware of the necessity of conserving the species. However, PST manifested the importance of diversify on the topics of the courses and trainees, in order not to create “compadrazgo”. Moreover, PST interviewed generally mentioned that training courses should be also mandatory for captains because they need to manage the boats responsibly in the whale shark aggregation area. Sometimes, particularly in Holbox, guides and captains exchange positions to reduce work load, which motivates some captains to attend training courses. PST pointed out that training on marketing, languages, computer and communication skills are required. Hence, local stakeholders believe that enhancing education is going to make users more aware of the importance of the whale shark for the communities, as a local operator in Isla Mujeres states “I hope all PSTs are aware that the whale shark tourism is feeding many people, and they should care about it”.

With regards to economic drivers 100% of PSTs concur that the promotion and recommendations from tourists will stress northern Quintana Roo as a destination for whale shark experience, in the tourism market worldwide\textsuperscript{32}. Therefore, the volume of tourists that will come to encounter the fish is expected to continue increasing. However, PST envision internet as a key medium to become more independent from intermediaries and lure tourists into the whale shark experience by themselves. Thus, the economic revenue remaining for the local stakeholders can increase. PSTs indicated that providing with accurate information to tourists willing to experience the whale shark is another reason behind promoting the use of internet. Sometimes, intermediaries

\textsuperscript{32} Local operators from Holbox attended a tourism fair in Mexico City, while local operators from Isla Mujeres did in another one in Las Vegas. In January 2009, the representative of one of the cooperatives in Chiquila attended FITUR (Feria Internacional del Turismo) in Madrid.
divulge non-friendly practices such as avoiding the use of life vests, touching or interacting as many times as desired with the animal. Interviewees identified (i) lack of organization within and among communities, (ii) social conflicts, (iii) pollution and (iv) inability among local stakeholders to respect a fix price of the tour as the main bottom-up factors endangering the sustainability of the social-ecological system.

### Table 11: stakeholders perception on the future sustainability of the whale shark tourism in northern Quintana Roo

<table>
<thead>
<tr>
<th>Top-down</th>
<th>Bottom-up</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enhancing sustainability</strong></td>
<td>- Sanction table</td>
</tr>
<tr>
<td></td>
<td>- Training and education</td>
</tr>
<tr>
<td></td>
<td>- Awareness of importance of the whale shark at the economic and ecological level</td>
</tr>
<tr>
<td></td>
<td>- Internet (direct sale)</td>
</tr>
<tr>
<td><strong>Jeopardizing sustainability</strong></td>
<td>- Lack of vigilance</td>
</tr>
<tr>
<td></td>
<td>- Lack of transparency</td>
</tr>
<tr>
<td></td>
<td>- Urban development</td>
</tr>
<tr>
<td></td>
<td>- High number of licenses</td>
</tr>
<tr>
<td></td>
<td>- Lack of organization</td>
</tr>
<tr>
<td></td>
<td>- Social conflicts</td>
</tr>
<tr>
<td></td>
<td>- Pollution</td>
</tr>
<tr>
<td></td>
<td>- Price of the tour</td>
</tr>
</tbody>
</table>

6. Discussion

This chapter examines the results obtained through the interviews and surveys, and associates them to the problem statement: wildlife tourism sustainability. It underlines the implications of the analyzed socio-economic drivers on the resource base, the whale shark population, as well as the potential threats for and from each local community involved in the whale shark tourism industry. Finally, the discussion provides the reader with a notion of how this study has contributed to sustainability science, and further research needed to assess wildlife tourism sustainability.

**Role of Intermediaries**

Results show that there is greater influence from intermediaries in Isla Mujeres than in Holbox, whereas the influence in Chiquila is null. The tendency where intermediaries direct tourists to local operators is increasingly prevailing over direct sale, especially in Holbox. This occurs as a consequence of tourists booking the whale shark tour through intermediaries, either from their place of origin or through international agencies working at the resorts in the rest of the state (Moriel 2008). Therefore, these tourists are completely disconnected from the local communities, and from the original sense of the
whale shark tourism. Moreover, the low impact recreational activity has become an overcrowded tourism as the rest of the tourism activities in the state. Furthermore, local operators have become intermediaries as well, directing tourists to other local operators, who lack of marketing channels or abilities (such as shops, sellers, contact with agencies or local hotels, etc…), in exchange for keeping a percentage of the price of the tour. There are even local operators who sublet other local operators’ boats (licenses) as part of their staff per season. This is mainly the case of boat owners with larger number of licenses and connections with intermediaries both, in Holbox and Isla Mujeres. The interviews to local PSTs evidenced that there are different type of intermediaries, ranging from individuals, local agencies or small dive shops to international tour operators. They all perceive the natural resources and project different attitudes towards it, and thus influence differently on its sustainability, for instance there still small dive shops that pay the stated fare, make tourists stay in local hotels to spend a night in the island, or prefer to attract smaller amount of visitors.

In general, intermediaries have the capacity to diminish the sustainability of the natural resource, as they persuade higher number of tourists to interact with the species. Their maximization strategy is completely disconnected from any knowledge on the dynamics of the species and the sense of precautionary principle on restricting activities while there is not enough consistent information, all in order to minimize the risk of impact in the future on the species and/or the habitat (Fennel and Ebert 2004, Mau 2008).

Additionally, intermediaries exert direct influence on optimizing the operation of the recreational activity via (1) demanding specific infrastructure from local operators (e.g. powerful engines), (2) demanding extra requirements (e.g. translators, certain food or pick up services), (3) demanding on reduced animal’s search time and (4) by guaranteeing the interaction. In case tourists don’t see or interact with the fish, local operators are forced either to reimburse totally or partially the money or to re-schedule another trip (COBI 2007, Moriel 2008). Consequently, there is greater pressure on captains and guides to find the whale shark (via GPS and radio communication), and to break the compliance with the code of conduct. When only few animals can be seen, there is a higher probability of boat crowding, since all boats present in the aggregation area “sharing” the same individuals. In such situations, code of conduct is often neglected, in order to satisfy tourists, who paradoxically are the priority in front of the resource base. As a result, whale sharks have started showing evasive behaviors, mainly change in direction, diving up and down, and steep diving downwards. Moreover,
literature manifests that boat overcrowding can increase boat injuries and therefore force animals to change their migratory routes, as well as noise pollution from boat engines (Martin 2007, Norman in Cardenas-Palomo et al. 2008c).

...Until the goose lays the last golden egg

Results evidence that local operators are not aware of the real and fully costs of the activity and that they lack of administrative skills. This fact, along with the lack of access to tourism markets by local operators, aggravates their economic situation both, in the short and the long run. This conclusion can be made, since results forecast the local operators with higher initial capital or fewer years involved in the recreational activity will notice the economic trap later. There is a growing tendency from licensees to be tied to intermediaries, who act as moneylenders or shareholders. So, local operators become economically dependent for maintaining, repairing or purchasing infrastructure (boats, engines, etc.), without increasing their own benefit. Moreover, the extensive number of licenses granted, lowers the value of the natural resource, which has actually become congestible, and triggers social conflicts by means of promoting disloyal competence.

All those factors contribute to the majority of stakeholders perceiving the natural resource as a “cake” or “golden goose”, so that they try to obtain the most benefit without considering the effects that their actions will have in the long run, whereas they undoubtedly depend on the quality of the natural resources for their economic wealth.

The Challenge to achieve Sustainability

Literature contemplates that impacts not only depend on the type, but also on the frequency and intensity of the recreational activity (Orams 2000). Therefore, managers should prioritize the conservation of the natural resource over allocating great amount of licenses, and at the same time complement traditional activities with new opportunities in tourism to diversify local community’s options. Whale shark tourism can employ people in different tasks, such as environmental educators, administrative, park rangers, maintenance staff (infrastructure, cleaning services, water quality monitoring) not only for the direct purpose of the activity but in order to improve overall life and service quality.
Another important challenge for managers is to include all stakeholders in the planning and management of the activity and the area. Hence, intermediaries should also be involved in this process. This would allow intermediaries to benefit from the resource without compromising the sustainability of it, by promoting quality instead of quantity. It is also in their own benefit to use the resource sustainably, otherwise if the number of intermediaries keeps increasing their benefits will equally decrease.

**Future of the Socio-Ecological System**

Studies on the human-animal interaction have determined that the impact of the activity so far is low (Cárdenas-Palomo 2008c). The major concern for the sustainability is the uncontrolled increase of the whale shark tourism in the area, together with Cancun’s urban development. Furthermore, non-compliance of regulations and unfriendly practices will intensify if protocol of surveillance *in situ* is not established. This should also be complemented by a constant monitoring of human-animal interactions.

On the other hand, establishing a Whale Shark Biosphere Reserve could be a window of opportunity to promote communication among stakeholders, to limit the number of licenses and to improve stakeholder’s organization. However, CONANP should employ an adaptive co-management strategy to arrive to a consensus on how the resource can be managed. Otherwise the establishment of the reserve can be counterproductive, since all users could move to “Agua Azul”, which is located outside the NPA.

Furthermore, CONANP should invest on habilitating information modules where tourists are informed about the species, the code of conduct, the area and how to support local communities, in order for them to make wiser choices. This could be used as a platform, for example by gathering for meetings or attending training courses, to foster communication, collaboration and organization among PSTs.

---

33 Agua Azul is a second aggregation area northwest Isla Mujeres, not included in the biosphere reserve. This area has been poorly studied, but it has been already used by PSTs for some years.
8. References


COBI. 2007. Diagnóstico básico del desempeño de los operadores de servicios turísticos de Isla Holbox, Chiquilá e Isla Mujeres, Q. Roo dedicados a la observación y el nado con tiburón ballena, con miras a la eco-certificación de la actividad por Green Globe 21.


Fennell, D.A., and Ebert, K. 2004. Tourism and the Precautionary


Last, P. R., and Stevens, J. D., Sharks and Rays of Australia. CSIRO, Australia.


Norman, B. 1999. Aspects of the biology and ecotourism industry of the
whale shark *Rhincodon typus* in north-western Australia. MSc Thesis, Murdoch University.


Remolina, F. 2003. Ficha Informativa de los Humedales de Ramsar (FIR). CONANP, Quintana Roo, Mexico.

Remolina-Suárez, J. F., Pérez-Ramírez, J. J., González-Cano, J. M., De la Parra-Venegas, R., Betancourt-Sabatini, N., Trigo-Mendoza, M., González-Moreno,


Solares, I. 2005. Evaluación socioeconómica rápida de las comunidades del interior y la zona de influencia del APFF Yum balam: una herramienta para definir estrategias de conservación para el desarrollo, dentro de una región prioritaria para la conservación". Mexico


Tesch, R. 1990. Qualitative Research: analysis types and software tools. Falmer. New York, USA.


Appendix 1

Local operators / Guides / Captains Interview: Protocol

Date:          Length:  
Place:  

Operator       Guide       Captain

Technical data:  
1. Own boats:  

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>+10</th>
</tr>
</thead>
</table>

2. 1______ 2______  Motors:    Enduro _______ 4 stroke ______

3. HP:  

| 60 | 100 | 150 | 200 | 225 | Other ________________________ |

4. Type of contract (in case he/she works for one operator):  

| Written | Oral | Other    |

5. Number of operators he/she works for (freelance):  

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>+10</th>
</tr>
</thead>
</table>

6. Number of workers during whale shark season (operators):  

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>+10</th>
</tr>
</thead>
</table>

7. Number of trips during season 2008 __________  

May __________  

<table>
<thead>
<tr>
<th>0-10</th>
<th>11-20</th>
<th>21-30</th>
<th>31-40</th>
<th>41-50</th>
<th>51-60</th>
<th>61-70</th>
<th>71-80</th>
<th>81-90</th>
<th>91-100</th>
<th>+100</th>
</tr>
</thead>
</table>

June __________  

<table>
<thead>
<tr>
<th>0-10</th>
<th>11-20</th>
<th>21-30</th>
<th>31-40</th>
<th>41-50</th>
<th>51-60</th>
<th>61-70</th>
<th>71-80</th>
<th>81-90</th>
<th>91-100</th>
<th>+100</th>
</tr>
</thead>
</table>

July __________  

<table>
<thead>
<tr>
<th>0-10</th>
<th>11-20</th>
<th>21-30</th>
<th>31-40</th>
<th>41-50</th>
<th>51-60</th>
<th>61-70</th>
<th>71-80</th>
<th>81-90</th>
<th>91-100</th>
<th>+100</th>
</tr>
</thead>
</table>

August __________  

<table>
<thead>
<tr>
<th>0-10</th>
<th>11-20</th>
<th>21-30</th>
<th>31-40</th>
<th>41-50</th>
<th>51-60</th>
<th>61-70</th>
<th>71-80</th>
<th>81-90</th>
<th>91-100</th>
<th>+100</th>
</tr>
</thead>
</table>

September __________  

<table>
<thead>
<tr>
<th>0-10</th>
<th>11-20</th>
<th>21-30</th>
<th>31-40</th>
<th>41-50</th>
<th>51-60</th>
<th>61-70</th>
<th>71-80</th>
<th>81-90</th>
<th>91-100</th>
<th>+100</th>
</tr>
</thead>
</table>

71
8. Average of boats per day doing the tour:

9. Average of fuel and oil used for the tour per boat:

10. Number of tourists per boat:

<table>
<thead>
<tr>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
</table>

**General facts**

11. ¿How long have you working in the whale shark encounter tours?
   - 1 2 3 4 5 6 7 8

12. According to your experience, how do you do the tour?

13. How do you find the whale sharks?

<table>
<thead>
<tr>
<th>Go to the aggregation area and look for the whale shark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use the same coordinates than the previous day</td>
</tr>
<tr>
<td>I see where the boats are, and I look around that area</td>
</tr>
<tr>
<td>See where the boats are, wait for they to swim with the sharks before my tourists do the activity</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

14. Comparing this season with previous ones, do you think the operation has changed?
   - Yes  No

   ¿How?

15. In general, do you think that the number of tourists coming for swimming with the whale shark has changed?
   - Increased  Same  Decreased

16. Why?

<table>
<thead>
<tr>
<th>Intermediaries have changed departure point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic crisis</td>
</tr>
<tr>
<td>Some operators monopoly the market</td>
</tr>
<tr>
<td>The tourists choose other tours</td>
</tr>
<tr>
<td>More promotion on TB, etc.</td>
</tr>
<tr>
<td>Lower price has attracted more people</td>
</tr>
<tr>
<td>Market is broader because agencies from Cancun, Riviera Maya or Playa del Carmen got interested</td>
</tr>
<tr>
<td>National tourism has increased compared to international tourism</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

17. How do you contact tourists? How do you capture tourists?

**Intermediaries**

18. Do you work with/for intermediaries?
   - Yes  No
19. Please indicate the average of tourists or trips you have capture through the following intermediaries:

<table>
<thead>
<tr>
<th>Hotels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local agencies</td>
</tr>
<tr>
<td>Dive shops from Cancun /Riviera Maya / Playa del Carmen / Cozumel</td>
</tr>
<tr>
<td>Travel agencies from Cancun /Riviera Maya / Playa del Carmen / Cozumel</td>
</tr>
<tr>
<td>Travel wholesalers (First choice, tui, turavia, …)</td>
</tr>
<tr>
<td>Other operators</td>
</tr>
<tr>
<td>Otro ____________________</td>
</tr>
</tbody>
</table>

20. How would you qualify your relationship with intermediaries?

<table>
<thead>
<tr>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Satisfactory</th>
<th>Bad</th>
<th>Very bad / inexistent</th>
</tr>
</thead>
</table>

21. Do you usually work with the same intermediaries?

Yes    No

*In affirmative case, how long have you been working for the intermediary?*

*In negative case, how many intermediaries have you worked for?*

22. Who established the relationship?

<table>
<thead>
<tr>
<th>I contacted the intermediary</th>
</tr>
</thead>
<tbody>
<tr>
<td>The intermediary contacted me</td>
</tr>
<tr>
<td>A third person put us in contact</td>
</tr>
<tr>
<td>There was a previous relationship</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

23. What type of agreement do you have?

<table>
<thead>
<tr>
<th>Written</th>
<th>Oral</th>
<th>Tacit</th>
</tr>
</thead>
</table>

24. How are these agreements negotiated?

25. Do they have any special requirement?

Yes    No

26. What type of requirement do the intermediaries request?

<table>
<thead>
<tr>
<th>Boat size and condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guide or interpreter without cost</td>
</tr>
<tr>
<td>Transport from Chiquila, Punta Sam or Puerto Juarez or from the hotel</td>
</tr>
<tr>
<td>Additional food or drinks</td>
</tr>
<tr>
<td>Additional sites to the whale shark aggregation</td>
</tr>
</tbody>
</table>

27. ¿Are those requirements easy to satisfy?

**Investment**

28. How much did you invested for entering into the whale shark tours?

29. What did you invested in?
30. How much did you invested for 2008-season?

31. Which was your source of finance?

<table>
<thead>
<tr>
<th>Own capital (savings, other businesses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ejidos</td>
</tr>
<tr>
<td>Private Loans</td>
</tr>
<tr>
<td>Bank Loans</td>
</tr>
<tr>
<td>Subsidies</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

32. In case of bank or private loans and subsidies, what did they requested?

**Operation costs and benefits**

**Operators**

33. How much do you sell the tour for?

34. What do you offer for breakfast and lunch? (including drinks)

35. How much does it cost?

36. How much does the equipment cost?

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetsuits</td>
<td></td>
</tr>
<tr>
<td>Life vests</td>
<td></td>
</tr>
<tr>
<td>First-aid kit</td>
<td></td>
</tr>
<tr>
<td>Radio</td>
<td></td>
</tr>
<tr>
<td>GPS</td>
<td></td>
</tr>
<tr>
<td>Rain coat</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

37. How much do you pay for CONANP’s bracelet?

38. How many and what kind of insurances do you have to purchase?

39. How much do they cost?

40. How much do you pay for authorizations or permits?

<table>
<thead>
<tr>
<th>Authorization</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONANP</td>
<td></td>
</tr>
<tr>
<td>SCT</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

41. How much does boat maintenance cost?

42. How much do you earn from each tour (net)?

43. How much do you earn as guide?
   - Do you do any kind of investment to be a whale shark guide?

<table>
<thead>
<tr>
<th>Investment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetsuit</td>
<td></td>
</tr>
<tr>
<td>Life vest</td>
<td></td>
</tr>
<tr>
<td>Snorkel</td>
<td></td>
</tr>
</tbody>
</table>

• Yes

• No
44. How much do you earn as captain?
   – Do you do any kind of investment to be a whale shark guide?
     Yes  No

| GPS | Uniform | Training courses (not compulsory) | Other |

**Future perceptions**

45. According to your experience, how do you think the activity will be in 10 years from now?

46. Do you think that there will be a unique/standard price among all operators?

47. In 10 years, do you think that operators will contact tourists directly or mainly through intermediaries?

48. What do you think it is necessary to improve the tourist activity?

49. How would you like to do the tours? what would you change?

**Appendix 2**

*Tourist Surveys*

1. **Where do you come from?**
   a) Canada  d) Europe ______________________________
   b) United States  e) Latin America ______________________________
   c) Mexico  f) Other _______________________________

2. **How many people are you travelling with?**
   1 2 3 4 5 6 7 8 9 10 +10

3. **Have you encountered whale sharks before? Where?**
   Yes _______________________________  No

4. **Which tour operator did you choose for the tour?**
   a) Direct operator
   b) Local agency / intermediary
   c) Travel wholesaler
   d) NA
   e) Other

5. **How much did you pay for the tour?**

6. **At what time did you departure from the dock?**
   6 6:30 7 7:30 8 8:30 9 9:30 10 10:30

7. **At what time did you arrive from the tour?**
   12 12:30 13 13:30 14 14:30 15 15:30 +15:30

8. **Why did you choose this tour operator?**
   a) They offered me a lower price
   b) I saw publicity / advertisement
c) Someone recommended it  
d) I have done the tour with them in previous years  
e) I booked the tour through my hotel or travel agency  
f) They offered me a better service (better food, better boats, ...)  
g) Other ________________________________

9. How long (hours) did it take to locate the whale sharks, since you left the dock until you encountered them?  
-1  1  1:30  2  2:30  3  +3

10. How many sharks did you encounter?  
0  1  2  3  4  5  6  7  8  9  10  +10

11. How many times did you swim with the same whale shark?  
0  1  2  3  4  5  6  7  8  9  10  +10

12. How many people swam with the whale shark at a time? (including the guide)  
1  2  3  4  5  6  7  8  9  10

13. Did the guide enter into the water with you every time?  
Yes  No

14. How many boats were around your boat, in a 500m distance?  
0  1  2  3  4  5  6  7  8  9  10  +10

15. Did you do any other additional activity besides swimming with the whale shark, during the tour?  
Yes  No

a) snorkel  
b) bird watching  
c) mangroves or the river  
d) lunch (ceviche, sandwiches, ...)  
e) fishing  
f) Other ________________________________

Comments / Observations / Recommendations for improving Whale Shark Tourism

Appendix 3

Code of Conduct