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Title: The influence of scuba diving on tourism destination management – A case study of the Cozumel Island, Mexico.

Abstract

The actual demand for water-related activities has taken coastal communities to develop structures, and operations for supporting tourism development. Cozumel Island receives approximately 2.8 million tourists every year, and during a period of two months, was stage for profiling visitors taking part in scuba diving activities. The study distinguishes two subpopulations of divers, according to their certification level and training programs on demand. The assessment of divers has produced relevant data for tourism management, from which 47.51% were interested in participating in diving activities. The island lives from tourism activity and services, and is a popular port of call for international cruise ships. Declared as one of the most popular diving grounds on the Mexican Riviera, more than 23 diving spots can be identified, and receive an average number of 818 divers and snorkelers per day. Scuba diving has strong influences on economic growth of the island, developing the local society, and therefore the National Park Cozumel Reef is monitoring for environmental impacts, setting the rules for any activity within the boundaries of the park.

Keywords: Tourism destination, scuba diving, marine protected areas, visitors, sustainable development.

1. Introduction

Cozumel is located on the Mesoamerican Barrier Reef system hosting the flag of the largest island in Mexico. The principal connections to the main land are present by car/passenger ferry boat, distant 16.5 Km from Punta Venado, near Playa del Carmen, the International Airport of Cozumel can support up to 9 flights per hour, and the smaller airfield "Capitan Eduardo Toledo" can be used for small and private aircrafts. Moreover, Cozumel has three international piers to accommodate the international cruise industry, receiving around 2.5 million passengers per year (SEDETUR, 2012).

According to the Secretary of Tourism for the State of Quinta Roo (SEDETUR, 2012) visitors have filled up 51 % of the hotel occupation among the 45 hotels installed on the island, which have accommodated 403.793 tourists during the period Jan-Nov 2012. The average stay on Cozumel was 3.3 days for the same period, and tourists have spent an average of 538.00 USD during their visit. In addition, the balance for 2012 issued by the Port Authority from of the state of Quintana Roo was 2.744.952 passengers visiting the island by cruise ship, spending an average of 89.00 USD during their 7 - 11 hour stay (APIQROO, 2012). Connections to the main land have registered 1.343.718 passengers using the ferry boat, and 457,269 passengers arrived by plane (ASUR, 2012).

Cozumel Island is populated by 79.535 habitants (INEGI, 2010), relying intensively on tourism industry. During a profile study conducted by Jiménez, Jiménez, and Hernández (2005, p. 56), "41% of the people visiting Cozumel were interested in water activities, from which 75% were involved in scuba diving or

snorkelling excursions". Following the tendency, Santander and Propin (2009) have confirmed a strong dependence from water activities on the island, highlighting more than 23 diving spots along the Cozumel reef system. Moreover, the most popular dive guide illustrates the 25 major reefs on Cozumel (Editions, 2003), and authors like the reefsofcozumel.com have referenced 43 dive spots.

The water temperature on Cozumel Island ranges from 25 to 29 °C, depending on the season, and also on the current flowing in the channel. Cozumel is named as the capital of drift diving on the Caribbean Sea; the water flow is manly conditioned by the North-equatorial current, and an extension of South-equatorial current, the Guyana current. In the Antilles, the current splits to create the Caribbean current, and crosses Yucatan strait to form important gyres in the Gulf of Mexico. The Caribbean current flows around 26 to 34 million m^3/s, increasing speed when crossing the Yucatan channel (Gordon, 1967). On both sides of the current there are back flows and important gyres with variable speed, but the main current flows over the East point of "Mosquito bank" and over "Rosalinda bank" with 1-2 knots, is on the Yucatan channel where the Caribbean Sea connects with the Gulf of Mexico, flowing at 3-4 knots and reaching the peak at 180 m deep (Emilsson, 1971). Affecting directly the local reef, and more close to Cozumel island, the dominant current flows South-North at 1-3 knots in the channel in between Cozumel and the main land, depending on the season of the year.

In July 1996, the Southwest part of the island was declared Marine Park, achieving six years later, the status of National Park Cozumel Reef (PNAC, in

Spanish). The park lays East from the main land at 20° 29' 02.93" and 20° 14' 27.02" N; 86° 53' 11.54" and 87° 03' 32.07" W, covering 11.987 ha, from the high tide shoreline to 2.5 nautical miles offshore (PNAC, 2013). A multitude of tropical fish can be found on the reefs of Cozumel, and depending on the season, species like eagle rays can be seen, or sea turtles, reef sharks, tuna fish, marlins, manta rays and whale sharks, among others.

The Southern tip Maracaibo has a 45 m deep wall, delighting drift divers by swimming along the fissures, and dramatic coral formations, giving a colossal view to the magnificent arch and overhangs. Big pelagic can be seen on this point, and only very experienced divers are advised to go to Maracaibo wall. Another popular reef is the Santa Rosa wall, offering huge coral formations, and variety of fish coming to feed along the big edge. Sharks, rays, moray eels, and turtles are often seen here. In town, and due to the variety of expertise levels suitable for diving, Colombia reef is very well promoted. Here many swim through are a delight for scuba divers, giving the chance for shutting sometimes into the blue, and gazing to abyss down to the 37 m deep wall.

Paradise reef is perhaps one of the most crowded, and visited dive site, is an entry level location, and also a must go for any diver. On paradise, coral formations are sitting at 12 m deep, ideal for beginners and try divers not swimming over the limits suggested by training agencies. The reef lays on a slope full of giant sponges, sided by wide sandy areas, ideal for practicing performance skills during training courses. Also from the extended list of species found on the reef, is common to spot for example, turtles, rays, cleaner shrimps, colourful anemones, crabs, and the famous splendid toadfish. Paradise is suitable for

observing all kind of marine life characteristic from Cozumel Island, and also stage for a popular spot, which commonly hosts more than 100 divers underwater, at the same time. Therefore, due to overcrowding dive sites, impacts are already visible, and demanding for good diving practices and diving skills. At this point, external stress factors are brought by touching or disturbing marine life frequently, poor buoyancy control, and bottom stirring.

1.1. Scuba diving, an important segment for tourism destination management

The PNAC estimates 1500 daily visitors, among divers and snorkelers visiting the local diving areas, and the park uses the same value for field capacity of the Cozumel reef. The value is estimated in function of seats per diving embarkation, which have been registered with the port authority to operate in the national park, although the entries in the park are controlled through wrist bands purchased in the PNAC main office. In 2012 the National Commission for Protection of Natural Areas (CONANP, in Spanish) has achieved the total number of 299.395 wrist bands. Regarding the fact that not every boat was going out with full capacity, for 2012 the average number of divers in the water was 818 per day (SEMARNAT, 2013).

On studies presented by the Diving Equipment and Marketing Association (DEMA), on the Caribbean coral reefs, including Florida, recreational scuba diving has generated around 2.1 billion USD, made out of 4.56 million visitor-

day per year. The diving activity is also responsible for 26.000 full time jobs related to the activity, and among locals taking diving courses, equipment purchase, and services related to scuba, only Florida has collected approximately 20 million USD in 2009 (DEMA, 2012).

For regular scuba diving it is required to have economic availability, as scuba gear has a quite elevated price on the market, and diving with a diving operator carries a considerable cost. Divers tend to have a minimum average annual household income of 50.000 USD (WTO, 2001; Gössling, Kunkel, & Schumacher, 2004; Vianna, Meekan, & Pannel, 2010), affording then to travel to coastal areas, for consumption of scuba diving-related activities. Studies have been mostly represented by the masculine gender (Musa, 2003; Todd, 2004; Tourism Queensland, 2006; Belknap, 2008, Vianna et al., 2010), but all divers are willing to travel long distances for visiting different reefs, and observe certain attributes on the bottom of the sea, where biodiversity provides attractive conditions for flourishing scuba diving activity. Furthermore, the Professional Agency of Diving Instructors (PADI) shares online data were the masculine gender have represented 66% of the 945,107 new certifications in 2012 (PADI, 2013). An online base survey conducted for describing activity levels and demographic variables, was returned by more than 3.000 responding divers aged from 38 to 53 years old (DEMA, 2006); in Belknap (2008) thesis, divers were aged from 18 to 65 years old, and in Vianna's et al. (2010) study about dive tourism in Palau, divers were aging from 31 to 50 years old (59%), with a significant representation of divers with more than 50 years old (22%).

On the literature founded, divers' education level (Cater & Cater, 2001; Musa, 2003; Thailing & Ditton's, 2003; Todd, 2004; Grőssling et al., 2004; Musa, kadir, & Lee, 2006; Belknap, 2008; Ong & Musa, 2011) varies from postgraduate studies to secondary school, important information to hold once the study also pretends to contribute with comparative data.

Scuba diving has become popular, and every day more people engages in the activity, some are just curious, others just want to try, and for some others is an addiction. Overall, people have elected scuba diving, and snorkelling as their preferred activity (Orams, 1999). Water-related activities are the ones moving more people around the world, but suffering a lack of representative data for backing up such numbers. It is known that snorkelling involves less equipment, and is more affordable than scuba, although Lindgren, Palmlund and Wate (2008) have observed connectivity in between both activities, triggering participants to engage in scuba diving.

Since 1992, PADI has been issuing more than half million new certifications per year, toping more than 21 million since their existence (PADI, 2013). The World Tourism Organization has estimated 6 million divers in 2001, and predicted 10 million active divers by 2005 (WTO, 2001), however Cater and Cater (2001) have estimated 28 million active divers for the same date. Some authors have profiled tourists based on their participation in diving activity, but Rice (as cited in Jennings, 2007) has also classified three groups of divers. One group composed by potential divers, which experience scuba only if it is available at the destination; another group composed by diving tourists, which undertake scuba while on holiday by selecting destinations where scuba is

available; and the last group defined by hard core divers, which choose their destination based on quality of diving conditions.

Tourism demand for recreational diving has increased between the two first categories (potential, and diving tourists), and for example, during 2012, the United States of America, Mexico, and Canada were top 3 countries on the PADI records, regarding diving courses taken in Mexico. The state of Quinta Roo (QRoo) was the most representative state in the Mexican diving industry, totalling 86% of non-certified divers participating on the "one day diving" experience, or "try dive", 85% of entry level certification courses, 87% of continuing education diving courses, and 83% of specialty diving courses (PADI, 2013).

The high number of try dives is product of good advertisement of the Cozumel reefs, and also resulting from the cruise arrivals to certain ports of call in the region, like Cozumel Island, Calica, and Costa Maya, all on the Mexican Riviera. Dive training courses are quite regular throughout the year, representing a different segment on the market, catering for visitors staying overnight on the island. The peak season for scuba diving on Cozumel is consistent with the first months of the year, ranging from January throughout April, and the second period during July and August, decreasing than until the end of December,

Along the coast, the model used for tourism development has permitted building big hotel compounds, owned by national, and international groups. Such facilities are very exclusive, but at the same time offering all type of touristic products, including day excursions to Cozumel Island, and scuba diving activities on local reefs (Cordoba & Garcia, 2003; Manuel-Navarrete, 2012). Only Cancun

has 17 km of coast crammed with hotels on the beach front, cutting the access to the beach.

Cozumel Island contributes strongly for diving education in Mexico, however data available refers to the entire state of QRoo. Searching on the PADI webpage, dive schools are listed for the whole state, and found to be representative of the scuba diving areas. For example, Cancun together with Isla Mujeres has eleven diving schools, and Playa del Carmen, the "well-developed" tourist location, hosts twenty one diving schools. Only Cozumel, at the time of the research had twenty seven registered PADI diving schools, but if there will be a proportional division among the three major touristic areas, Cancun, Playa del Carmen, and Cozumel Island, the estimative of 39% represents the contribution of Cozumel to the diving scene in Mexico.

2. Methodology

Scuba diving activity has become object of revision during fieldwork for a Ph.D. thesis, studying scuba diving as a predictor for good environmental behaviours, in the household. For assessing divers regarding the variables on study, it was developed a measurement tool, being delivered as a survey.

The scope of collecting a representative sample of the diving scene on Cozumel Island, has driven to select the most representative nationality in visiting Mexico. Hence, through the cross-border movement in Mexico, in 2012 can be verified that 5.941.914 USA citizens have visited the country, followed by

1.571.544 from Canada, and 363.142 from the United Kingdom (SIOM, 2013). From the universe of tourists visiting Cozumel Island, and all visitors seeking diving activities, American U.S. divers were invited for registering their observations, while signing up for diving activities on the popular diving destination. For engaging in open water diving activity, PADI requires to be at least 10 years old, although, for convenience of the Ph.D. study, it was set for surveying participants with the minimum age of 18 years old.

For granting a statistic with 95% confidence, with 10% sampling error associated from an unknown population size, from the 5th of February until the 7th of April, 2013, the total of 236 surveys were administered, although, only 181 participants with origin in the U.S. were taken in the control group. On Cozumel the majority of students are participating on "try-dive" experiences, and therefore can lead to under-representing certifying courses which take longer time to finish. As a consequence, using such sample error is accepted as valid for the control group (Valledor & Carreira, 2000), fitting well with the distribution of the population.

Field work was conducted by differentiating two subpopulations, divers with certification for open water diving, and students taking intro dives, entry level programs, or any continuing education training level. On random days, and in the facilities of 11 PADI registered diving schools, the majority of divers were assessed early in the morning, and before being transferred to the boat. Only with two operations, divers were assessed during surface interval, spent in a specific beach club, and another during their "try-dive" sessions taking place from 9.30am to 2 pm. In order to remove pressure from the local staff, it was assembled a self-

service display/drop box, made out of recycled cardboard. Such tool was labelled with clear instructions for filling up the form, and dropping on the back afterwards. In this way, divers could participate throughout the day without the presence of the researcher, and minimizing disremembering to handle the surveys to new divers,

The use of the IBM SPSS 20 has provided statistical analysis for both subpopulations, representative of the diving scene on Cozumel Island.

3. Results

All U.S. tourists participating in diving activities were target for considering two subpopulations, although all nationalities could register their observations for a small description of different markets existent on the island. From 236 surveys administered, 17 nationalities were registered, with 181 (76.69%) of divers from the USA leading the table, followed by 20 (8.47%) from Canada, and 17 (7.20%) from Europe. Divers were arriving from South America, the Middle East, Asia, and Australia, showing variety on the market, but not representative for this study.

The table 1 illustrates the 181 U.S. divers' profile for a socio-demographic description, being represented by 61.33% male, and 38.67% female. The most representative age rank has 42.54% of participants aging from 18 to 30 years old, followed by 24.31% of divers with more than 50 years old. The rank

for 31 to 40 years old is represented with 16.02% of participants, and the rank for 41 to 50 years old characterized by 17.13%.

Table 1: Divers' Socio--demographic profile, on Cozumel Island.

Socio-demographic characteristics	Frequency	%
N total	**236**	100
N valid (Americans U.S.)	**181**	**76.69**
Gender		
Male	111	**61.33**
Female	70	**38.67**
Age		
18 - 30 years old	77	**42.54**
31 - 40 years old	29	**16.02**
41 - 50 years old	31	**17.13**
> 50 years old	44	**24.31**
Education		
High school	41	**22.65**
Bachelors	79	**43.65**
Master	40	**22.1**
Ph.D.	7	**3.87**
Other	14	**7.73**
Annual Household income		
<= 15.000 USD	15	**8.29**
15.001 to 25.000 USD	11	**6.08**
25.001 to 35.000 USD	10	**5.52**
35.001 to 45.000 USD	22	**12.15**
more than 45.000 USD	123	**67.96**
Motivation		
Leisure	74	**40.88**
Diving	45	**24.86**
Nature	1	**0.55**
Beach holiday	11	**6.08**
Business	2	**1.1**
Other	7	3.87
Diving and other	41	**22.65**

Source: Mota, 2013.

Divers' education level is well represented with high school (22.65%), bachelors (43.65%), and master degree (22.1%), with smaller fractions for other studies taken (7.73%), and Ph.D. (3.87%). A fact to be mentioned is the coincidence of the fieldwork progress taking place during spring break, which is characteristic from a young generation purchasing diving activities, in particular "try-dives".

The 67.96% of the participants have registered their annual household income as more than 45.000 USD, followed by 12.15% collecting between 35.001 and 45.000 USD. The lowest rank with less than 15.000 USD is represented by 8.29% of the divers, 6.08% earning from 15.001 to 25.000 USD, and 5.52% grossing 25.001 to 35.000 USD.

Divers were assessed for their motivation for traveling to the destination, represented by 40.88% visiting Cozumel Island for leisure, and 24.86% inspired only for reef diving. The island can offer a remote beach holiday, attracting 6.08% of the participants on the study, also 1.1% of the divers were on the island for business, and only 0.55% were encouraged by nature. Some visitors were particularly motivated for diving, but also had other interest while on Cozumel, and therefore combined with "only diving", it can be admitted that as 47.51% of the participants were visiting Cozumel Island for scuba diving.

Users must be certified for open water diving, or when practicing without certification, they must be direct supervised by a diving professional. The table 2 illustrates the two subpopulations on study, where 99 certified divers have registered their experience certification level, and 100 participants were taking diving courses, or part-taking on try-dives.

Table 2: Correspondent diving profile on Cozumel Island.

Divers characteristics		Frequency	%
N total		236	100
N valid (Americans U.S.)		181	76.69
Certified divers		**99**	54.7
Missing system		82	45.3
Level	OWD	64	**64.65**
	AOWD	16	**16.16**
	Rescue	12	**12.12**
	Professional	7	**7.07**
Diving students		**100**	100.00
Missing system		81	44.75
Level	DSD	74	**74.00**
	Entry level	12	**12.00**
	Continuing education	13	**13.00**
	Divemaster	1	**1.00**

Source: Mota, 2013.

Among recreational certified divers, 64.65% were holding the open water diver certification (OWD), for descending to 18 m deep as recommended maximum depth, 16.16% with advanced open water diver (AOWD) certification, and certified for descending to a maximum recommended depth of 30 m deep, and 12.12% with Rescue level which have training for self-rescue, procedures to assists distressed divers, or participate on rescue scenarios. The professional level was represented by 7.07%.

Dive training programs are differentiated by obtaining a certification, or just registering on the discover scuba diving experience (DSD), or try-dive. On Cozumel, many non-divers seek this experience as a way to visit the local reefs,

and therefore the study has characterized 74% of the participants taking the DSD package, which is not a certification. Training courses for obtaining dive certification were represented by 12% for entry level options, 13% for continuing education in courses such the advance, rescue, or specialties, and 1% trained for being divemaster, the first step on the professional level..

4. Discussion

Tourism activity is the primary income source on Cozumel Island, the whole society benefits from the arrival of tourists, and much more from the natural resources available on the island. Scuba diving represents a big share on the local GDP, generating employment, and therefore considered to have strong influence for managing the tourism destination. For example the PNAC delivers an environmental training course, focused on the diving activity, directed in particular to all diving staff, boat captains and assistants, videographers, and photographers. Such training is compulsory for getting authorization for operating within the boundaries of the National Park.

Previous studies have demonstrated 41% of the common visitors motivated by water activities, from which approximately three quarters were interested in scuba diving (Jiménez, et al., 2005). On the recent study, 47.51% of the divers were attracted by scuba diving, and 40.88% interested on leisure. Authors have documented the age range of 18-65 years old, or more than 50, on Cozumel, age still corresponding with previous research for a general profile, but

emphasising the extremes, giving indication of two different markets to manage. Also divers still being more represented by males, indicating to have a quite high annual household income. Previous studies have documented the relationship between diving activity and economic availability, and therefore on Cozumel, divers are characteristic to be financial prosperous.

Among certified divers, the OWD certification level is the most common to have, although, divers hold also more experienced levels represented with continuing education training, and professional ranks. The cruise arrivals are favourable for one day visit to the island, and therefore programs like DSD are the most representative among diving students. Participants staying for longer periods, can afford to enrol in dive training sessions requiring several days, and further performance requirements for obtaining a dive certification.

The data available for this study provides representative data for profiling the dive scene on Cozumel Island, through 181 U.S. divers illustrating the socio-demographic profile. In addition, the study provides the level of motivation for traveling to the destination, giving indications that scuba diving plays an important role on the local tourism set up.

5. Conclusion

The case study of Cozumel Island explains why nature-based activities are considered important to include on tourism development, giving contribution for employment, and education. Observing wildlife requires professional

guidance, and as well can be used for educating visitors. In this case study, dive professionals have extended briefings about rules to follow inside the Marine Park, and also explain the importance of preserving the reef system.

Now a day, characteristics about divers, and impacts created on the reef are becoming more common to read. Diving motivation is very representative on the island, and therefore demanding for updated studies about impacts on the local economy, and reef capacity.

For managing the natural resource where diving activities take place, the PNAC controls the entry in the Park, providing rules and training for granting sustainability of the activities, and the whole reef system. The average number of 818 bracelets is representative of visitors to the National Park, being absent from controlling any diving set-up located outside the boundaries, and where diving takes place as well.

Recreational diving is very popular on Cozumel, attracting users from overseas, but besides teaching diving, there is the need to educate visitors about the importance of adopting good practices, and respecting the environment. Since the moment that rules are explained to visitors, also details can be delivered in a non-formal education setting, this way tourists can learn about responsibility for granting future sustainability.

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