

Environmental education for tourism providers and volunteers in Marine Protected Areas: The case of the National Park Cozumel Reef

Educação ambiental para **prestadores de serviços turísticos** e voluntários em Áreas Marítimas Protegidas: O caso do Parque Nacional do Recife de Cozumel

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Abstract | The program for environmental education offered by the National Park Cozumel Reef (PNAC) represents the tendency for adults seeking non formal education programs. The aim is to increase good practices when operating in the marine protected area, and for better environmental awareness of the 2.8 million tourists visiting Cozumel Island every year. The study approaches the need for training professionals and provides descriptive data of the 1,087 professionals trained by the PNAC course in Cozumel. An update of the last 5 years Coral training program is the basis for statistical analysis and recommendations for a recycling course. This document supports the importance of training programs for managing protected areas.

Keywords | Education, marine protected area, sustainability, scuba diving, management indicators.

Resumo | O programa de educação ambiental oferecida pelo Parque Nacional de Cozumel Reef (PNAC) representa uma tendência para os adultos que procuram programas de educação não formais. O objetivo é aumentar as boas práticas para operar em áreas marinhas protegidas, e para uma melhor consciência ambiental dos 2,8 milhões de turistas que visitam a Ilha de Cozumel todos os anos. O estudo aborda a necessidade de formação de profissionais e fornece dados descritivos dos 1.087 profissionais formados pelo curso PNAC em Cozumel. Uma atualização dos últimos 5 anos do programa de formação Coral é a base para a análise estatística e para recomendações para um curso de reciclagem. Este documento apoia a importância de programas de formação para a gestão de áreas protegidas.

Palavras-chave | Educação, áreas marinhas protegidas, sustentabilidade, mergulho, indicadores de gestão.

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1. Introduction

The use of indicators for development management has been in practice since 1950 with economic indicators for modernization (Hartmuth, 1998) through the international conferences promoted by the United Nations (UN). In 1972, the Stockholm Earth Summit on the Human Environment presented a list of 26 principles and 109 recommendations from which international laws had their evolution. The United Nations Conference on Environment and Development held in Rio in 1992, intended governments to rethink the economic development policies and to find ways to alternate natural resources destruction and pollution (UN, 1987), introducing concepts of sustainable development highlighted in the Brundtland report, "Our Common Future" (UN, 1987), becoming the '40 chapters of Agenda 21 and the 27 principles of the Rio Declaration on Environment and Development. It defined sustainable development as development which; *"meets the needs of present generations without compromising the ability of future generations to meet their own needs"* (Gardiner, 2002, p.1).

A revision of the implementation of the Agenda 21 and recommendations for further achievements took place in 1997 during the Earth Summit +5 in New York. During the Millennium Summit in September 2000, world leaders established new goals and objectives for the millennium presenting indicators for sustainable tourism (Frausto, Giese, & Chale, 2002).

The World Summit on Sustainable Development, held in Johannesburg (2002) and the Mauritius Conference for reviewing the Barbados Program of Action for the Sustainable Development of Small Island Developing States (SIDS, 2005), designated the period 2005-2014 as the United Nations Decade of Education for Sustainable Development (UN 2013). Twenty years after the Rio Earth Summit, the international community created clear measures for implementing sustainable development through green economies and lift people out of poverty (UNCSD, 2012). Based on the Millennium Goals, a

new set of critical issues (jobs, energy, cities, food, water, oceans and disasters) became new targets for the 2015 development agenda.

For a number of decades, Mexico has developed economic activities producing impacts on the existing natural resources. They have been used in a way, limiting their capacity for regeneration, called non-sustainable use (Chavez, 2005). High levels of contamination, and programs were implemented to minimize impacts when developing the country in a more sustainable way.

The Mexican Tourism Board has transposed the Agenda 21 commitment for the travel and tourism industry (SECTUR, 2003), enforcing tourism development to conform with environmental sustainability in order to deliver economic and social benefit to communities. Taking into account a wide range of definitions for sustainable tourism, natural resources play an important role for sustainability. This form of tourism seeks for the harmony of tourism in the natural environment. Furthermore, local communities shall receive benefits without endangering their culture, forming clusters for distinctive forms of intellectual capabilities, affection, materials and spiritual values (Lickorish, & Jenkins, 1997, p.35).

Cozumel is located on the Mesoamerican Barrier Reef system and is the largest island in Mexico. In July 1996, the area Punta Sur was declared Marine Park of Cozumel Reef and in 2002 it achieved the status of National Park Cozumel Reef (PNAC in Spanish). The park lies east off the mainland 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).

Cozumel Island can be acceded by car/passenger ferry boat with a 16.5 Km journey from Punta Vena-do near Playa del Carmen. Cozumel International Airport can support up to 9 flights an hour, and the smaller Capitan Eduardo Toledo airfield caters for small and private aircrafts. Cozumel has three international piers for international cruise liners and receives around 2.5 million passengers per year (SEDETUR, 2012).

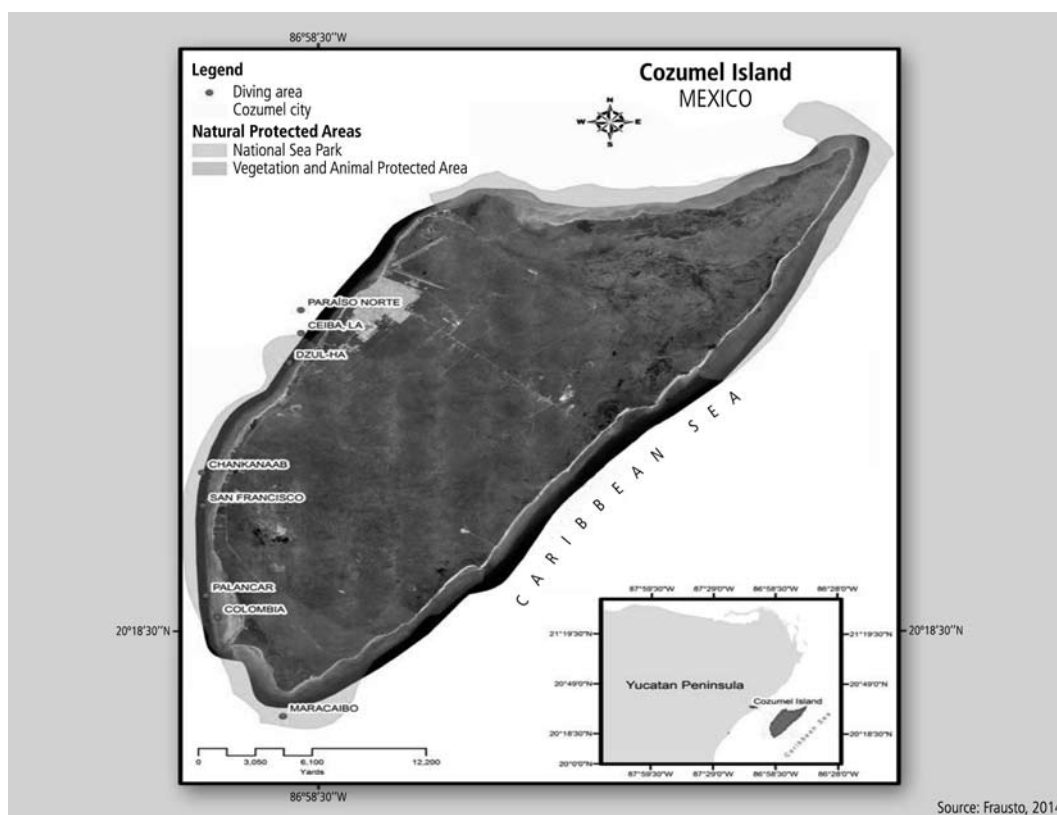


Figure 1 | The map of Cozumel and respective Marine Protected Areas (Frausto, 2014).

According to the Secretary of Tourism for the State of Quintana Roo (SEDETUR, 2012), visitors have filled up 51 % of the hotel occupation among the 45 hotels; 4,098 rooms accommodated 403,793 tourists. The average stay on Cozumel, in the same year was 3.3 days and tourists spent an average of 538.00 USD during their visit. In 2012, according to the Port Authority of the state of Quintana Roo (APIQROO, 2012), 2,744,952 passengers visited the island by cruise ship spending an average of 89.00 USD during their 7-11 hour stay. Connections to the main land carried 1,343,718 passengers by ferry boat and 457,269 passengers by plane (ASUR, 2012).

Currently, Cozumel Island is populated by 79,535 habitants (INEGI, 2010), who rely heavily on the tourism industry. A profile study conducted by Jiménez (2005, p. 56), found that "41% of the

people visiting Cozumel were interested in water activities from which 75% were involved in scuba diving or snorkeling excursions". Following this trend, Santander (2009) confirmed the strong dependence on water activities by the island, finding more than 23 diving spots.

The PNAC (2013) estimates that 1,500 visitors, among them divers and snorkelers, visit the local reef areas daily and the park uses the same value for carrying 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 marine park. Correspondingly, the park controls the divers' entry through wristbands purchased in the main office. In 2012, the National Commission for Protection of Natural Areas in Mexico (CONANP)

issued a total number of 299,395 wristbands. Considering that not every boat went out at full capacity, for 2012, the average number of divers in the water was 818 per day.

For good management of the natural resources found on the island, and adapted from the Agenda 21, the local government and the Tourism Academic Board proposed a roll of sustainable indicators for the region. (Frausto et al., 2002).

1.1.Indicators for sustainable development of tourism

Based on Agenda 21 commitments, SDIs were created on the principle of sustainability after Rio-92, for measurement and to follow up sustainable development (Vera and Ivars, 2001). Key indicators must sustain ecology, society and economy, allowing: a) To know future goals and objectives, b) Time and space comparative analysis and c) Antici-

pate risk or conflictive situations (Frausto, Rojas, & Santos, 2006).

Countries like Mexico are partaking by adopting the system of indicators for sustainable development, contributing with 134 indicators, designed and clustered by themes as described in Agenda 21, and divided into 4 categories – social, economic, environment and institutional. Leaders are much more interested in implementing the indicators and complying with international commitments than only seeking solutions to monitor or control issues arising from the four categories (Frausto et al., 2006).

On the Caribbean and Central America International Congress for Indicators for Tourism Development, Frausto and Chale (2003) have identified a list of 54 indicators for Cozumel Island, centred in local problems and specific objectives, differentiated by general, ecological, economic and social indicators (see Table 1) . High on the list is Environmental Education, the indicator claiming for high priority to achieve balance and guarantee future generations.

Table 1 | System of indicators for sustainable development on Cozumel Island

Hazard or Risk	Indicators
General Indicators	
Tourism level in the region Hotel occupancy Local population	– Number of tourists visiting the area. – Percentage of Hotel occupancy. – Regional migration rate.
Ecological Indicators	
Protection of freshwater resources Protection of natural resources Coral reef degradation Solid waste management	– Accessibility to freshwater resources. – Legal parameters for freshwater quality. – Biodiversity of the coral reef area. – Pollution of coastal water. – Level of fecal coliforms on local beach. – Amount of endangered species in regards to native species. – Volume of produced waste (Industrial, municipal and tourism).
Economic Indicators	
Resilience of the tourism sector Receipts from the tourism sector Tourism cost and benefit	– Percentage of jobs in the tourism sector, or total percentage of jobs directly related to the tourism sector. – Daily expenditure per tourist. – Proportion of social benefits regarding the cost of tourism activity.
Social Indicators	
Loss of cultural identity Access to public beach Participation of the local population	– Percentaje of Spanish speaking people in comparison to those speaking English. – Percentage of people speaking Maya. – Percentage of Beach with access to the local population. – Level of participation by the local population in municipal decisions.

Source: Translated from Frausto & Chale (2003).

1.2. Background of Environmental Education

Environmental education is a continuous process of awareness and knowledge about practices, values and important experiences for decision making (Martin, 1999, p. 15). It has been featured by the international commitment stipulated on the United Nations Conference on Environment and Development held in Rio, Agenda 21.

Gonzales (1996, p. 89) refers to environmental education as a form to transfer knowledge based on "past experience for observation and enjoyment of the nature", knowledge and respectful use of natural resources are in balance with the society and the need for development.

Among the basis described for environmental education, Castillo (2002) describes an evolution from the end of the XIX century where students were more in contact with nature science. Since the thirties, environmental issues have been on alert, natural resources conservation starts being enforced and has place on outdoor environment, exposing students to the nature, for increasing awareness. The same author states that environmental movements have started in Europe and North America pushing for ecology and educational systems centered on ecosystems and biophysical factors.

1.3. Non-formal education program

Non-formal education is "every kind of learning that happens outside the traditional school setting" (UNESCO, n.d.), can be a complement for professional activity, enhancing capabilities for success (Case, 1988). This complement can be offered by institutions, other than public education, being very specific, or even becoming more important than official learning programs.

For example, this type of education can be taken in "learning grounds such as museums, science centers, zoos, botanical gardens, visitor centers and nature activities as the most usual sites outside

school" (Falk, 2005, p. 2). In Ritchie's study (as cited in Minnaert, 2012, p. 1) non-formal education programs were delivered as "Educational tourism,... including special interest holidays, language courses abroad, and field study trips". Moreover, Minnaert reveals that usually this type of non-formal education is more focused on the significance of learning as a motivation instead of what tourists will actually learn from their experience. A different approach was described by Ballantyne, Packer and Falk (2010), expressing for example wildlife tourism as a form to educate visitors about nature and threats facing wildlife.

1.4. The case study: Environmental Education for Tourism Providers and Volunteers in Marine Protected Areas.

The case study of Cozumel Island can become a model for managing protected areas and tourism destinations looking for sustainable development policies. The indicator analyses important strategy for local development, "creating growth and employment" (Shakeela, 2011, p. 332), and provides data quality for better decision-making. Furthermore, the indicator is achieved through an environmental course to increase awareness and train professionals willing to work inside the marine park.

Taught since 1997, the training is valid for 4 years, and has been a blue print for qualifying diving instructors, diving and snorkeling guides, boat captains and their crew members. During 3 days, and through theoretical sessions developed by Garcia and Dominguez (1999), the training course presents environmental problems detected in the marine park, and teaches about "Physical-geographical aspects, Terrestrial ecosystems, Coral reef ecosystem, Zoning, Natural enemies of coral, Man and the coral reef system, Cozumel coral reef, looking and touching, purposes and goals of the PNAC, and laws governing the Natural Protected Area" (Frausto & Chale, 2003, p. 56).

According to Frausto and Chale (2003), and the PNAC (2013), during the first segment of the course, and during a period of 5 years, more than 1,500 participants have attended the educational program on Cozumel. The study case was focused on the register of the environmental education course, updating the database for analysis, identifying socio-demographic variables since 2008, and providing abundant information to suggest improvements to the training.

As already mentioned by Frausto and Chale (2003), the course is active but there is no track of participants after attending the training program. There is enough information to describe the indicator but, in some cases, there is insufficient data for analysis of tendency, spelling failure for the strategy for assisting to predict problems, risk and significant changes in the PNAC.

Given this context for the implementation of SDIs, the purpose of the authors in this research was:

- (1) Describe how the Environmental Education indicator designed for Cozumel Island is being delivered and monitored.
- (2) Based on the last update of the database, built for the training course existing for the PNAC, the study aims to provide descriptive data regarding the participants' education level and nationality, and confirm the job position associated to tourism providers on the island.
- (3) Based on the course evaluation and duration of the permit to operate in the National Park, register relevant suggestions for including in a recycling course.

The findings represent the gap existent in the current training program which is delivered also as recycling course after the 4 years validity of the permit. Staff members from the Natural Park are already working on a new materials selected for such course and therefore suggestions are part of the author's fieldwork on Cozumel Island.

2. Methodology

The SDI designed for Cozumel Island is practicable through the non-formal education-training course "Environmental Education for Tourism Providers and Volunteers for the National Park Cozumel Reef". As a reference for this study and to illustrate the training course, it was taken into consideration the transcript of the academic thesis, being a previous evaluation by Chavez (2005) since the creation of the Marine Park until the year 2003. Further reading for better understanding of sustainable indicators designed for Cozumel was important for describing the state of the art and to support the need of this research.

In the year 2008, Coral Reef Alliance reviewed the course contents and formatting for being delivered and introduced changes on the evaluation process, becoming more accessible to all tourism providers on the island. On the previous academic program from the University of Quintana Roo on Cozumel (UQRoo), the course was registered on a database crowded with variables describing demographics (nationality, place of birth, age, gender, and time of residence on Cozumel) and socio-cultural profile (educational level, working position and work experience). Therefore, based on the last available registry the period 2008-2011 was reviewed and updated up to the last course taught in 2012.

The document includes a list of suggestions for improving the efficiency of the training, verifying issues for data quality, evidence of participation on the course by tourism providers, volunteers and what practices are best for the ecosystem. Additionally, for being more familiar with current environmental practices on Cozumel, to observe how participants in the course were learning about local environmental issues, the corresponding author has attended to the training course.

Informal interviews at the PNAC office were conducted for better understanding of the paper work review and variables reviewed for analysis of the last 5 years of the training course.

3. Results

In deep analysis of the sustainable indicator for Environmental Education the database study runs from 2008 and was updated until the last training course of the year 2012. It has been noticed that some information still not being provided on the enrolment forms reducing the quantitative study to 1,087 participants. Data such as date of birth, education level, how much time the participant has been living on Cozumel Island, the actual work position at the time of the course and experience on the job are relevant for good management of the database and to understand how much is possible to affect participants on their career. There are specific groups of participants which are listed on the database but their information is classified due to the fact of being employed by Military Special Forces, only course date and the numbers of participants are recorded. The variables in study are presented on Table 2 where the course is described on his first appearance with the new format provided by Coral Reef Alliance.

Data represented on this table is subjected to personal information provided by the participants, and professionals arriving from Playa del Carmen haven't been registered as residents on Cozumel giving missing data on the database. The variance of age ranges from 16 to 73 years old, indicating participation and interest of local population in learning about marine protection, receiving vital understanding of the whole ecosystem on Cozumel. The course, meant to be for tourism providers has become mandatory for any professional who wants to work within the National Park boundaries, being Mexican citizen or who is in procession of the Mexican

work permit FM3. It is frequent to have individuals volunteering for the PNAC in order to help any park ranger, protecting the island ecosystem, for academic internship, or when the nature of their professional activity requires acceding to the National Park area. For this group of people is given the opportunity to participate as a volunteer and together with tourism providers attending to the environmental education course.

The minimum time of residence on Cozumel Island is 3 weeks and can be addressed to volunteers or professionals seeking for job opportunities when dive centers are fully staffed, and therefore cannot offer a position to work. Local professionals have been living up to 67 years on the island but the description of individuals provides the modal time of 30 years. Since the early 70s and 80s the tourism has been settling down on Cozumel Island providing work opportunities for the younger generations. The workers modal age is 32 years old and 6 years of work experience when enrolling on the course.

Table 3 represents both genders on the training programs with 91.4% male (n=895) and 8.6% female (n=84) likewise the heterogeneity of the groups attending to the course. The PNAC is not exclusive to Mexican citizens but as well educates any foreign professional, or volunteer, that pretends to work within the marine park boundaries. The credentials were issued to 86.2% Mexicans (n=850) and 13.2% foreign citizens (n=129). The education level varies from people that did not attend to school to people holding university degrees. 38.3% were Mexican citizens leading the work force with majority of males educated at secondary school level (n=375) and registering 0.3% individuals without

Table 2 | Descriptive table for the population in study

Population in study	Count	Missing	Minimum	Maximum	Mean	Mode	Standard Deviation
Age	1087	173	16	73	36	32	10
Residence in Cozumel (years)	1087	211	.06	67.00	21.06	30	12.91
Total years of working experience (years)	1087	383	.33	40.00	7.65	6	6.33

Source: Mota, 2014.

Table 3 | Participants level of education attending to the environmental course

Population in study vs. Education level		Values		Education					
		Missing	Valid	No School	Primary School	Secondary school	Bachelors	Univ. degree	Total
Nationality	Mexican	108	979	3	111	375	219	102	810
	Male			0	1	7	16	16	40
	Female								
	Foreign			0	2	7	28	48	85
Position at the time of the course	Male	131	956	0	2	7	28	48	85
	Female			0	0	0	9	35	44
	Diving instructor			0	3	19	58	117	197
	Diving guide			1	9	71	66	22	169
	Snorkel guide			0	2	27	24	5	58
	Captain			2	50	121	17	8	198
	Skipper			0	39	97	39	8	183
	Video			0	0	3	6	6	15
	Photo			0	0	4	6	1	11
	Beach boy			0	4	25	31	22	82
	Owner President			0	0	1	4	3	8
	Tour operator			0	0	0	1	0	1
	Supervise			0	0	2	1	4	7
	Guide tour			0	0	5	14	3	22
	Military			0	0	0	0	0	0
	Artist			0	0	0	0	1	1
	Driver			0	2	2	0	0	4
	Total			3	109	377	266	200	956

Source: Mota, 2014.

having attended to school (n=3). Mexican women registered on this database count with 0.1% educated at primary level (n=1) and 1.6% with bachelors and university level respectively (n=16). Among foreign professionals there is no indication of not having attended to school, comprising 4.9% males and 3.2% female concentrated on university degree level (n=48; n=35).

Regarding working positions at the time of the course and respective education level, Table 3 indicates 424 in-water positions supported by 20.6% of diving instructors (n=197), 17.7% of diving guides (n=169), and 6.1% of snorkeling guides (n=58). Water activities are more popular on the southern reefs of Cozumel Island and always requiring qualified staff to operate inside the PNAC. Snorkeling tours take place in locations outside the PNAC and for that reason is a not required certified snorkeling guide. 12.2% of diving instructors are holding university degree (n=117) and only 0.3% have finished

primary school (n=3); among diving guides 7.4% have finished secondary school (n=71) and only 1% don't have any school record. Positions for boat handling have higher values for 12.7% of Captains and 10.1% skippers with secondary school (n=121; n=97), 2 captains have no school level recorded and 2 skippers attended only to primary school.

Different working positions can play an important role to promote good practices and educate about the local environment, beach boys and tour guides are the positions which are also relevant on the job position list. Their knowledge and education ranges from primary school (Beach boy=4), 4.7% bachelors (Beach boy=31; Tour guide=14) and university degree (Tour guide=3).

Find solutions to respond the objective previously mentioned, this paper updates the database developed on a previous study, and provides suggestions for a recycling course. As referred before, the permit to work inside the boundaries of the National Park is

Table 4 | Number of credentials to be renewed yearly

Population in study		Number of credentials to be renewed yearly					Total
		2012	2013	2014	2015	2016	
Course year	2008	255	0	0	0	0	255
	2009	0	302	0	0	0	302
	2010	0	0	194	0	0	194
	2011	0	0	05	71	0	76
	2012	0	0	0	0	260	259
Total		255	302	199	71	260	1087

Source: Mota, 2014.

valid for 4 years. Until now, recycling courses require attending to the same training as before and the PNAC staff is working on the syllabus for the new course. Based on the year when the course has been taken, Table 4 indicates the number of professional credentials to be renewed yearly.

At the time of this paper, more than 550 professionals had the need to attend the same course as before, being refreshed with information regarding environmental impacts on the system coral reef-mangrove. The permit is then extended for the next 4 years. The issue has been already addressed, and the PNAC staff is working on finding a solution for renewing the 1,087 credentials with a specific recycled training course.

4. Discussion

Sustainable development indicators have been developed for Cozumel Island, reinforcing the need to educate people becoming more responsible and capable to respond to local environmental issues. As per the title, the course is meant to be only for tourism providers and volunteers, being mandatory for any professional whom needs to accede to the National Park. This way people involved locally make the difference by adopting good practices at work and providing detailed information to visitors about the reef ecosystem and environmental behaviors. The course brings professional benefits to individuals looking up to ascend in their job career and working

in any position inside the PNAC and is recognized as non-formal education course.

The data base study refers to the period from 2008-2012, it has relevant missing information for good management of the course and to analyze professional evolution of the participants. There is enough data for conducting studies about frequency of the training course, but due to the lack of detailed information, in some cases, still insufficient data for analysis of tendency. The variables created for demographic description of the participants and their socio-cultural profiles are important to be registered, allowing having a better approach when developing materials for new training sessions. Moreover, studies can provide knowledge about migrations to Cozumel Island and characterize the importance of the Island for Sustainable Tourism Development planning.

Since the introduction of the training course, and as a way to settle the environmental education indicator, the program has always been focused on the natural ecosystem supporting nature as the main attraction on the island. Sustaining travel industry and tourism development on Cozumel, Coral Reef Alliance has updated the course contents for the environmental education training, and introduced changes on the evaluation procedure. Due to the fact that the course is taught in Spanish language and 13.2% of the working professionals are from foreign countries, the updated format gives the chance to clearly understand the subjects approached during the training and obtain working credentials without a written exam.

Based on the number of participants and training date, it is perceived a need to generate a recycling course for renewing the permit and operate inside the PNAC; individuals trained prior to 2009 are already in requesting for new credentials.

5. Conclusion

The PNAC can be congratulated for the good work in keeping up with environmental education programs on Cozumel and for being part of the process to achieve the sustainable development indicator designed for Cozumel Island.

When enrolling on the training course, collecting important data is mandatory for good management of the indicator and to assist tourism providers in preparing their operation for the coming seasons. Jiménez et al. (2005) and Santander (2009) have been referring scuba diving and snorkeling as the main activity of the island. Diving allows tourists to visit the beauty of the Cozumel coral reef and observe underwater species in their habitats. The same authors and the National Commission for Natural Protected Areas (CONANP) have stated that Cozumel reef has the capacity to receive 1,500 divers per day within 23 dive sites and snorkeling areas. Although, there more places accessible for scuba diving which are not being monitored by the PNAC and also contribute for monitoring impacts on the reef.

At the moment it is crucial to develop new materials for a recycling course. There are many professionals that need to attend the same course instead of being renewed with technical aspects or data from previous related projects which the PNAC have been involved.

A new list of suggestions can be added to enforce the new generation for environmental education training course for tourist providers and volunteers in Marine Protected Areas:

1. Joint projects with the University of Quintana Roo shall be enforced to keep track of professionals which have attended to the course in past editions. The procedure provides knowledge about workers in the Marine Park, and understanding for benefits of the training for their career development. An organized database allows keeping track of professionals requiring a recycling course. When signing up for a course, it is very important to provide all data asked on the form, hence, the PNAC can be more effective when organizing new courses.
2. From the operation point of view, it is suggested for the recycling course to approach technical aspects, talk about boat operation and common practices on the reef. What is the function of the buoy on the reef and what type of buoys can be used? The whole set of buoy and anchor systems can be mentioned to increase effectiveness of a control plan for dive site traffic congestion. The perfect understanding of boat maneuvers for drop-off and pick up divers, it will definitely enforce good practices and safety on the reef.
3. Waste management onboard is a very important issue which every operator has to deal with on a daily basis, programs to evaluate the type and amount of waste can be put in place. Solutions might result from the course sessions due to sharing experience on different boats.
4. The use of group exercises developed during the training course can stimulate participation in official events, developing channels and tools for better tourism information and more responsible tourism.

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