Socioeconomic Assessment of Punta Allen: A tool for the management of a Coastal Community

SIAN KA'AN BIOSPHERE RESERVE, MEXICO

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COMISION NACIONAL DE AREAS NATURALES PROTEGIDAS
Sian Ka'an
ICRAN International Coral Reef Network
UNEP

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PROJECT

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Comisión Nacional de Áreas Naturales Protegidas

MÉXICO

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Cancún, Quintana Roo

MEXICO

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Background

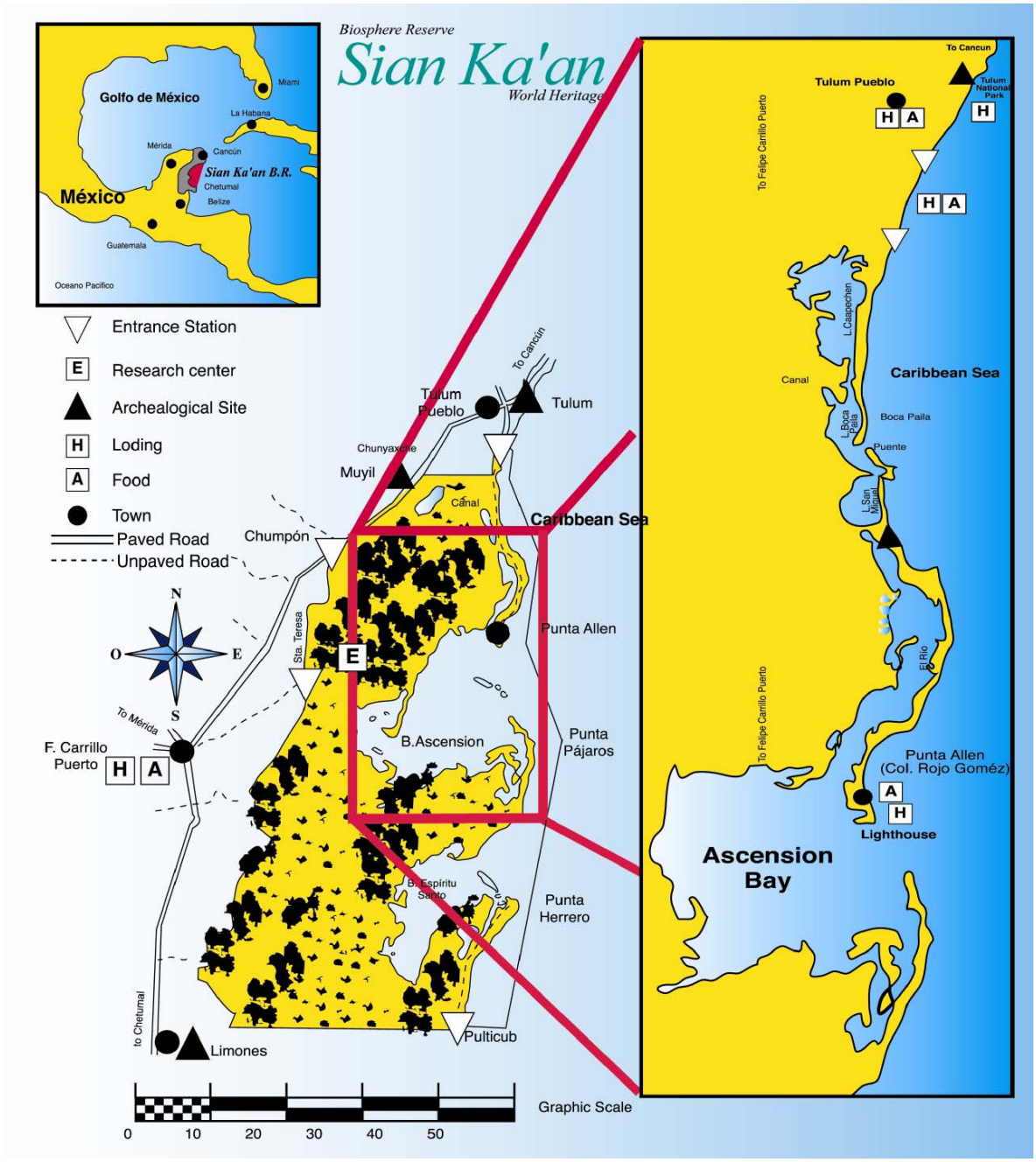


figure 1: Sian Ka'an Biosphere Reserve Map

History of the Community

One of the most ancient human settlements in Sian Ka'an Biosphere Reserve, Mexico (Decree in 1986), is the fishermen community Javier Rojo Gomez, better known as Punta Allen, an isolated community that stands on the coastal zone, at the tip of a tiny peninsula, north of Ascension Bay (Figure 1), in the State of Quintana Roo, Mexico. It is a modern lobster fishing community established in 1970 by fishermen who founded the Vigía Chico Cooperative.

Before 1960 the cultivation of coconuts as the main agricultural activity, fishing and other types of marine exploitation (e.g. turtle and alligator) were the most important economic activities in the coastal zone of the State of Quintana Roo (SEMARNAP, 1996). Afterwards, the harvest of coconuts declined due to the lethal yellowing of palm trees, and fisheries became the major economic activity in the region.

The *Sociedad de Producción Pesquera Pescadores de Vigía Chico S.C.L.* was established in 1968 as a lobster cooperative of 49 members. The majority of lobster fishermen were earlier farmers and urban workers who began lobster fishing with relatively little fishing knowledge. Some others were part of the Cozumel Island Cooperative (Leslie, 1995). The traditional way to obtain lobster was using portable wood lath traps (*nasas*) or bully nets. Artificial habitats (*casitas cubanas*) were introduced to the State of Quintana Roo in the late 1960's by Cuban fishermen. Cubans had enjoyed a long tradition of fishing along the Caribbean coast of Quintana Roo since 1848 when Gov. Miguel Barbachano gave them State fishing rights (CIQRO, 1986). Less than a decade after their introduction, artificial habitats were being employed by six cooperatives in the State, and Vigía Chico had 7,500 to 15,000 in Ascension Bay (Miller, 1982).

Before Punta Allen was established, some of the original fishermen and their families (approximately thirty) lived in ranches, at the very tip of the peninsula, near the lighthouse, about 2 Km south from Punta Allen, at a property owned by the lighthouse keeper, Manuel Mendoza (Leslie, 1995). Susano Torres, a fisherman who lived at the lighthouse, discovered fresh water in a piece of land, full of coconut trees, and north of Mendoza's property. Casimiro Choc, the official founder of the Cooperative, organized a group of fishermen to take this land away from Romualdo Ancona, owner of a failing commercial coconut enterprise. Governor Rojo Gomez acquired the land and gave Punta Allen to the cooperative fishermen in the form of common property[1]. Fishermen divided this land into privately-held land plots among themselves and built thatch-roofed huts on individual lots, and named the village *"Colonia de Pescadores Javier Rojo Gómez*", later renamed Punta Allen; but the village is always referred as *La Colonia.*

[1] The Federation's Official Diary (D.O.F) published in December 16, 1972, the Declaration of Property of a National extension of land of 527 hectares, in Cozumel Municipality. That portion of land included Punta Allen.

A few years ago, inhabitants of the community quested tenure regularization of their lands, but due to the establishment of SKBR in 1986 (D.O.F. 20/I/86) and the lack of information on the ownership of the occupied land, the State Governor of Quintana Roo issued "Possession Record Documents" in September of 1988, to each inhabitant of the community, instead of "Property Records". This document accredited the "occupancy of the land described in the back of this document, while further regularization occurs". This document also states that it is forbidden to sell, transfer, grant or alienate the land.

By the mid-1980's, lobster fishermen in Punta Allen were economically prosperous and the landscape of thatch-roofed hunts with structures made of local palm *chit* wood changed, and more than half of the houses were rebuilt with concrete blocks. According to César Dachary and Arnaiz Burne (1989), this shift in housing materials was due to the local perception of concrete structures as desirable urban status symbols.

In 1988, 120 fishermen of the Vigia Chico cooperative owned 46 fishing grounds—*campos*—(several of them owned 2 or 3), but Hurricane Gilbert in 1988 led to the temporary collapse of lobster production and the long time economic prosperity enjoyed by fishermen's families. According to Leslie (1995), three events burdened fishermen with a great deal of cooperative debt for the next five years: 1) lobster production decreased due to ecological destruction in Ascension Bay and the destruction of half of the artificial habitats (approximately 20,000), at a time when prices were declining in the U.S. lobster market; 2) failure to finish building a fish processing plant in Tulum, which was 80 per cent complete when Gilbert hit; and 3) embezzlement of loan money by corrupt cooperative officers.

After this economic collapse, and as lobster resources continued to decline, local fishermen started to look for economic alternatives in tourism. In the beginning, lobster fishermen took the advantage of having boats and snorkeling gear (their fishing equipment) to offer tours around the bay and to the reef. Later on, Cancun's massive tourism industry extended to southern coastal destinations, such as Playa del Carmen and Tulum—just 50 Km away from Punta Allen—. Punta Allen's virgin beaches and beautiful coral reef, gave the community a good reputation and tourism has increased tremendously in the past 5 years. In order to respond to the increasing demand for tourism services and infrastructure in a sustainable way, SKBR encouraged the formation of Tourism Cooperatives and private enterprises in the community, and created rules and regulations. At present, there are 4 tourism cooperatives in the community and the Reserve has been working closely with them, organizing training workshops and providing them with basic tools for the development of sustainable activities. Nevertheless, one of most important factors that have contributed to the maintenance of Punta Allen's pristine landscape is that the journey from Tulum to Punta Allen is difficult and some times impossible, due to bad road conditions.

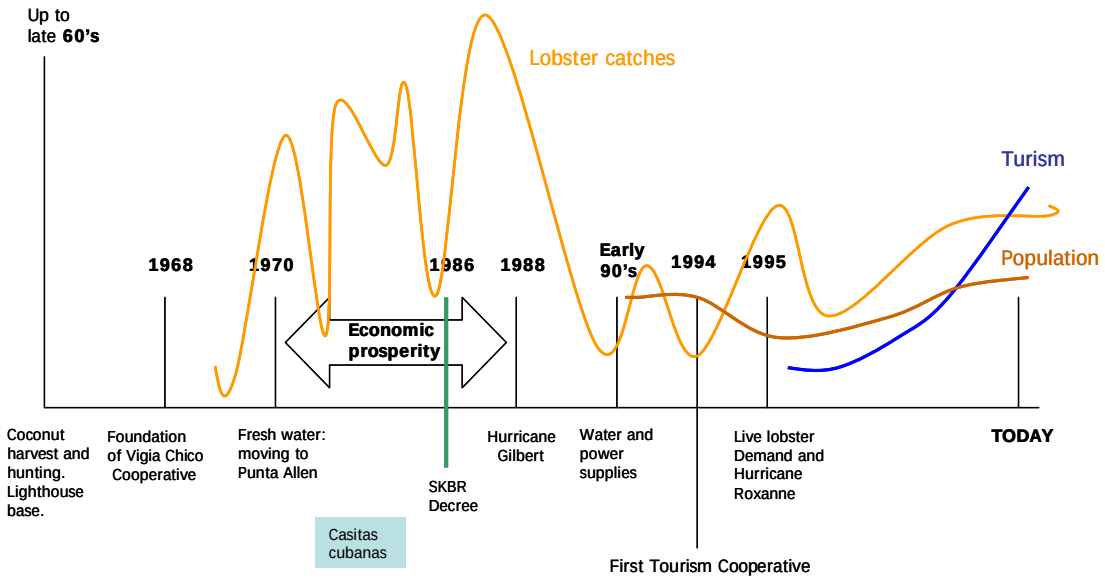
After the formation of the first tourism cooperative in 1994, a rapid and sudden change in the economy and social dynamics of the community occurred. Most fishermen are now involved in tourism activities, women are playing new roles in family income and both, elder and young people have new fields to develop economic activities.

This shift in economic activities is the main issue of this work, and will be analyzed deeply in further chapters, in terms of its benefits, the opportunities that it will provide, the threats that come with it, and last, the main gaps that will have to be filled in order to maintain natural and cultural values of the community.

Figure 2 shows a timeline of Punta Allen with the main socioeconomic and environmental events that have settled the community's present conditions. The economic prosperity registered during the 70's and the 80's decreased after hurricane Gilbert in 1988.

In response to the need for new income-generating activities, tourism cooperatives were formed and private enterprises arose. Although the increasing visitation rates shown in the past 5 years, community demographics have remained stable.

Figure 2. Main Socio-economic Events and Tendencies in Punta Allen, Q.Roo, Mexico.



ASCENSION BAY AND CORAL REEFS

Ascension Bay and the Spiny Lobster

Ascension Bay is a large (740 Km^2) and shallow (< 6m) bay located in the central part of the coast of the State of Quintana Roo, and inside the Sian Ka'an Biosphere Reserve, México (19° 45'N, 87° 29' W). The sea floor is composed of dense patches of sea grass (*Thalassia testudinum*) interspersed with sand and coral rubble (Eggleston et al, 1992). Mangrove forests border the shoreline and a number of mangrove islets have formed within the bay and function as waterfowl nesting, fish nursing and shelter areas (Leslie, 1995). The small islets (10-20 m in diameter) are called *mogotes* and the larger ones are called *cayos*. The coral reef barrier along the mouth of the bay protects the water from wave surges, making the bay calmer than other parts of the coast (CIQRO, 1984).

Ascension Bay is a productive nursery for spiny lobster (*Panulirus argus*), the majority of which are small juveniles (Lozano et al, 1994). In a two-year study during 1985-86, 1,256 lobsters were recaptured in six sample zones ranging from the innermost part of the bay to various locations among the mouth of the bay. Lozano et al, (1994) found that the distribution of lobster size in the bay is not random. Smaller lobster (mean carapace length of 61.4 mm) occupy the more interior parts of the bay, while larger lobsters (mean carapace length of 65.2 mm) occupy areas closer to adjacent coral reefs. In 1994, Lozano et al. found even larger lobsters (mean carapace length of 92.2 mm for males and 80.4 mm for females) further outside the coral reefs along the continental shelf. They also found signs of reproductive activity in female lobsters near adjacent shallow reefs.

Lozano et al (1994) recorded the movements of tagged lobsters and found that the majority of the recaptured lobsters that left their initial zones tended to move toward and along the reefs outside the bay. This pattern of movement, in addition to significant differences in lobster size between inner and outer bay areas, and a lack of reproductive females near adjacent reefs, all provide evidence that as lobsters mature they move from the innermost areas of the bay toward deeper waters outside the bay near the coral reef. In 1994, Lozano found evidence of a winter offshore migration of lobster from the shallow waters of the bay to deeper offshore areas. This seasonal migration helps explain why Vigia Chico lobster catches decline in winter while lobster catches actually increase in deeper lobster fishing grounds in the north (Leslie, 1995).

Coral Reefs and other ecosystems

The 1.6 million acre SKBR, located along the shore of the Caribbean Sea, contains saltwater, brackish and freshwater lagoons, and limestone sinkholes fed by a network of mostly underground rivers and springs. More than 1,200 vascular plants, 2586 vertebrate species, including more than 350 birds are found within the reserve's borders in tropical forests, savannas and mangrove forests. SKBR includes Mexico's largest protected coastal wetland, providing refuge for thousands of species of plants and animals including the endangered cat species of southern Mexico – jaguar, puma, ocelot, margay, and the jaguarundi, along with spider and howler monkeys, white-tipped and collared peccary, tapir, brocket and white-tailed deer. It is the breeding ground for least terns, osprey, American crocodile, manatee, and loggerhead, hawksbill, leatherback and green turtles. In addition to the extensive wetland ecosystem the SKBR includes a marine protected area with coral reefs covering approximately 150,000 hectares. The pristine coral formations are renowned for their abundance for sport fishing of species such as tarpon, bonefish, and permit. It is part of the second largest barrier reef in the world and it is home to a diversity of marine life which is well preserved (UNEP-CAR/RCU-SKBR MOU, 2002).

Purposes of this Socioeconomic Assessment

This socioeconomic assessment provides information on the factors that have influenced the changes affecting the population, and how the inhabitants have adapted to the changes. This report also provides information on the people's perspective on conservation, and how the management of the SKBR has affected their lives. The aim of this document is to serve as a case study to improve future management programs that directly affect coastal communities in the Caribbean Region.

Methods are described in detail at the end of the document (Annex 1). Methods were based on the Socioeconomic Manual for Coral Reef Managers (Bunce et al, 2000), the Socioeconomic Monitoring Guidelines for the Caribbean (Bunce & Pomeroy, 2003), and the Indicator Matrices for the Social, Economic and Environmental Impacts (Chuprine and Sisfontes, 2000). Some modifications were made to adapt the guidelines to the specific conditions of the site.

Chapter II

Punta Allen's People Today

DEMOGRAPHY

Population

Figure 3 shows that the population growth in the community has remained relatively stable with a small descend in 1995 probably generated by hurricane Roxanne, which caused a temporary emigration to Tulum and Carrillo Puerto, due to the damage caused to community infrastructure and the decrease in lobster catches. After Roxanne, population started to increase slowly, and nowadays Punta Allen has 433 inhabitants.

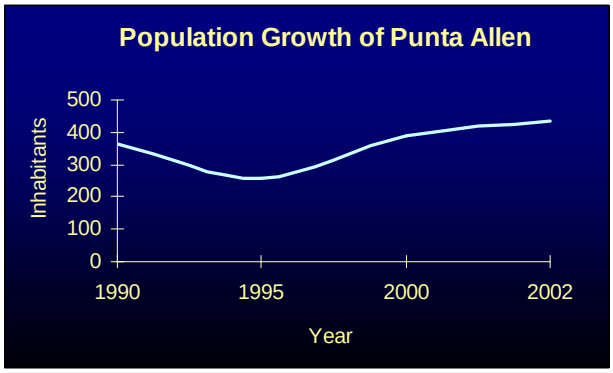


Figure 3. Population Growth of Punta Allen over the past 12 years.

Punta Allen is located in the Municipality of Solidaridad, in the State of Quintana Roo. This Municipality has the highest growth rate in the Country (INEGI, 2000) due to the increasing tourism projects that are taking place in the area. Table1 shows that the stability of Punta Allen's population has caused a decrease in the ratio of its population compared to the total population in the Municipality.

Locality	1990		1995	
	Number	%	Number	%
Playa del Carmen	3098	29.4	17621	62
Tulum	2111	20.1	3603	13
Cobá	669	6.4	836	3
Akumal	578	5.5	470	1.63
Chanchen	437	4.2	596	2
San Silverio	436	4.1	468	1.62
Punta Allen	**362**	**3.4**	**257**	**0.9**
Other Localities	2840	27.4	4896	16.8
Total Population of Solidaridad Municipality	**10531**	**100**	**28747**	**100**

Table 1. Population Proportion of Punta Allen, compared to other localities of the same Municipality. (INEGI, 1990, 1995)

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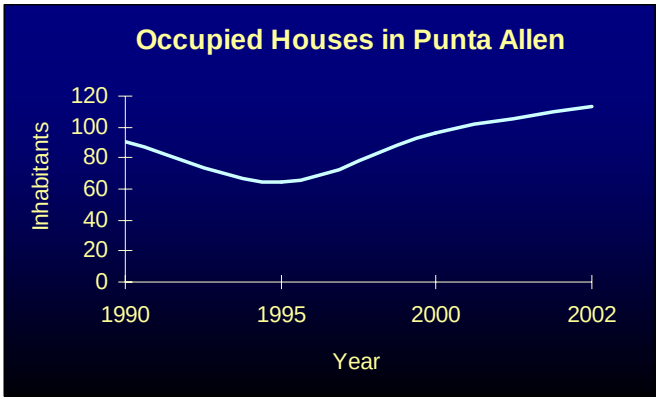
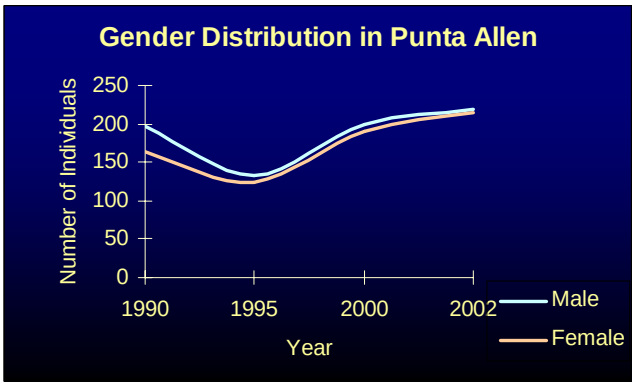


Households. Data collected from INEGI (1990, 1995, 2000), and that obtained by the Census Survey conducted during the fieldwork of this project, show that the number occupied houses in the community has grown slowly.

Figure 4. Changes in occupied houses in Punta Allen in the past 12 years

The 433 local inhabitants of the community are distributed in 113 houses, with an average of 3.8 occupants per house. Seventy eight per cent of these houses consist of one room and the kitchen, (usually located at the back side of the house). The other 22% are houses with more than one room and the kitchen.

Age and Gender



Gender Distribution: There haven't been considerable changes in gender distribution in the community in the past 12 years. Census Surveys from INEGI and fieldwork of this project revealed the following proportions: 45, 49, 49, 49 %, of females versus 55, 51, 51, 51 % of males, for 1990, 1995, 2000 and 2002, respectively.

Figure 5. Changes in gender distribution in Punta Allen

Age Distribution: The Census Survey conducted during the fieldwork of this project provided the following information, concerning age distribution in the community.

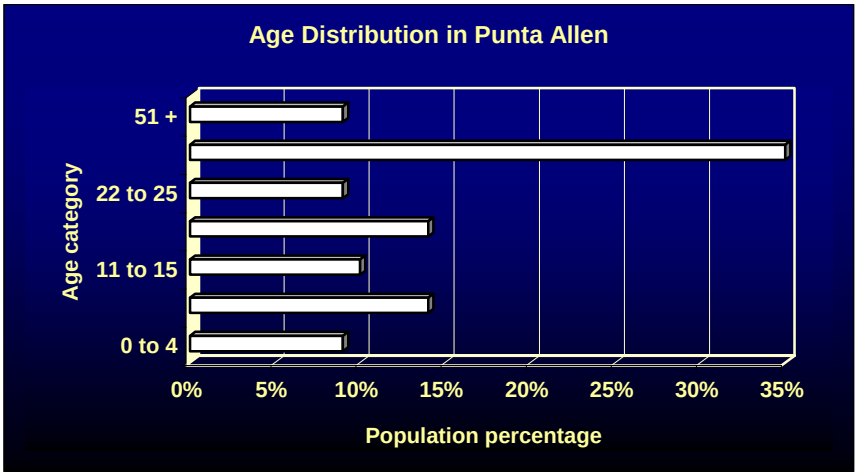


Figure 6. Age Distribution in Punta Allen.

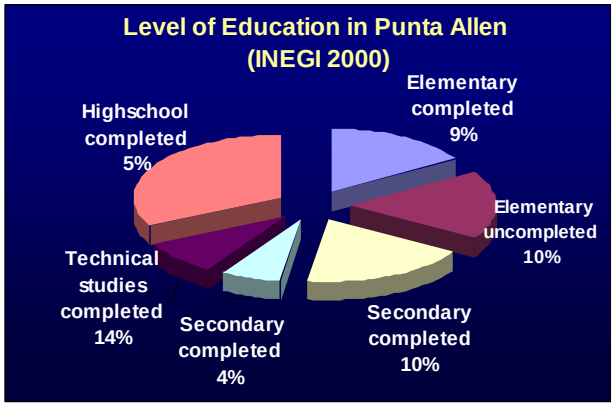
Caste and religious background

Origin. Most of the population in Punta Allen comes from different cities and small towns of the State of Quintana Roo (60%), particularly Cozumel. Twenty nine percent of the population comes from the State of Yucatan, mainly from the cities of Valladolid and Mérida. Four per cent of the people come from the State of Tabasco, and 7% from other States.

Languages. Even when Spanish is the language spoken in the community, 13% of the population over 5 years old also speak Maya, the native language of the Yucatan Peninsula, and 10% speak English besides Spanish.

Religion. Catholicism is the most practiced religion among the local inhabitants of Punta Allen (57%), some people belong to the Jehovah's Witnesses (17%) and 20% of the population stated to be atheist.

Education



Education and Literacy. According to the INEGI (2000), six is the average number of years of education of people in the community. Seventy two per cent of the population over 15 years old can read and write, while the other 28% can not.

Material style of life and assets

Most of the houses are made of wood, with thatch-roofs. A small proportion of houses are constructed with cement, but roofs are mostly made with thatch. Houses consist of a big living room, one room with hammocks for all family members, and a kitchen located at the back side—usually open. Not all houses have a bathroom.

Punta Allen residents have access to a set of services that will be described in *Community Services and Facilities*, but the following table summarizes the number of houses that have some of these services.

Service	Number
Water	97%
Electric Power	97%
Gas kitchen	88%
Wood kitchen	22%
Septic Tank	70%
Latrine	7%
SIRDO	16%
Radio	92%
TV	83%
VCR	15%
Refrigerator	30%
Laundry System	70%
TV Cable	37%

Table 2. Access to services, and assets by household (N=113)

Key informants noted that it is important to take into account that building a house in Punta Allen is very expensive because of the distance of the towns where materials are bought, and the bad conditions of the roads. Besides, inhabitants don't invest a lot in certain assets or in materials for their homes, because there is always a hurricane threat, which means they have to leave the place and possibly loose all they have. They prefer, instead, to invest building a house in Tulum, Carrillo Puerto, Mérida or Cancun.

Availability of Food

Nutrition in Punta Allen is good. Every home visited provided us with abundant and balanced meals. Most households in Punta Allen include a fisherman, which secures a good source of proteins to the family. In addition, most families have relatively good

incomes, so they have the chance to complement their diet with fresh fruits, vegetables, cereals and other animal products.

Occupational Structure

During the past 30 years, the primary economic activity in Punta Allen was lobster fishery. Nowadays, tourism activities and services are growing fast, as a consequence of the increasing massive tourism projects in the north of Quintana Roo. The Census Survey conducted during the fieldwork gives us new information on the occupational structure of the community.

OCCUPATIONAL STRUCTURE

MEN

Activity	Primary	Secondary	Tertiary
Fisheries	56 (33%)	4 (2%)	0
Tourism	69 (41%)	37 (22%)	4 (2%)
Business owner	3 (2%)	1 (0%)	0
Others	41 (24%)	17 (10%)	4 (2%)
Total respond	**169**		

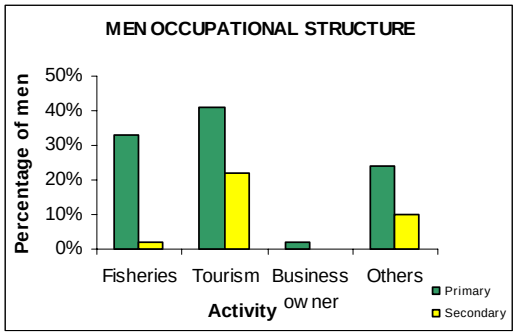


Figure 7: Occupational Structure of men of Punta Allen

In 1994 the first Cooperative of Tourism Services was founded in Punta Allen, as a result of a management strategy, to provide alternative livelihoods to the local inhabitants, and also to meet the increasing demand for this kind of services. Today, there are four Cooperatives of Tourism Services, and the data available show that tourism has become a very important source of income for both women and men in the community.

OCCUPATIONAL STRUCTURE

WOMEN

Activity	Primary	Secondary	Tertiary
Tourism	15 (14%)	3 (3%)	0
Business owner	9 (8%)	2 (2%)	0
Home	71 (66%)	13 (12%)	1 (0.1%)
Others	13 (12%)	1 (0.1%)	0
Total respond	**108**		

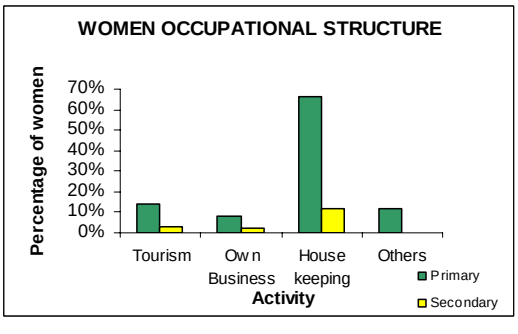


Figure 8: Occupational Structure of women of Punta Allen

Women in Punta Allen are still dedicated to housekeeping, but in the past 6 years, they have been incorporated to economic activities, particularly in the tourism sector, in which they participate in a wide variety of activities: as members of tourism cooperatives, owners of boats, chefs, waitresses, housekeepers in guesthouses, secretaries, etc. Other significant source of income for these women is running their own business, including supermarkets, restaurants and guesthouses.

Income and credit

Income. The census form was also useful to gather information about the monthly average income by productive activity. Results show that even when women represent 23% (N=220 productive individuals) of the economic force in the community, they are earning the same amount of money that a man involved in tourism activities, and even more, when it comes to running their own businesses. The average income was calculated by dividing the total amount reported for each activity, by the number of men/women who kindly provided information on their earnings by month.

	Women (N=34)	Men (N=117)
Fisheries	0	537.00
Tourism	309.00	303.00
Business	380.20	314.81
Others	422.22	308.00
Total	398.00	526.00

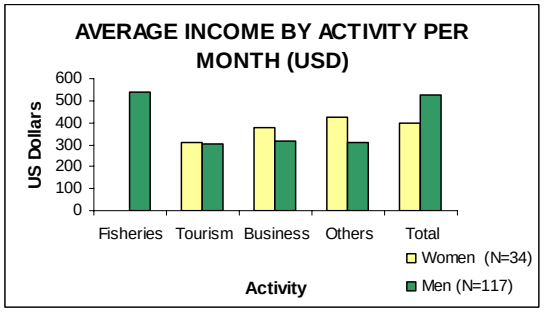


Figure 9. Average income by productive activity per month

Through their income generating activities, local inhabitants can have access to goods and services such as food, transportation and medical services. Education in Punta Allen is free, from Kinder Garden to Secondary School.

This means that 67% of the families can afford Technical or College-Level Education for their children, outside the community.

Good/Service	Percentage of households
Housing	74%
Feeding	97%
Education	67%
Transportation	81%
Medical services	79%
Vacations	39%

Table 3. Goods and services obtained through income-generating activities by family. N=113 families

Credit. There is a Fishing Trust that gives credit to fishermen of the cooperative and to other organizations in the community, to buy and/or repair shades, engines, boats, etc. Key informants did not provide further information about credits, but some inhabitants currently have bank credits.

Community Services and Facilities

Medical Services

Despite the austere infrastructure—a bathroom, a small hall, one room with two beds and an oxygen tank, a small room with a bed and basic and simple medical instruments and first aid kits—, the Mexican Institute for Social Security (IMSS) unit, and the personnel that work in it were found in excellent conditions of hygiene. Ms. Sandra Rodríguez, the physician responsible for the unit, works 8 hours a day from Monday to Friday, but everybody in Punta Allen knows where she lives, so she is available in case of emergency 24 hours a day. During the weekends, she leaves the village, but a nurse stays at the unit.

Everyone in Punta Allen has access to free medical services and medication. The unit has basic drugs, such as analgesics, anti-inflammatory medication, common antibiotics, first aid kits, IV solutions, strong pain and fever relievers, anti-flu medication, and antipyretics, among others. Nevertheless, one of the most important problems that the medical staff has to face is the lack of equipment and drugs needed to assist an emergency.

The doctor and one nurse agreed that the chances to improve the conditions of the medical services of the community are very low, because water and power availability is only restricted to certain periods a day.

Vaccination campaigns take place three times a year. During these campaigns, basic vaccines and vitamins are given for free to all, children and adults, and first aid courses are offered to parents. Other special programs are those dealing with the prevention and early detection of diabetes, hypertension and cervix, uterine and mammary cancer.

Mercedes Campos, one of the nurses, informed that the most common illnesses in children are those related with the respiratory system. Diarrhea is not as common as it is in other rural communities in the tropics, so it is not considered a public health problem. Elderly men usually develop inner and middle ear problems, hypertension—both caused by all the years of diving—, and diabetes. Women usually present urinary and genital infections, which are easily treated in most cases. Besides these affections, the doctor said that alcoholism is the most important factor that contributes to deterioration of men's health in the community.

The community is not comfortable with the medical services that the unit provides. They basically complain because they feel that doctors are not well prepared, and they want to have a doctor, not only a nurse, during the weekends.

Educational and Religious Facilities

Kinder Garden. Children between 4 and 6 years attend school in a schedule from 8:30 to 11:30. This school has two 7 X 7 m cement rooms and wooden windows. One is a store room and the other one is the classroom. The classroom is clean and ordered, and it is usually decorated depending on the season of the year (e.g. Christmas, Independence Day); it has 4 little wooden tables and plastic chairs.

The room is divided into different areas: music, nature, library and construction. Restrooms are small but clean. There is a big play ground covered with grass in front of the classrooms. Miss Milka Ken is the Kinder Garden teacher since September 2001. She seems very enthusiastic and looks happy with her job in Punta Allen. She said that she has developed a very close relationship with parents. Monthly meetings with parents are held to discuss the issues and subjects that will be covered in the following month, and parents are allowed to express their interest in particular issues they want to emphasize.

Primary School. At the entrance, the school has a *palapa* and a room that is currently used as the nursery room (children from 0 to 3 years). It has a blackboard, 4 little wooden tables, chairs, games, and diverse materials. The restrooms are located behind this room; both of them were clean and have showers. Three more cement rooms (7 x

7 m) with wooden windows are assigned for primary school, but one of them is a store room. The other two have big blackboards and personal desks. Surrounding the classrooms, there is a big yard and a basket ball court. The school was clean and recently painted. There are two teachers for 60 students. One of them, Mr. Misael Poot said that when he first arrived to the community, there were many deficiencies in the school infrastructure, but lots of improvements have been possible thanks to the "School Image" program implemented by the Ministry of Public Education.

This program empowers teachers and students to re-forest, keep clean, paint and maintain their schools in order to obtain monetary incentives. But the teacher has tried to extend this program to the community, promoting campaigns to clean beaches and streets. These programs have not been really successful because parents don't want their kids to "pick up garbage". But despite this feeling, kids show interest and enthusiasm towards these programs, thanks to environmental education workshops and courses provided by Amigos de Sian Ka'an and the SKBR staff. The teacher also mentioned that a new program started recently. This program empowers teachers to be available for students in the afternoons, and to stay in the community during weekends, with the objective of assisting students and parents in school issues, community service and cultural and sport activities.

Secondary School (Tele-secondary). It has only two cement rooms (7 x 7 m) with wooden windows; both of them have blackboards, personal desks, a computer and a television in each one. Restrooms also have showers and were clean. There is a Volley Ball Court in the middle of the play yard.

The Principal and teacher since 1999 is Ms Maricruz Cambambia, who has post graduate studies in Education. Another teacher takes care of two more groups, but Ms Cambambia said it is urgent to hire one more teacher because, according to her experience, the limited personal contact between the student and the teacher will negatively affect the student's academic progress.

Students watch a TV program transmitted via satellite. For 15 minutes, they listen to the program and then they ask questions to the teacher and he explains details about each subject. The program covers the following areas: geography, history, chemistry, physics, biology, mathematics, physical education, arts, humans and their environment, computers, ethics and civic formation.

Churches. There are two churches in the community, one offers Catholic services and the other one is a Jehovah Witnesses Temple. Services are offered at different times and they are usually crowded.

Public Utilities

Sewage Treatment Facilities. The Sub Delegate of the Municipal Government informed that Punta Allen does not have a sewage system. Most houses have septic tanks, but there is a lot of uncertainty about whether they are well constructed or not. Some data from the National Water Commission suggests that the mantle is highly polluted. People from the community agree with this and they said that some years ago it was safe to drink water from the wells, but it is not nowadays. Through community promoters SKBR has implemented a program in which the Reserve gives subsidy to all those families interested in buying an ecological toilet called SIRDO (organic waste recycling system). These toilets are an adequate alternative to control pollution of the mantle, and the price is very low (US$250) compared to that of a septic tank (US$2,000).

Electricity Supply. Mr. Randy Ruíz, ex President of the Power Commission of Punta Allen informed that a year ago a new diesel station that generates enough electricity for 12 hours of power was inaugurated. In early times, community power was financed by the Vigia Chico Cooperative, but in the last two years the Municipal Government of Solidaridad has been responsible for the station. Recently, the State Governor of Quintana Roo, Mr. Joaquín Hendrix, visited the community and took the commitment to absorb the expenses for 6 more hours a day, so nowadays Punta Allen has 18 hours of electricity a day.

Water Supply. Since 1993, Mr. Manuel Braga has operated the station of the National Water Commission in Punta Allen. He said 20 years ago, the community covered its needs of water with a small well. Fifteen years ago a new well was drilled, and today, it still provides water and its level has not changed through time. The well is located 7 Km away from Punta Allen: 5 Km of pipes go from the well to El Playon, there is 1 Km of underwater pipes, and 1 Km runs to the center of the locality. Water from the well is bombed mechanically (an operator lives next to the shaft) with a 15 HP diesel engine, to an elevated tank in the community, from where it is distributed to all houses. With each bombing, a 100 g chloride tablet is dissolved. Besides, every month the NWC takes samples of the water and makes the appropriate chemical and biological analysis, to secure that all the sanitary requirements are met. The water supply service costs US$10 a month and it is available almost 24 hours a day.

Communication Facilities. There are two public telephone cabins, and 18% (N=113) of the houses have a private telephone. All of them are satellite-based. There is no internet access in the community. Radio is the most common communication system. TV cable is brought from Carrillo Puerto, and almost all homes have access to it for US$35.00 a month.

Markets. There are six small stores in the community. All of them sell cold drinks, yogurts, canned foods, fresh fruits and vegetables, eggs, meat, chicken, jams, etc. Products in these stores are considerably more expensive than in Carrillo Puerto or Tulum, but there is always a variety of food, as well as medicine in some cases. There is one place where fuel and oil for boats are sold at high prices.

Guest Houses & Restaurants. There are 9 guest houses in Punta Allen, most of them owned by local inhabitants and few of them by foreigners (2). Most of them consist in 1-4 rooms. Fly fishing lodges are bigger, and can hold 20 – 50 persons, but there are only three of them in the community. Three cooperatives of tourism services run a restaurant located at the beach, and other 5 small restaurants and bars are distributed in the community. Currently, tourism infrastructure is not being developed in the coastal zone of Punta Allen.

Transportation. There are different ways to get to Punta Allen:

- Tulum-Punta Allen Road: This road is in very bad conditions. Public transportation is now available.
- Felipe Carrillo Puerto-Playon Road: It is not in very good conditions but the real disadvantage is that in order to get to Punta Allen from El Playon, it is necessary to take a boat. Public transportation for both parts: road and sea.
- Km. 48-Playón-Road: Same conditions and disadvantages. No public transportation available, except from El Playon to Punta Allen.

Social Situation

Organizations

The most important and recognized formal organizations in the community are Vigía Chico Fishermen's Cooperative, and 4 Tourism Cooperatives: "Gaytanes", "Las Boyas", "Punta Allen" and "Vigía Grande". Other informal organizations—not legally recognized—were identified by key informants and are summarized in Table 4.

Two religious groups, Catholics and Jehovah's Witnesses have a Temple or Church where they meet to pray and to organize diverse activities related to their religion. Other important group in the community is called "Pescadores de Sobriedad" (Sober Fishermen); it was established in 1983 with the intervention of Alcoholics Anonymous (AA). His leader, Mr. Casimiro Choc, said that they have daily meetings, and, in his

words: “even when not every member comes daily, here we always find a friend to share our experiences with, as well as our fears and the blessing of being sober.

Parent Councils are very important groups in the community because, according to the teachers, they are responsible for fund raising to organize special events (cultural and sports events), and to maintain school’s infrastructure. Teachers also said that most of the time it is very hard to work with the councils because religious differences generate discrepancies among families.

Mr. Julio Fernández is the representative of the Soft Ball Team of Punta Allen. The team is registered in the State Official League and it is sponsored by Grupo Corona.

A delegate from the Municipal Government is responsible for the *Family Integral Development (DIF)* Program. In order to achieve its goals, a Support Committee for this program was founded. The main function of this group is to provide and prepare lunch for all children in the community every day.

In November 2001 the Bird Watching Club of Punta Allen was established. Integrated by children and adults of the community, this group, leaded by Ms. Rosario Salazar, has the aim of getting to know the bird life of the area and support the conservation efforts and environmental programs of SKBR.

Organization		Activities
Formal	Vigía Chico Fishermen Cooperative	Lobster fisheries
	Gaytanes Tourism Cooperative	Tourism services
	Las Boyas Tourism Cooperative	
	Punta Allen Tourism Cooperative	
	Vigia Grande Tourism Cooperative	
Informal	Catholics	Community service and religious meetings
	Jehovah's Witnesess	
	Pescadores de Sobriedad (AA)	AA meetings
	Parent Councils (all school levels)	Fund raising for special events and school improvement
	Soft Ball Team	Sports
	Family Integral Development (DIF)	Lunch preparation for children in the community
	Bird Watching Club	Bird Watching, conservation, environmental education, support to SKBR programs

Table 4. Formal and Informal organizations of Punta Allen

Participation

Religion plays a key role in the way it influences people participation in public activities, since religious differences cause a permanent division of the community. Mr. Poot, a school teacher, said that in most cases Jehovah's Witnesses do not participate in traditional (e.g. All Souls' Day) or national celebrations (e.g. National Flag's Day), neither in recreative activities (e.g. theater plays). This information was corroborated by other inhabitants, who told us that religious differences, added to people's apathy, cause a lack of participation in the community.

Social Pathologies and Security

Observations during fieldwork and information provided by key informants suggest that the most important problem is alcoholism. According to the informants, this is not a severe cause of public disorders, but it has important influence in men's health, promiscuity, communication problems with children and in some cases, violence. Drugs, mainly marihuana and cocaine are commonly consumed among certain groups, but teenagers are starting to get involved in this behavior. Municipal Authorities take part in conflict resolution, most of them caused by drunk people. Nevertheless, inhabitants are not comfortable with the measures that have been applied to solve these problems. People said that they are not severe enough and faults keep on occurring.

Chapter III

Lobster Fisheries

As it was mentioned before, Punta Allen is a lobster fishing community founded by peasants that abandoned coconut harvest after the lethal yellowing of palm trees. These new fishermen and some others from different sites of the State of Quintana Roo, established the Vigía Chico Cooperative in 1968. This cooperative, as other fishing cooperatives in other Mexican States, has its roots in post-revolutionary legislation that took fishing under the jurisdiction of the Mexican government (Leslie, 1995). According to Miller (1982:59), there was a slow development of fishing cooperatives in Quintana Roo due to "the State's backwater location, the small-scale character of the fishery, and the limited local market for the reserved species". As lobster became a more lucrative resource, fishermen realized that they could guarantee access to lobster through cooperatives.

In 1970, the coastal economy of the State became increasingly tied to tourism with the rapid development of Cancun as an international tourism destination. As a result, lobster and shrimp production became important in the local economy (Leslie, 1995), causing an increase of 441% of lobster production during the 1970's (CICRO, 1986). Lobster production became even more important in the 1980's when fishing cooperatives started to sell lobster to the international market (Leslie, 1995).

Organization of the fishing ground

Fishing Concessions

Lobster industry in Quintana Roo developed after a number of political reforms (Article 27 in the Constitution of the United Mexican States of 1917), which socialized the nation's agrarian and marine economies. Since 1957, the Caribbean lobster cooperatives have been assigned certain sea territories or *campos* under national reforms, similar to those that assigned *ejidos* or common land to agrarian collectives. In the 1970's, the Mexican government initiated a process of modernization in the fishing and agrarian sectors in order to increase production. In the 1990's the fishing sector went once again under State pressure to increase production, as a part of a privatization process initiated by President Carlos Salinas de Gortari in the 1980's (Leslie, 1995).

In order to stimulate lobster production in Quintana Roo, cooperatives initiated a process to become more competitive in the future. In 1994 a reorganization of the 21 traditional fishing grounds reduced individual lobster fishing territories into only eight concessions. Thanks to its high productivity—the lobster catch from Ascension Bay accounts for 17% of the total catch in the State of Quintana Roo, and Vigia Chico Cooperative has the second highest catch of the State—, in 1993 the State Government of Quintana Roo granted Vigía Chico Cooperative with a 20-year concession of marine territory, specifically for lobster

fishing. This concession has clear legal boundaries and covers the area comprised between Punta Xamach and Punta Pájaros, including Ascension Bay.

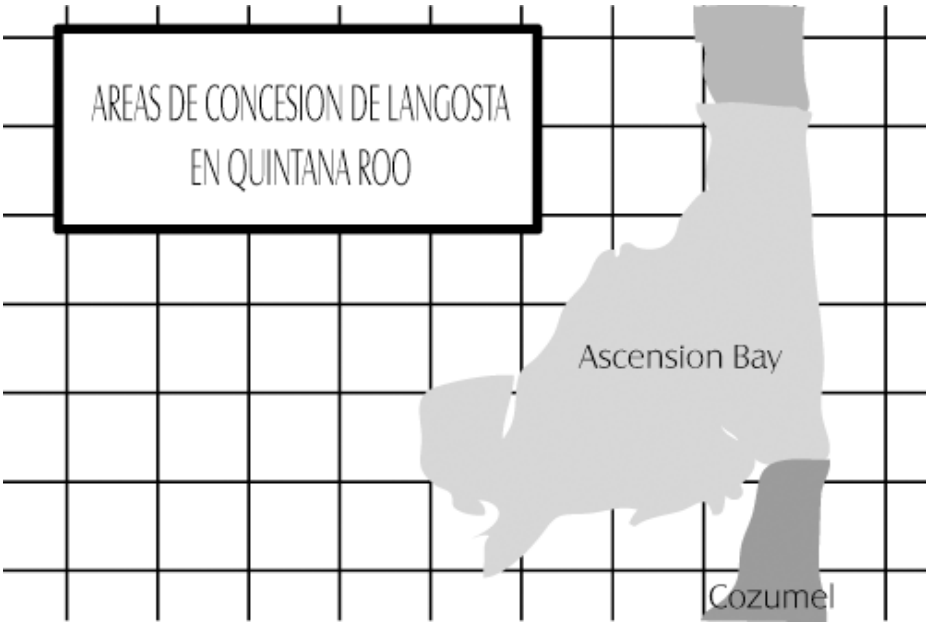


Figure 10. Area of concession of Vigía Chico Cooperative.

Vigía Chico Traditional Management

The *campo* system.

Vigía Chico Cooperative represents a model of organization in Latin America, since it has divided the bay and other fishing grounds along the area of concession into private parcels or *campos* to capture spiny lobsters (Alvarez, 2003). This system was developed and is enforced by local fishermen, it was not an initiative of the government and it is not recognized officially by Mexican Fisheries laws. Although, local fishermen have developed a formal system that provides the framework for how lobsters resources are exploited and distributed among fishermen in the cooperative. According to Leslie (1994), "the division of the cooperative's common fishing grounds into *campos* and the socioeconomic organization of fishermen into groups which exploit specific *campos* are the most important aspects of the local system".

Figure 11 is a map that resulted from a study of ECOSUR/CINVESTAV/ CICESE (2003). It shows the areas corresponding to *campos* in Ascension Bay. It describes that in 2003, 190Km^2 of the total area of 760 Km^2 is being used for *campos*. It shows that 25% of the area is used as fishing grounds where fishermen have deployed "casitas". It also shows the production of lobster in each area of the concession.

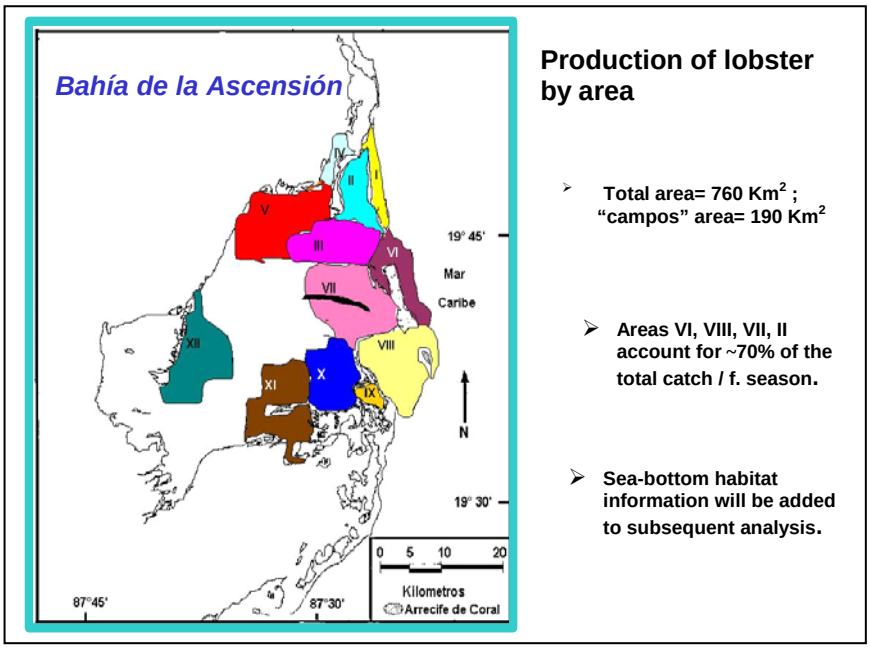


Figure 11. *Campos* distributed in Ascension Bay and their productivity ((taken from ECOSUR/CINVESTAV/CICESE, 2003).

This system is a well defined set of private property rights, governed by a set of formal rules developed, practiced and enforced by the local fishermen. The system regulates the access to privately-owned artificial habitat resources (*casitas*), resulting in the organization of labor and the distribution of economic benefits among co-ops (Figrure 12).

The cooperative keeps record of who owns which *campos* and cooperative officers participate in official cessions. A *campo* is registered to a fisherman with a document called *constancia de propiedad* (record of property). Cession, purchase and sale regulations, as well as penalties, and *campo* conflict resolutions are concentrated in three documents:

Ley General de Sociedades Cooperativas [The General Law of Cooperative Associations], *Actas y Bases Constitutivas de la Sociedad Cooperativa de Producción Pesquera "Pescadores de Vigía Chico S.C.L."* [Minutes and Incorporation Papers of the Fishing Cooperative Association Vigía Chico S.C.L.], and the *Reglamento Interno* [Bylaws].

Vigia Chico Cooperative Set of Regulations		
Type of regulations	**Set of Regulations**	**Recongnition**
Formal	*Ley General de Sociedades Cooperativas*	State Government. Provides general regulations on how cooperatives operate.
	Actas y Bases Constitutivas de la Sociedad Cooperativa de Producción Pesquera "Pescadores de Vigía Chico S.C.L."	State Government. Specific regulations and statements (e.g. administrative structure, members, etc.)
Informal	*Reglamento Interno*	Created by local fishermen. Not officially recognized. Provides specific regulations concerning enforcement and surveillance, sanctions, campo conflict resolution guidelines, etc.

Table 5. Regulation Sets of Vigía Chico Cooperative

The structure of the Cooperative changed as a result of the economic stress caused by Gilbert, and frauds committed by cooperative officers. By voting out certain fishermen who broke rules, the cooperative downsized and admitted more young fishermen without *campos.*

By 1995 the number of fishermen was reduced to 78 and only 51 were owners of at least one campo. The other fishermen would only participate collaborating with owners of *campos*. Today, there are 76 fishermen in the cooperative,

*Artificial habitats (*casitas*).*

Fishermen privately invest in *casitas* and place them on the seafloor in their *campos.* Traditionally, *casitas* were made with chit palm wood (*Thrinax radiata*) and reinforced with concrete slabs. Several styles were developed through time, and a variety of materials were used.

Nowadays chit palm is considered an endangered species and *casitas* are built with cement, gravel and metallic thread. Because of their weight, *casitas* are rarely removed from the seafloor. To repair them, fishermen dive to the seafloor with their tools. Artificial habitats are set up in patterns for fishermen to easily find them and also distinguish their shelters form those of their neighbors.

There are two reasons why artificial habitats help improve lobster fishing. First, artificial habitats attract lobsters because they are gregarious, and second, they enhance the survival of juveniles, protecting them from predators (Miller, 1982).

SOCIOECONOMIC ORGANIZATION FOR LOBSTER FISHING

Dueños and *Chalanes*

Lobster fishermen are known in the cooperative by their status as owner (*dueño*) or as assistant (*chalán*). *Dueños* are fishermen that own *campos*, invest in artificial habitats and have their own boats. *Chalanes* do not own either of these things. Typically, *dueños* are senior fishermen and several have hold key positions in the cooperative's administrative structure. *Chalanes*, tend to be younger and poorer, but can also hold official positions in the cooperative.

Leslie, (1995) recognized two formal types of sharing systems within the cooperative. The most common one is based in the division of total lobster production among crew members into three or four parts. This distribution is made by the *dueño* of the *campo*. *Dueños* pay for gasoline and invest in boats and motors, as well as in artificial habitats, and get a share for their labor and boat, and some times they also get an extra share for their artificial habitats (usually during the first months of the season when catches are high). *Chalanes* invest only in snorkeling gear and get a share of the total catch, unless they own *campos*. The second system is commonly observed among fishermen sons who join their fathers without any capital investments, but both fishermen equally divide the catch.

Some women also own *campos*. Most of them inherited *campos* from their husbands or took over them if their husband abandoned them. These women receive a share of the lobster catch made by fishermen that choose to work in their *campo*.

One day of lobster fishing at Ascension Bay

During the lobster season (July 1-February 28), around 8 am, 2 fishermen in one boat leave the shore and move towards their *campos*. Once they get there, one fisherman dives into the water using a snorkel, a mask and fins, and carrying a net (jamo) that is used to catch the lobster. The diver has to lift the shade with one hand, and catch the lobster with the other (Perez, A. Pers. Comm.). While out in the sea, fishermen remove the tail from the lobster, and discard the head in a large area near the shoreline south of the lighthouse. If the lobster has eggs or does not meet the minimum legal size (13.5 cm of tail) fishermen put it back into the water. Some members have *campos* near the coral reef but they say they are aware of the fragility of these ecosystems and seem to be very careful when diving around them (Choc, C. Pers. Comm.).

Before bringing the lobsters to the shore, fishermen pack the lobster tails in plastic coolers with ice. The lobsters are deposited in the Reception Center where the tails are measured and weighted and individual catches are recorded. Most of the lobster tails meet the minimum size, but the catches always include tails under the required length. Those are taken home for personal consumption.

Fin fishery

This activity takes place all year long, but fishermen are enforced to observe closed seasons for each species. Fishermen catch some fish for self-consumption and for selling it to the Tourism Cooperatives' restaurants. Most common species are: nassau grupper (*Epinephelus striatus*), jewfish (*Epinephelus itajara*), gray snapper (*Lutjanus griseus*), dog snapper (*Lutjanus jocu*), queen snapper (*Etelis iculatus*), hogfish (*Lachnoalaimus maximus*), permit (*Trachinotus falcatus*) tarpon (*Magalops atlanticus*), among others.

During the lobster closed season the *campo* system is not in effect, and fishermen can fish anywhere. A month previous to the opening of the season, fishermen are advised to stop fishing in *campos* that are not their property.

Fishing for both resources (lobster and finfish) appears to have almost no impact on other marine resources. Yet, this needs to be studied. Nonetheless, the description of how the fish activity is conducted as described by fishermen and other stakeholders (academics) shows to have little impact in the structure of habitats. This is because simple techniques are used to catch these types of resources.

CATCHES

According to Alvarez (2003), compared to Vigía Chico Cooperative, in the rest of the cooperative associations of the northeast of the Yucatan Peninsula, the *casitas* system was not successful because fishermen placed them anywhere in the common area (concession) which meant that lobsters could have been taken from the *casitas* by anyone. This practice led to hostility and competition between fishermen for the best areas of fishing, increasing production costs.

A few years later, the *casitas* were abandoned and the popularity of nets and hooks increased once more. As a result of this unregulated use of the natural resources, the lobster population declined almost completely in the north eastern area of the State.

The IUCN identified Vigia Chico Cooperative as the most successful fishing cooperative society in Latin America during the past decade. As it was explained, fishermen there developed their own rules to regulate the use of the fishing areas. Lobsters are caught in the central part of Ascension Bay where there is an average depth of 5 metres. However, the population of reproductive individuals of *Panulirus argus* lobster inhabits the deep reef 40 metres underwater where diving and fishing is prohibited (Alvarez, 2003).

Hurricane Gilbert destroyed 50% of the *casitas* deployed in *campos* and also changed the bottom conditions in several areas of the bay. Production in the most productive *campos* decreased. A first measure taken by co-ops was considering setting up new *campos* in the inner part of the bay, but always complying with the minimum legal size and the closed season management regulations.

Campos in these new areas had different conditions. Many of them presented a muddy bottom with very low densities of lobsters. Additionally, it was possible to observe a size gradient with smaller individuals in the inner part of the bay, and individuals with appropriate sizes for fishery purposes (>135 mm tail length) in areas close to open sea.

Decreasing rates in lobster catches after the Gilbert hurricane and other hurricanes and storms, were considered an important sign of danger to the fishery, but the latest seasons have shown an important increment in lobster catches. There is a controversy between researches, because some of them strongly believe that the fishery is showing an increasing tendency, while others disagree. For this reason, the catching pattern has to be deeply analyzed.

Since 1995 lobster started to be caught alive when a new implement (jamo) was introduced in fishery. This change was a response to the need of exporting live lobsters to Hong Kong and other Asian countries. This new market increased income, and most co-ops made the necessary arrangements to participate in it. During the last seasons, in the first two months of catching, lobsters have been caught specifically for the live lobster market. Almost 60% of the catches are obtained during these two months.

Figure 12 presents the results of a study conducted by ECOSUR/CINVESTAV/CICESE. Here, a series of catches on a seasonal basis shows that catches were declining between the seasons in 1979/80 and 1994/1995. Since the 1995/96 season and onwards, catches have been stable and, considering the comments of fishermen, the last three seasons showed a recuperation trend, perhaps at levels not seen for many years.

Catch-effort trends

Catches have been stable for period 1990-2001.

Effort measured as number of trips/season shows a decreasing tendency since 1989.

CPUE shows an increasing tendency

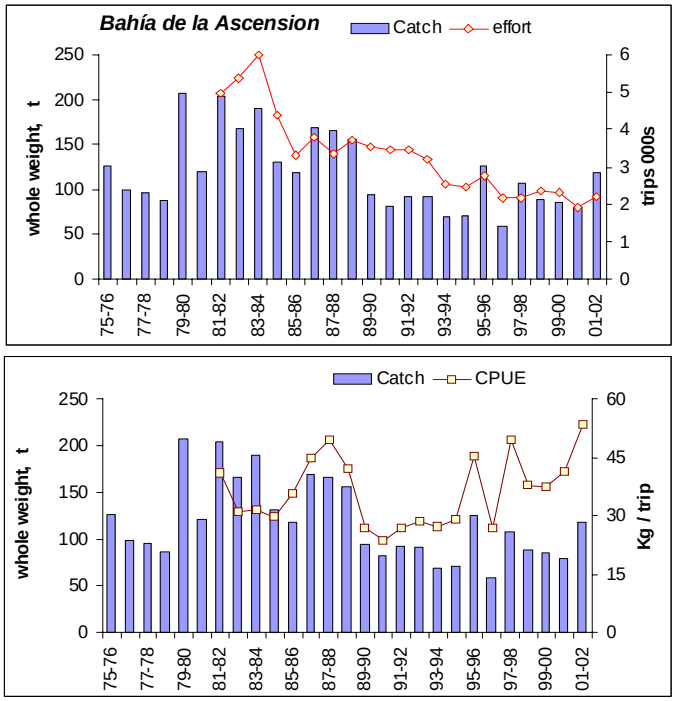


Figure 12. Catch and effort trends of the Vigía Chico Cooperative (taken from ECOSUR/CINVESTAV/CICESE, 2003).

According to members of the Vigía Chico Cooperative the past season (2002-2003) resulted in higher catches. This increase tendency in the last three catching seasons should be studied. Reasons that might support this trend are:

- With the development of new economic alternatives fishermen seek to optimize their time, and increase their income. During July-August most of the time is spent catching lobsters in their fishing *campos*. From September on, availability of lobsters decreases and fishermen start combining the fishing activity with tourism. This has reduced the number of trips and an economic optimization process is taking place. The managing rules set by the Vigía Chico cooperative members have made this possible, since they assure that lobsters in each *campo* will not be removed. Only the owner decides when to visit his *campo*(s) to check the *casitas* for lobster extraction.

- Ascension Bay is a nursery area for lobsters. However, there is a high degree of compliance to the regulations of the co-ops. An internal agreement in the cooperative states that fishermen must not fish undersized lobsters, otherwise they could lose the right to fish lobsters and be expelled from the cooperative. This form of auto-regulation has had great effects to maintain the fishery. A first measure taken by co-ops was to establish new *campos* in the inner part of the bay,

but always complying with minimum legal size and closed season management regulations. *Campos* in these new areas had different conditions. Many of them presented a muddy bottom with very low densities of lobsters. Additionally, it was possible to observe a size gradient with smaller individuals in the inner part of the bay, and individuals with appropriate sizes for fishery purposes (>135 mm tail length) in areas close to open sea.

- An aspect to be mentioned is the importance of understanding the role of post-larvae recruitment and management in Ascension Bay. Unlike other fisheries, it has been seen that it is feasible to fish spiny lobster at earlier ages (sizes) than recommended by traditional fishery practices, as long as measures to prevent overexploitation are observed. While this is a matter of discussion amongst fishery managers, this practice will continue to take place in Ascension Bay, because it has complied with such measures, and new economic alternatives might also contribute to the improvement of this fishery.

- Ascension Bay is benefited by the buffering effect of the terrestrial area of SKBR. This area reduces the probability of poaching and increases the certitude of management rules set by members of the Vigía Chico Cooperative.

- The implementation of Federal laws and the respect that the Reserve has shown to fishermen's knowledge and experience—including local agreements, and enforcement and surveillance methods—, might have been important to successfully maintain the population of lobsters.

- The increased level of awareness in conservation issues and self-organization of the community.

SUPPLY, DEMAND & MARKET STRUCTURE

Supply

The president of the Fishermen's cooperative said that only 2-3 % of the total extraction of the season stays in the community—around half a ton—, and the rest of the production is sold outside. The extraction amount varies every season, depending mainly on environmental conditions. The last two seasons (2001-2002 and 2002-2003) were more productive (see Figure 12) than the past ones. Table 6 shows the weight of the two last seasons of lobster catches at Ascension Bay. As it can be noticed, weights are separated into tails, live, and dead lobster.

Season	Tails	Live	Dead
2001-2002	31 Ton, 6 K242 g	6048 K 200 g	
2002-2003	34 Ton, 609.160 K	23 Ton, 228.76 K	10 Ton 970.150 K

Table 6. Catches (in weight) for the last two seasons at the Vigía Chico Cooperative.

Demand and Market Prices

The cooperative sells the lobster at different prices each season, depending on the deal made with the buyer. Last two seasons, prices were: $10.75 US per Kg of live lobsters, $10.00 US for dead ones and $25.40 US per K of tail. Live lobster is only sold during the first two months of the season, but not all seasons. If there is no buyer for live lobster, fishermen only sell tails.

There is a new buyer every season. Approximately one month before the season starts, several buyers have meetings with the cooperative authorities to propose the buying price to them. The cooperative sells its product to the buyer that offers the best price. There is not a contract or legal commitment between the buyer and the cooperative; therefore, if other buyer comes offering more money per Kg, the cooperative has the right to change the buyer, even at the middle of the season.

It is important to mention that even when the Vigía Chico Cooperative has the highest prices in the market, it is the one that produces and sells more lobster in the State (Pereira, A. Per. Comm).

Market Structure

Live lobster buyers collect the product at the dock and take it out of the community by themselves. The product is then taken to the State of Baja California, where it is prepared for export. On the other hand, tails are transported from Punta Allen to Tulum after one to two days of storage. All buyers live outside the community and they mainly sell the product to hotels and restaurants in Cancun and the Mayan Riviera.

Chapter IV

TOURISM:
AN ALTERNATIVE LIVELIHOOD

SKBR is located between the end of the Mayan Riviera (from North to South), and "Mundo Maya" (from South to North), both developing massive tourism poles. Even when Punta Allen community has been traditionally dedicated to lobster fishery, in recent years, demand for tourism services and activities has emerged as a consequence of the increasing influx of visitors from Cancun and the Mayan Riviera—mainly Tulum—, who want to visit Sian Ka'an, and particularly, Punta Allen. This influence has been felt in the community for some years, and it was taken as an advantage to promote alternative sources of income for the fishermen, after the effects of the severe decreases in lobster catches in the late 80's and early 90's. Nowadays, most fishermen are involved in tourism activities, some of them during the lobster's closed season; and some of them are participating full-time in these activities.

This new economic activity has produced diverse changes in the community, in terms of the social, economic and environmental aspects. The development of this activity may become the main threat to the ecological and cultural integrity of the community. Institutional and social mechanisms must be established in order to regulate tourism development in Punta Allen, based in the capacity and the limits of the ecosystems to support tourism activities, and not based in the market's demand, since this one will definitely exceed the capacity of the natural offer.

EMPOWERING TOURISM DEVELOPMENT IN PUNTA ALLEN

Punta Allen is located in the Buffering Zone of SKBR, which, according to the *Ley General de Equilibrio Ecológico y Protección al Ambiente*—LGEEPA—(1996) , means that *"productive activities in these areas will only be developed by local communities that were already established at the moment of issuing the decree…activities must be strictly compatible to the objectives, criteria and sustainable use programs of the Protected Area…"* For this reason, community participation in the development of tourism inside the Protected Area is considered one of the most important points in the implementation of the SKBR Public Use Program. According to Bezauri and Arellano (2001), this is important in order to prevent an undesirable immigration process to the community that might hinder the sustainable development of this activity.

Based on this, and responding to the increasing demand for tourism activities and infrastructure, ten years ago, the SKBR management body initiated a process to empower Punta Allen community members' participation to organize themselves in social enterprises to offer and develop tourism activities and services. This initiative considered that community organization was fundamental in securing the distribution of social and economic benefits generated from this activity among locals (Bezauri & Arellano, 2001).

In 1994 the first cooperative of tourism services was founded, and today there are 4 of them (See Table 7). Tourism activities and services are also offered by private enterprises of the community, and some private companies from the Mayan Riviera. These foreign companies have made arrangements with local cooperatives that provide boats, meals and guides to the tour, and pay a commission to the outside operator just for bringing the tourist down to the community.

Cooperative	Co-ops	Available infrastructure
Punta Alem	24	Restaurant, boats, information center
Vigía Grande	46	Information center, boats, bikes, restaurant
Gaytanes	10	Boats, restaurant, information center
Las Boyas	5	Boats, information center

Table 7. Tourism Services Cooperatives of Punta Allen

In addition, the initiative also promoted the opening of 5 guest houses and/or fly fishing lodges with 23 rooms that existed before the Decree of the Protected Area was issued. Results from the last Accommodation Census are shown in Table 8.

Accommodation Services	Places	Rooms
Local private enterprises and tourism cooperatives	14	41
Land owners operating before the Management Plan of SKBR (mostly fly fishing lodges)	9	52
TOTAL	23	93

Table 8. Accommodation services offered in Punta Allen and surrounding areas

TOURISM ACTIVITIES

Snorkeling Tours

Snorkeling tours are offered by 4 Cooperatives of Tourism Services based in the community, and by 4 private companies owned by locals. Each cooperative and company has a different number of members and tour guides. All guides are trained and certified as “Naturalist Guides” by the Ministry of Tourism and the Ministry of Environment and Natural Resources.

Training consists in basic environmental interpretation of ecological features of the PA; basic biology of coral reefs, fish, marine birds; legislation; and sustainable use of marine resources.

Tours last approximately 2 to 3 hours and take place along the coral reef barrier located in front of Punta Allen. Visitors come from all over the world, but Italian and German are the most frequent guests. For details on number and nationality of visitors, sites visited and average duration of activities, see tables 2 and 3. High seasons for these activities are *Semana Santa* [Holly Week] in April, Summer Break, July and August, as well as Christmas Holidays from December to January.

Snorkeling sites have been selected, recognized and signed by the SKBR management staff, and are regularly monitored by a ranger. Each boat can take 6 passengers at the most, who wear snorkeling gear and life vests in order to make them float and keep them away from the corals. The number of visitors and snorkeling tours vary with time of the year and weather conditions.

Tables 9 and 10 summarize the activities, number of boats, visitors per semester, nationality of visitors, sites visited and duration of activities of each of the tourism enterprises (social and private).

Tour Operator	**Cuzan Guest House**	**Victor Barrera**	**Pesca Maya Fishing Lodge**	**Posada Sirenas**
Activities	Wildlife observation	Wildlife observation, Lagoon tour	Wildlife observation, snorkel tour	Snorkel
Boats	5	3	8	1
Average number of visitors per semester	77	957	700	136
Nationality of visitors	American, British, Mexican	Italian, Spaniors, American, German	American	American
Sites visited	Cayo Culebras, Punta Pájaros, Hualoztoc, Tres Marías, Xamach, El Recodo, Santa Rita	Laguna Capechén, Boca Paila, Chunyaxché	Punta Allen Coral Reef, Xamach, El Recodo, Santa Rita, Pelícanos, El Barco, Cayo Valencia	Punta Allen Coral Reef, Xamach, El Recodo, Santa Rita,Nichehabbin, El Barco
Duration of activity	3 hours	6 hours	4 hours	4 hours

Table 9. Activities offered by the private enterprises of Punta Allen

Tour Operator	Punta Allem	Vigía Grande	Las Boyas	Los Gaytanes
Activities	Snorkel and flyfishing	Wildlife observation, snorkel tours, fly fishing	Wildlife observation, snorkel tours, fly fishing	Snorkel
Boats	24	24	2	10
Average number of visitors per semester	4283	2049	1195	2226
Nationality of visitors	Italian, Spaniors, American, German, Mexican and Russian	Italian, Canadian, French, American	Italian, Spaniors, American, German	Italian
Sites visited	Blanquizal, Punta Allen Coral Reef, Laguna Negra, Isla Anidación de Aves	Blanquizal, Punta Allen Coral Reef, Laguna Negra, Isla Anidación de Aves, El Barco, Tres Marias	Blanquizal, Punta Allen Coral Reef, Cayo Culebras, Esperanza, Gaytanes, El Barco, Tres Marias	Blanquizal, Punta Allen Coral Reef, Laguna Negra
Duration of activity	3 hours	6 hours	4 hours	4 hours

Table 10. Activities offered by Tourism Cooperatives of Punta Allen.

Fly Fishing Tours

Fly fishing tours are available from November to June. Tours can be offered to tourists coming by themselves to the community, or are arranged by private companies that work closely with local guest houses. Even when the 4 tourism cooperatives offer fly fishing tours, only one, Las Boyas, is almost entirely dedicated to this activity. Nevertheless fly fishing guest houses (private enterprises) are the most important sources for this activity in the area. Tour starts at the Punta Allen dock at 8:00 am. Boats move towards different sites in Ascension Bay, were two guides and fishermen spend the day catching bonefish, tarpon and permit. All fish are released after being caught. Fishermen go back to Punta Allen around 6:00 p.m. High season starts in November and ends up in late January. For details on equipment, number of visitors,and sites visited, refer to table 11.

Tour Operator	Palometa S.A de C.V.	Cuzan Guest House	Víctor Barrera	Casa Blanca	Posada Sirenas	Pesca Maya Fishing Lodge	Romualdo Ancona
Boats/Equipment	3 / 3 fishing rod per person (soin and fly rods).	3 / 3 fishing rod per person (soin and fly rods).	3 / 3 fishing rod per person (soin and fly rods).	24 / 3 fishing rod per person (soin and fly rods).	1 / 3 fishing rod per person (soin and fly rods).	8 / 3 fishing rod per person.	4 / 1 fishing rod per person.
Average number of visitors per semester	125	141	30	2,226	140	136	78
Sites	Ascension Bay: Hualoxtoc, Tres Marías, Chobon.	Ascension Bay: Hualoxtoc, Tres Marías.	Laguna San Pinocho, Vigía Grande, Tres Marías, Cocalito, Lagartijas, Boca Paila.	Ascension Bay	Cocalitos, Tres Marías, Esperanza, Laguna Negra	Ascension Bay	Ascension Bay
Duration of activity (trip)	7 hours	10 hours	4 hours	8 hours	9 hours	9 hours	8 hours

Table 11. Fly fishing tour companies working in or around Punta Allen (except Cooperatives).

Bird watching and Mangrove tours

Some certified tourist guides offer small "environmental interpretation" tours, including bird watching and hiking in the surrounding mangroves.

DEMAND & MARKET STRUCTURE

Demand

In the past 4 years visitation rates have increased dramatically, as it is shown in Figure 14. This increasing influx of visitors, most of them Europeans (Figure 14), is caused by the influence from the big tourism poles at the North of the State of Q. Roo, and by the location of SKBR in the so-called "Mundo Maya" (Mayan World) that includes important archaeological sites (e.g. Tikal in Guatemala, Tulum and Chinchen Itza in Mexico). This greater flow of visitors is also reflected in the increasing demand for accommodation facilities.

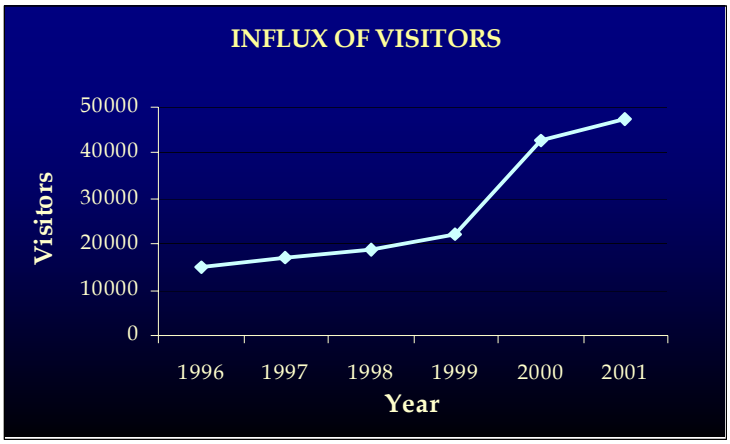


Figure 13. Increasing rates of visitors to SKBR

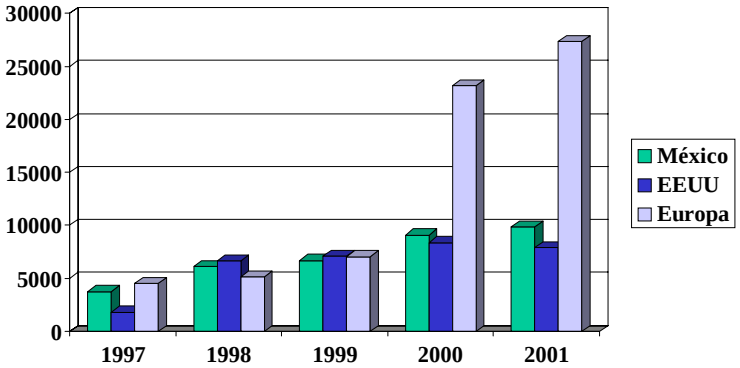


Figure 14. Increasing rate of visitors by origins

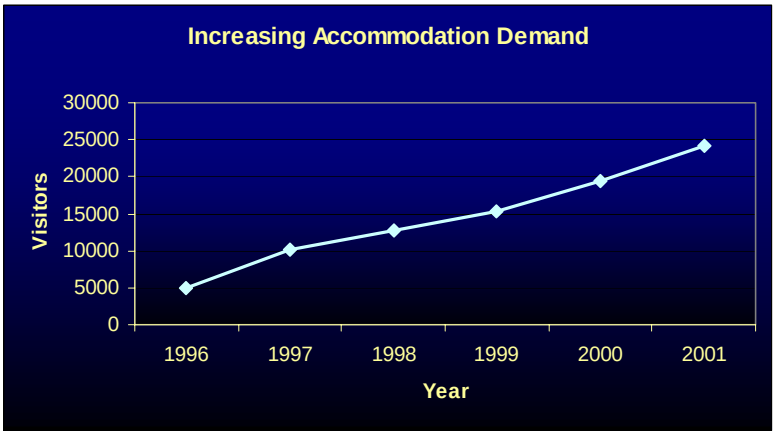


Figure 15. Increasing Demand for accomodation facilitiesof visitors by origins

Supply

As it was described in the past section, tourism services are offered by cooperatives of tourism services or by private enterprises in the community. Some of these enterprises (social or private) have made arrangements with tour operators from the Mayan Riviera. Commonly, local enterprises provide boats, meals and guides to the tour; and pay a commission to the outside operator just for bringing the tourists down to the community.

Chapter V

MANAGING A PROTECTED AREA

In January 20th, 1986 a Presidential Decree declared the establishment of the Sian Ka'an Biosphere Reserve. The process of establishment started in 1982 with a project of the *Centro de Investigaciones de Quintana Roo (CIQRO)* for the creation of a protected area in the State of Quintana Roo, in order to preserve its enormous natural richness (SEMARNAP, 1996). SKBR is a legal entity designated by the National Commission for Natural Protected Areas (CONANP)—a decentralized body of the Federal Government: Ministry of Environment and Natural Resources (SEMARNAT). It is located in Mexico: 19°05' - 20°06'N and 87°30' - 87°58'W, from km. 1 to 50 along the south coast of the Municipality of Solidaridad and the entire coastline of the Municipality of Felipe Carillo Puerto, in the State of Quintana Roo. SKBR was designated as Mexico's first UNESCO World Heritage Site in 1987.

The ecosystems within the SKBR are threatened due to economic, demographic and infrastructure growth of the so called Riviera Maya. This zone is characterized by a massive tourism development and intensive use of natural resources. Both activities have caused severe damage to the reefs because of different factors, including improper waste disposal, untreated wastewater, uncontrolled boat traffic, bilge discharges, extensive diving, over fishing, illegal fishing, and more. The aforementioned threats make the management of the SKBR increasingly difficult (SKBR-UNEP MOU, 2002).

MANAGEMENT

Authorities & Staff

Chapter II of the *Reglamento en Materia de Áreas Naturales Protegidas* [Bylaws of Natural Protected Areas] establishes the attributions of the Director of the PA. Summarizing, the Director is responsible for the administration and management, and he/she must be supported by technical, operative and administrative personnel.

SKBR has 27 members in its staff. The Management Body (MB) is distributed in different locations:

- Cancun offices, where the administrative staff, Director, Sub director and Project Leaders for Research and Monitoring and Natural Resource Management are based.
- An operative office located in Carrillo Puerto, conformed by Environmental Education, Public Use Program and Surveillance and Monitoring Project Leaders.
- Inspectors and rangers are based in Carrillo Puerto, but they're constantly rotating among the accesses (entrances) to the PA (El Arco, Muyil, El 48, Pulticub, and the Santa Teresa Field Station).

Management Plan

The SKBR current Management Plan (MP) is the result of a review done in 1996 (SEMARNAP, 1996). The main purpose of this MP is being a tool for the integration, follow-up and evaluation of the protection and sustainable use of natural resource strategies. It is an instrument for planning and regulation, in which the activities, actions and basic regulations for management and administration of the protected area are established.

SKBR MP contains a deep description of the physical, socio-cultural and natural resources use characteristics of the PA. After listing the major objectives of the Reserve, the MP states the short, medium and long term strategies, based in the following goals:

- Guarantee the physical integrity of the Area.
- Promote reasonable use of natural resources.
- Foster social participation and representation in management and in the sustainable use of natural resources.
- Spearhead research and education towards a better understanding and utilization of natural resources in the Areas, and the environmental benefits that this would bring to the region.
- Secure financing for the permanent and continuous operation of the Area.

According to these goals, the MP is divided into 5 components and sub-components. Each of them has specific objectives and implementation strategies. The MP includes a section describing the basic legal frame and an annex in which Use Regulations and Zoning inside the limits of the PA are established: Core zones, Buffering zones and Critical zones.

The MP of SKBR is not a legal instrument because it has not been published in the Official Journal of the Federation. At the time of its creation, the SKBR board of directors was not aware of the importance of its official publication, and it was published as a Public Policy to guide the management of the PA. Despite this, local resource users recognize, respect and observe its regulations.

They recognize the authority of the PA Management Body and, in most cases, they collaborate with them in order to succeed in common management goals and objectives.

Zoning

For management purposes the Reserve is divided into three different areas:

- *Core Zone:* which comprises the best preserved areas, and is only intended for conservation and limited scientific research.

- *Buffering Zone*: where appropriate low-impact human activities and sustainable use of natural resources are allowed within the formal boundaries of the reserve.

- *Cooperation Zone*: which includes those lands and human settlements located outside but adjacent to the formal boundaries of the reserve, where technology and know-how on natural resource management, which has been developed and tested, within the reserve, are also applied.

Enabling Legislation & Use Regulations

Punta Allen is located inside the Buffering Zone of SKBR. In this area, human settlements are found, and it is the portion of the Reserve where regulated activities and participative research oriented to eco development take place. The use of natural resources and development of economic activities inside SKBR are regulated and subject to the permits and concessions given by the MB and/or particular Government Agencies.

Permits are finally evaluated and accepted or rejected by the Ministry of Environment and Natural Resources (SEMARNAT). Permits may cause the payment of use/right fees.

Permits are given to local users, in the following order of priority:

- For self-consumption.
- To traditional users of a specific resource.
- To organized social groups in the reserve.
- To organized social groups located in the reserve's cooperation zone.
- To particulars inside the reserve.
- To particulars of the cooperation zone.
- To owners of land in the reserve, that don't live there.

A detailed list of use regulations for SKBR can be found in the MP (SEMARNAP, 1996), but some of those are listed in Table 12.

PARTICIPATION IN MANAGEMENT

Advisory Councils and Government Agencies

In addition to the management authorities, an Advisory Council (AC) advises and supports Directors about the management of the PA. Theses Councils are constituted by representatives of all stakeholder groups, including government, community organizations, local, regional and international NGOs, private sector, research institutions etc. SKBR AC was first created in 1992 and was restructured in 2002. Changes responded to the needs of the groups they represent. Today, AC has 28 members and it is presided by Biol. Arturo Bayona, from ECOCIENCIA, a local NGO in Carrillo Puerto.

Type of Use	Regulations	Specific Regulations
Flora	Aprovechamiento de árboles para uso doméstico y de autoconsumo	
	Aprovechamientos forestales	
	Recolección de plantas y subproductos forestales	
	Recolección de especies vegetales para uso científico	
	Reforestación	
	Especies vegetales en veda total	
Terrestrial Fauna	Hunting regulations	
	Special capture permits	
	Colection of animal products	
	Wild species raising	
	Introduction of exotic species	
	Special management (endangered or seasonal)	
Acquatic Fauna	Types of fisheries and sites	Self-consumption
		Sport fishing
		Commerecial fishing
	Specific regulations for particular species	Lobster
		Cangrejo moro
		Bonefish and tarpon
	Introduction of exotic species	
	Special management (endangered or seasonal)	
	Reef protection	
	Turtle protection	
Mineral and Hydric Resources	Mineral resources	
	Saskab	
	Rocks	
	Sand	
	Soil	
	Hydric resources	

Agriculture	Desmontes y control de malezas	
	Fertilizants and pesticides	
	Alive vegetal material	
Cattle	Allowed species	
	Zoo-sanitary regulations	
	Apiculture	
Development and coastal protection	Legal founds	
	Private property land	
	Development rights	
	Use rights and protection of coastal dunes	
Vehicles and transportation	Terrestrial	
	Acquatic	
	Aereal	
Tourist use	Any tourism-related activity requires special authorization of SEMARNAT, SECTUR , INAH and SKBR through its Public Use Program.	
Scientific and academic use	Collection of species	
	Field work	
	Manipulation and experimentation	

Table 12. Use Regulations applicable to Punta Allen activities

The AC must meet at least twice a year to inform their members about what has been done and which are the next steps to be taken, and to provide a progress report. Nevertheless, these meetings can be called any time, according to specific needs of one stakeholder, or in order to solve urgent problems.

The AC is the most important forum for communication between stakeholders and the Director's Office of the Reserve, and inside the AC all management issues are solved: the AC validates and provides technical elements to elaborate management strategies and measures. These advises are later discussed by the management body, and they take the last decision in concordance with the PA objectives.

The AC is divided into Sub-councils that "appear" and "disappear" in response to particular problems, circumstances or events affecting the PA (positively or negatively). At present, there are only two sub-councils conformed by tourism and fisheries sectors.

These sub-councils are constituted by all members of the sector and they meet regularly with the PA management body to discuss important issues related to their activities, such as use fees, permits for activities, regulations, closed seasons, etc. Both sub-councils participate actively in management.

Community Participation

Management authorities have paid special attention to community stakeholders' participation in management. According to Bezauri and Arellano (2001), an important part of the socioeconomic improvement of Punta Allen has been the participation of the community in the development of tourism. Arellano (Pers. Comm. 2003) states that community stakeholders' (fishermen and tourism social and private enterprises) participation in management is relatively high, because they are considered the most important stakeholder groups in Punta Allen. They are constantly informed and consulted about new management strategies or measures, changes in policy, implementation of projects; and they also participate in training workshops and courses. Table 13 summarizes the role and level of participation of each of these stakeholder group in the management of the PA.

Primary stakeholders	Activity	Role and level of participation in SKBR management
Vigía Chico Fishermen Cooperative	Lobster fishery	Very active participants and collaborators in management decisions/community-based management activities. They are the basis of the community.
Tourism Cooperatives (4)	Recreational services	Very active participants and collaborators in management decisions. Important alternative source of income.
Private local tour operators	Recreational services	Active participants and collaborators in management decisions. Small income generating activities.
Guest houses/Fly fishing lodges in the community	Recreational services / housing	Active participants and collaborators in management decisions. Important employment generating activity.

Table 13. Role and level of participation of Primary Stakeholders in Punta Allen's management.

Government Agencies Participation

It is very important to take into account the participation of Government Agencies (Federal, State and Municipal) in the management of the area. Alfredo Arellano emphasized that the lack of intra and inter-institutional coordination between Federal Government Agencies that have plenty of attributions and jurisdiction inside the limits of a PA, diminishes their participation in management to a point that, in some cases, they don't participate at all. The reasons for this are very complex and it is not our intention to get into that kind of details.

State Government and Municipalities are also fundamental stakeholders. They are involved in a few number of projects, but their collaboration and input for management is oriented, in most cases, to recover the jurisdiction they have lost in a part of their territories—since PA are part of the federal jurisdiction. Their level of participation in management is relatively low.

Government Level	Agency	Department of Sub agency	Responsibilities
Federal	SEMARNAT	DGIRA	Environmental impact evaluations and authorizations
		PROFEPA	Surveillance and enforcement
		ZOFEMAT	Concessions and agreements in the Federal Maritime and Terrestrial Zones
		DGVS	Use and management of wildlife
		CNA	Regulations for the use of fresh water and sewage
		Sub secretary of Management	Permits for forest use
		CONANP	Permits for recreational activities, surveillance, enforcement, monitoring, territorial planning, research, management and administration in Protected Areas.
	SAGARPA	Fisheries Sub Delegation	Authorizations for fishing activities and aquaculture. Marine surveillance
	SECTUR		Capacity building for tour guides
	SCT	Harbor Master's Office	Register of boats: navigation and aquatic transportation
	SEMAR		Surveillance, monitoring and research
	SRA		Land tenure regularization
	SCT		Public transportation
	Secretary of the Public Function	CABIN	Record of federal real state
State	SeyC		Education services
	SESA		Heath services
	SEDUMA		Territorial planning, rural roads.
	API		Port infrastructure
Municipal	Diverse		Construction, land use, territorial planning, security, transit, subdivision of land, waste disposal and management.

Table 14. Government Agencies with responsibilities and authority inside the PA

The Role of NGOs and Research Institutions

Local and International NGOs and Academic/Research Institutions participate at different management levels according to the kind of projects they are financing, conducting or supporting with technical assistance. Their participation in

management is crucial because they contribute in different ways to the development, implementation and evaluation of management strategies.

The basic operations of the SKBR are financed by the Government of Mexico and funding for specific projects related to the Management Plan. As of July 2003, the Reserve has received assistance from a list of supporters, including the following foundations:

National

- *Amigos de Sian Ka'an A.C.* – Research, monitoring, social development projects, natural resources management, administrative support, planning.
- *Fondo Mexicano para la Conservación de la Naturaleza* – Administrative support projects.
- *Econciencia A.C.* – Environmental Education and social development projects.
- *Uyool ché A.C.* – Natural resources' management, social development projects.
- *Cuerpos de Conservación Mexicanos.* – Assistance and volunteering
- *Comisión Nacional para la Biodiversidad* (CONABIO)

International

- *The Global Environmental Facility* (GEF). – Funding for basic operations.
- *European Union* (EU). – Funding for diverse projects.
- *RARE Center for Tropical Conservation*. – Ecotourism projects, environmental education.
- *The Nature Conservancy* (TNC). – Funding, capacity building and training, technical assistance for planning.
- *United Nations Development Programme* (UNDP). – Funding of projects for socioeconomic development.
- *United Nations Environment Programme* (UNEP). – Funding for conservation projects.
- *World Heritage Site* (WHS-UNESCO). – Funding, environmental education, public awareness projects.
- *World Wildlife Fund* (WWF). Funding, technical assistance for monitoring and resource management projects.

International Agreements

- Man And Biosphere (MAB)
- World Heritage Site (WHS-UNESCO)
- RAMSAR
- Red de Áreas Marinas Protegidas de Norteamérica,
- Alliance with Guanacahabibes Biosphere Reserve, Cuba.
- Demonstration Site for the International Coral Reef Action Network.

Research and Academic Institutions

- El Colegio de la Frontera Sur (ECOSUR)
- Universidad Nacional Autónoma de México (UNAM)
- Centro regional de investigación Pesquera (CRIP- Puerto Morelos)
- Universidad de Quintana Roo
- Instituto de Ecología A. C.
- Instituto Tecnológico de Chetumal
- Instituto Tecnológico de Mérida
- Centro de Investigaciones Avanzadas (CINVESTAV)
- Benemérita Universidad Autónoma de Puebla
- Universidad Autónoma de Chapingo
- University of Texas (Corpus Christy)
- University of Florida
- University of Wisconsin
- University of Colorado

Chapter VI

Punta Allen's People Perceptions

As part of the fieldwork to collect information about the perception of Punta Allen's people in regards to the conditions of natural resources, threats and problems for the community and the natural resources, solution to those problems, and management and participation in decision-making, the assessment team spent two weeks in the community to carry out 51 household interviews. A questionnaire was specifically designed for this purpose, as well as a coding sheet and a data base. The results from these interviews will be described in detail in this chapter.

PERCEPTIONS ON RESOURCE CONDITIONS

Coastal and Marine Resource Conditions

Figure 16 shows that most respondents agree that, at present, reef and other coastal marine resources are in good conservation conditions. Very few respondents said that those conditions were bad or very bad. Nevertheless, when they were asked to compare current conditions to those existing 15 years ago (Figure 16), answers were more heterogeneous. These variations might have been caused by differences in age and experience of the respondents. Probably, old fishermen perceive deterioration of the resources, while young respondents don't have a good point of reference to answer this question. This is assumed because key informants (most of them senior fishermen) supported that both, conservation conditions of the coral reef and other coastal and marine resources could be considered to be worse than 15 years ago.

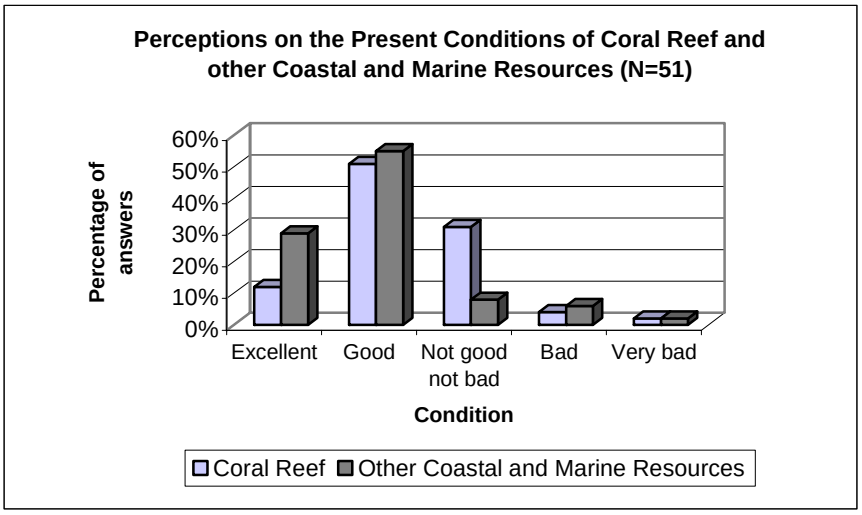


Figure 16. Perceived present conditions of the resources

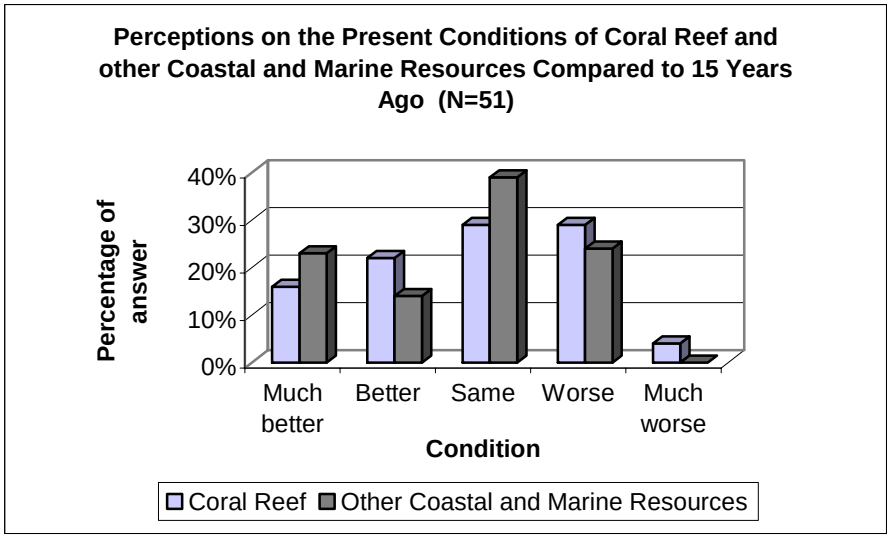


Figure 17. Perceived conditions compared to 15 years ago

Lobster and Finfish Catches

Figure 18 shows that today's lobster and finfish catches are less than those obtained 15 years ago. These results were cross-checked with data from the Sub delegation of Fisheries-SAGARPA and the Vigía Chico Cooperative.

As it has been mentioned, catches decreased considerably after Gilbert hurricane in 1988. Nevertheless, focus groups revealed that fishermen have noted an increase in lobster catches during the past three years.

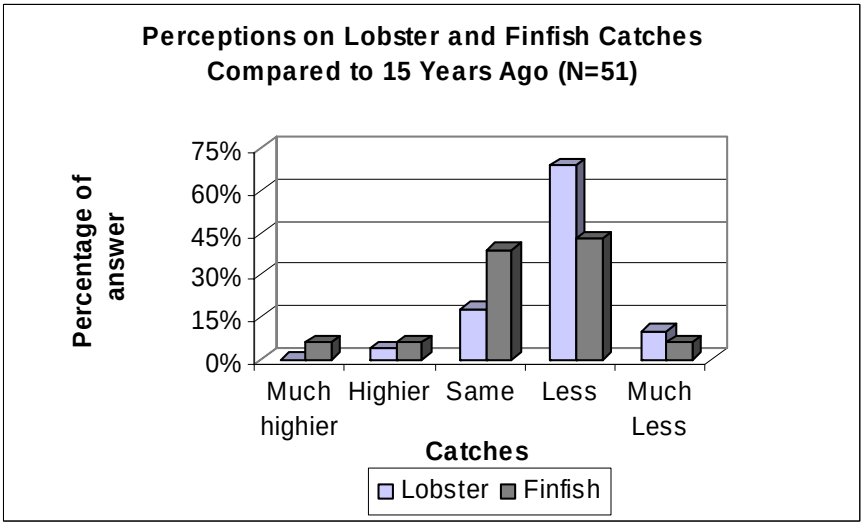


Figure 18. Perceived changes in catches in 15 years.

Damage to the Resources

Besides Gilbert hurricane, key informants also noted that Roxanne hurricane in 1995 and in general, bad weather conditions have caused serious damage to the reef and to other coastal and marine environments, resulting in important decreases in catches, and deterioration in the conservation of resources. Punta Allen community members' perceptions on the events or factors that have contributed to resource damage are shown in Figure 19.

Human activities such as tourism and fisheries are considered important factors that contribute to resource damage. In regards to fishing, key informants noted that over fishing outside Ascension Bay is a matter of concern, because they are aware of the relevance of regional protection in order to sustain fishery.

Focus groups revealed that there is a level of disagreement with management authorities in terms of the number of permits given for the development of recreational activities. They believe that these policies might be having a negative impact in resources. Nevertheless, responses to the questionnaire and key informant interviews highlighted that hurricanes and storms continue producing the highest impact on the health of coral reefs and marine environments.

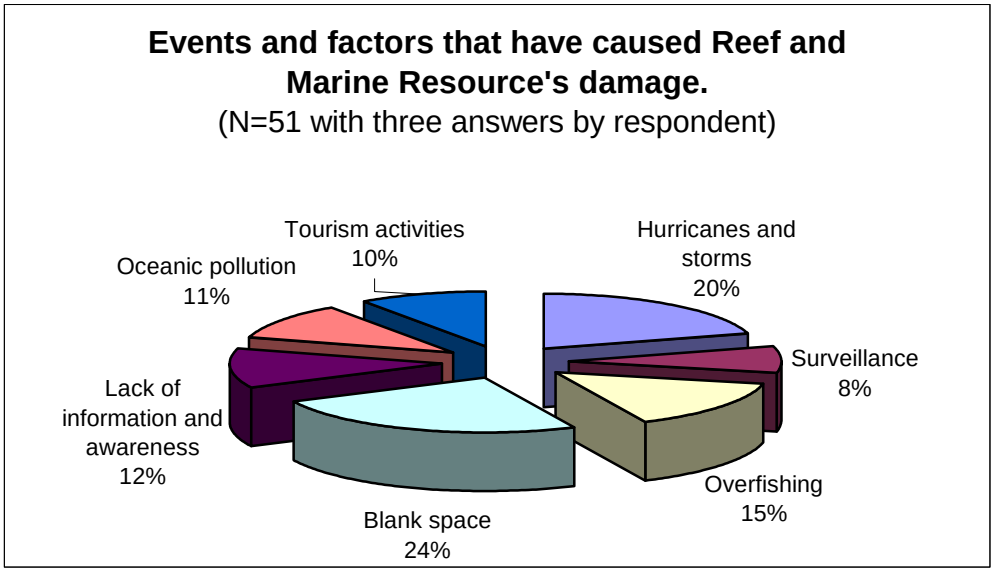


Figure 19. Perceived events or factors that have contributed to damage of coastal and marine resources

Awareness of the importance of resources

Questionnaire responses, together with focus groups results, show that Punta Allen community members are aware of the importance and level of impact that human activities can cause to their community and natural resources. They said that most of these ideas come from past generations, but they mentioned that SKBR has made them change their minds through education programs and training workshops. One fisher said: "*SK is a protected area because of the beauty and abundance of natural resources, we are part of it and we want it to stay that way, because we love living here, and because its resources are the future of our children"*.

Why to take care of natural resources	Responses
Conservation and protection	31%
Heritage	19%
Means of subsistance	29%
Blank space	19%

Table 15. Perceptions on the importance of taking care of resources
(N=51 three answers by respondent)

THREATS, PROBLEMS & SOLUTIONS

We have previously discussed that most resource users think that negative environmental conditions, such as hurricanes and storms are the most impacting events in coastal and marine resources. But when it comes to human impact on their community and coastal marine resources, the questionnaire answers show that tourism development is the human activity that most concerns the population. In order to simplify the analysis, tourism development here considers different kinds of responses, including permits, infrastructure, foreign investments, and introduction of bigger boats. When we asked people in the focus group why they considered tourism development as a threat to their community, they said they are afraid of population growth and of being displaced by big international companies. In regards to marine resources, they mentioned that more development for tourism activities will bring more tourists to the community and with that, big hotels. Some fishermen said "if that happens, we will damage our mangroves and beaches; there will be more boats in the water and more oil will be spilled; and also more wastes will be generated". We were surprised as these responses were coming out of the group, because it seemed unbelievable that they were so aware of the possible damage resulting from these activities. Proposed solutions to avoid tourism-related problems in the community and in resources were, in first place, the support of government agencies, particularly for permit control, and also to control tourism activities through policy making and surveillance.

Waste generation was identified by respondents as another important threat for the community and its resources. People are aware of the need for recycling systems to avoid pollution of water and accumulation of inorganic wastes. To solve this problem people think they need support from Government Agencies to improve current methods of waste management, and they suggested to continue receiving workshops and courses provided by the reserve.

It was also interesting to find out that resource users feel that uncontrolled fishing (including over exploitation and illegal fishing) could be a threat in the future. Punta Allen fishermen have always been proud of their own capacity to enforce compliance of agreements and regulations, so while we were in the focus group we asked them to tell us why they were worried about that. Some of them said "we are worried because we are taking care of our resources, but we know that in some other places nearby, fishermen do not observe rules…if they are fishing illegally, that might cause serious damage to the resource and we could be affected by that, since lobsters are moving down there (the ocean ground)". Another one said: "we are taking care and some others, outside the Bay, use that as an advantage". Proposed solutions to these problems were surveillance, education and public awareness outside the community (particularly with other fishermen cooperatives of the State).

Lack of surveillance is not considered as an important threat or problem to the community or its resources. This can be explained by the existence of local arrangements and agreements that enforce compliance of rules and regulations, and by the presence of a SKBR inspector in the community.

	COMMUNITY		MARINE RESOURCES	
N=153 (3 answers by respondent)	Responses	Percentage	Responses	Percentage
Threats	Hurricanes and storms	17%	Hurricanes and storms	13%
	Tourism development	24%	Tourism development	17%
	Blank spaces	23%	No answer	30%
	No answer	6%	Uncontrolled fishing	23%
	Waste and pollution	9%	Waste and pollution	15%
	Population growth	9%	Lack of surveillance	2%
	Others	12%		
Problems	Roads	22%	Uncontrolled tourism	24%
	Power and water supply	14%	Uncontrolled fishing	6%
	Waste and pollution	25%	Waste and pollution	17%
	No answer	24%	No answer	47%
	Lack of participation	5%	Lack of participation	3%
	Feral fauna	6%	Lack of surveillance	3%
	Others	4%		

Solutions	Support of Government Agencies	35%
	Education and public awareness	24%
	Recycling	9%
	No answer	19%
	Community participation	6%
	Eradication of exotic species	4%

Education and training	22%
Public awareness	21%
Surveillance	12%
No answer	27%
Control of tourism activities	17%

Table 16. Main threats, problems and solutions identified by Punta Allen community Members. (N=51, three answers by respondent).

MANAGEMENT

Successes, Failures and Challenges

We asked community members about the two most impacting things that the SKBR Management Body had done, as having a positive impact in their lives. This is what they responded:

- Encouraging tourism activities and the creation of rules and regulations for their development (This was only noticed by 4% and 6%, respectively; most of them tourist co-ops and tour guides).
- SIRDO[2] and Waste Management courses and workshops haven't been really successful. We asked further details on this to key informants and they said that SIRDOs were at first, warmly welcomed, but then it was complicated to keep them working well. Waste Management courses had a positive impact at the beginning, and people started to make composts and to separate wastes. Key informants think that people forgot about it with time.
- Surveillance and enforcement haven't been successful either. Respondents say it is necessary to count on more personnel from the PA in the community.
- 21% of respondents left blank spaces and when we asked them the reason for that, all of them said that they feel SKBR hasn't done anything positive for them.

POSITIVE IMPACT	
Activity/Measure	**Responses**
Training	55%
SIRDO	3%
Waste management courses	3%

[2] SIRDO: *Sistema Integral para el reciclaje de desechos orgánicos* (Integral Organic Waste Recycling System)

Blank space	21%
Encourage tourism activities	4%
Regulation of tourism activities	6%
Surveillance and enforcement	7%

Table 17. Positive impacts of management strategies, as perceived by the community.

(N=51, two answers by respondent).

As it can be noticed in Table 17, training is considered among inhabitants as the best thing that SKBR has done to benefit their lives and their community. SKBR has been offering environmental education to community members for many years. The course contents change every year, but they intend to cover a wide variety of subjects. To identify the level of importance of training for community members, we asked them to what extent, the obtained information was useful. Figure 20 shows the answers:

After all these years of work, 55% of community members (N=51) feel that one of the major things that SKBR has done very well, as a management authority, is to provide environmental education to improve their quality of life, and to offer training courses that have contributed to the development of alternative and sustainable livelihoods in their community.

94% of respondents to the questionnaire have attended at least one of these courses/workshops/exchanges; and most of them, 80%, said that the information received in them has been indispensable or very useful to improve their economic activities.

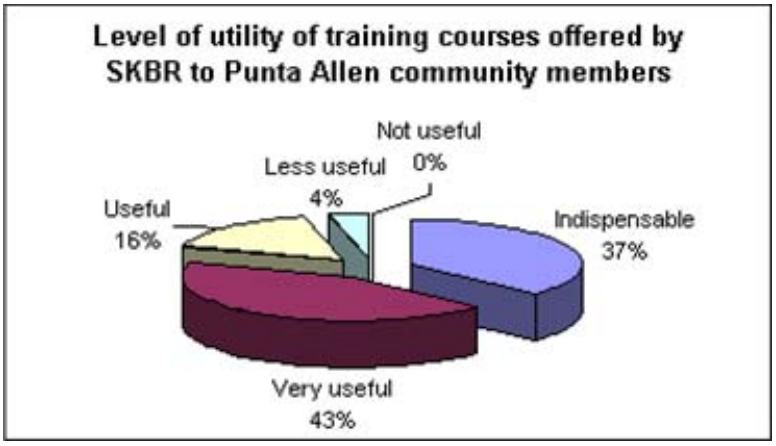


Figure 20. Perceived usefulness of training courses offered by SKBR (N=51)

When we tried to get information about negative-impact measures or activities made by SKBR, many key informants noted that in general, people do not feel that SKBR has ever done anything that caused negative impact in their lives or in the community. Because of this, instead of asking about negative-impact measures, we asked about non beneficial measures or activities. These are the results:

- Use fee for marine recreational activities is a new decree and few co-ops (5%) are against it because they believe tourist does not feel comfortable paying US $2.00 per person.
- As it was pointed out before, Waste Management courses and workshops haven't been successful and therefore, they are not considered as beneficial to the community.
- 11% of respondents feel uncomfortable with some decisions made by the Management Body concerning permits for tourism activities. They said that permits are given to foreigners.
- Also noticed before, surveillance and enforcement seem to be deficient. People want SKBR to have more "presence" in the community.
- 63% of respondents did not answer this question. Key informants and some fishermen and tour co-ops said that there isn't anything that has not been beneficial; they think that even when some measures did not work, or some activities failed, they are still beneficial: "we learnt", they said, "and know we know what NOT to do".

NON BENEFICIAL	
Activity / Measure	**Responses**
Use fees	5%
SIRDO	1%
Waste management courses	9%
Blank space	63%
Tourist permits for foreigners	11%
Surveillance and enforcement	12%

Table 18. Non beneficial management strategies, as perceived by the community .

(N=51, two answers by respondent).

Based on these answers, respondents had to come up with ideas that the SKBR Management Body could develop to improve coastal and marine resource management. These were the answers:

- We noticed before that there was a deficiency in surveillance and enforcement, for this reason it is not surprising to find it here as the most important issue considered by respondents. It is evident that SKBR needs to improve surveillance systems in Punta Allen.
- Inhabitants are asking for regular visits of management authorities to the community. Key informants said that in past years, SKBR authorities, such as the Director and Sub Director, used to visit the community and talk with all fishermen, women and tour operators. They think that the link between the community and the management body has been lost.
- Only few people considered waste management programs as a measure that could improve SKBR management. Waste management in Punta Allen is a very serious problem, but community members know that the Municipal Government, not the Reserve, is responsible for this.
- 11% of respondents said that increasing the number of conservation projects, such as environmental education, beach cleaning campaigns, eradication of exotic species (*e.g. Casuarina obtusifolia*) and feral fauna, would improve management of community resources.
- Tourism continues to be a matter of concern for many inhabitants. They said they are worried because they feel that if MB gives more permits for tourism activities, competition will increase even more and prices will have to go down so much, that the productivity will decrease considerably.

Activity / Measure	Responses
Surveillance and enforcement	36%
Regular visits of management Body	12%
Waste management programs	4%
Blank space	27%
Conservation project	11%
Control of tourism activities	8%

Table 19. Activities and/or measures that SKBR could do to improve management of resources (N=51 two answers by respondent)

Participation in Decision-making

Questionnaire results revealed that Punta Allen community members in general (60%), feel that the SKBR management body considers their opinion in management decisions. Interviews with key informants supported these results, adding that even when they are not always consulted, PA managers always inform them about new regulations or management procedures. Mr. Casimiro Choc (senior fisherman) said that when this happens it is because the PA is responding to higher instructions, observing rules that where not created by them.

Sixty four per cent of local members considered their level of participation as "*active*" and "*some*". It is not surprising to find out that this respondents are mainly tour guides and tour co-ops, because nowadays tourism development in Punta Allen is one of the most important issues in the PA. Meetings of the Sub-council take place very often to discuss important aspects of the development of tourism activities and infrastructure in the community and around it.

Fishermen's perception is different from that of tour operators; they consider their level of participation as "*some*" or "*little*" (N=26, 59%). A key informant supported this by saying "*fishermen involved in tourism activities feel they are active participants in the management of the PA, but the rest of us don't feel the same; but this is not a bad thing. The reason is simple: we were here before the MPA was established, we are well organized and we respect regulations… they don't need to make too much work with us".* And he is probably right. Before the establishment of the PA fishermen were organized and had their own mechanisms for surveillance. Nowadays, they continue to have their own management system for lobster fishery and they participate with PA authorities in management strategies and decision making, but their traditional knowledge has been totally respected. That is why, they say, "*we have been able to solve conflicts, because they respect us and we respect them".*

CHAPTER VII

CONCLUSIONS

With the purpose of using all the information described in the former chapters and with the objective of generating an efficient tool for decision making about natural resources management for Punta Allen, we systematically described how socioeconomic processes that have taken place in this community are the result of a group of strategies suggested to apply sustainable use of community resources. All the data collected and the information generated was systematized beginning with a description of effects or threats, and their causes that hampered the sustainable use of community resources. Then, these threats with their causes were analyzed based on the strategies that were created and used to diminish their effects. Finally, a matrix was built in order to show the threats and its causes, the strategy applied to face them, the actions developed and the indicator(s) used to evaluate the effects of the strategy and/or action. These indicators will be considered as priority in the up-coming Socioeconomic Monitoring Program for the Coastal Communities of the PA.

Many of the strategies described in the matrix were developed by the community itself—mainly through the Fishermen's cooperative. Some others were created by Municipal and State Governments. But most of the strategies were developed by SKBR, since its establishment was based under conservation goals that were followed by the generation of diverse strategies (laws, rules, respect, and support) to assure sustainability of the resources.

Table 20 summarizes our findings at the community. An important amount of information is not represented in this table, because instead of being the result of a particular management strategy, is consequence of external factors. Note that the indicators are stated in numerical order for each threat, not in order of the action implemented.

INTERESTING FINDINGS

In contrast with other towns in the State, such as those located in the Mayan Riviera, Punta Allen has not shown an accelerated growth rate thanks to the strategies mentioned before. Another factor that has contributed to demographic stability in Punta Allen is migration of young people outside the community. New generations have access to better education—outside the community— thanks to the improvement in the economic status of households. Once they finish their studies, some of them go back to Punta Allen and continue the fishery tradition of their parents, some of them get involved in tourism activities, and most of them find jobs in the Mayan Riviera, so they only go back to the community for vacation.

Punta Allen is a provider of natural attractions and cultural heritage, but besides a beautiful landscape, fresh lobster and the warmth of its people, Punta Allen is offering other community resources. In addition, the impacts of increasing rates of visitors start to be evident (e.g. organic and inorganic wastes are increasing). Because of this, it is important to determine the Carrying Capacity of the community, and include eco-technology (e.g. street lighting generated by solar or eolic energy) within the development model, creating a detailed program that secures sustainability of these activities.

This increasing demand for tourism in Punta Allen is minimized by the border effect that results from 1) SKBR management plan with its specific programs—Public Use, Signage, Capacity Building, Ecological Ordering of the Territory etc—, and its sets of rules and regulations, which have also played a key role in diminishing this pressure; and 2) the road that connects Punta Allen with Tulum, which is full of potholes that are commonly filled with rain water or covered in parts by branches that have fell down from tropical canopies, resulting in a difficult and some times impossible journey.

If all the efforts of the SKBR management body to secure the development of a sustainable tourism inside the PA, specifically in Punta Allen, and the resulting shifting between economic activities (fishing and tourism) are considered, one may come to the conclusion that empowering this alternative livelihood in the community has been successful because it has improved the socioeconomic status of local families. Nevertheless, it is crucial to keep the eyes opened to identify potential threats to natural resources and cultural values of the people in Punta Allen. Negative effects of these new threats might be prevented through monitoring indicators contained in Table 20, which provide relevant information for planning future strategies and activities.

It was possible to learn about some changes that have taken place in the community as a result of diversification of productive activities, through the information collected for indicators H1 to H8 (Household demographics), KS1 to KS12 (Community demographics), KS14 to KS19 (Coastal and marine activities), and H10. Some of the most relevant issues are:

- ✓ Women are now playing an important role in income generating activities, as well as politics of the community. They are either members or are working in the cooperatives; they work in guest houses and restaurants, and own their own businesses (e.g. supermarkets, bakeries). This has not only impacted the economy of the community, but has also modified the traditional family structure and women's roles. The best example for this is that for the first time in the history of the community, the recently elected delegate of the Municipal Government is a woman.

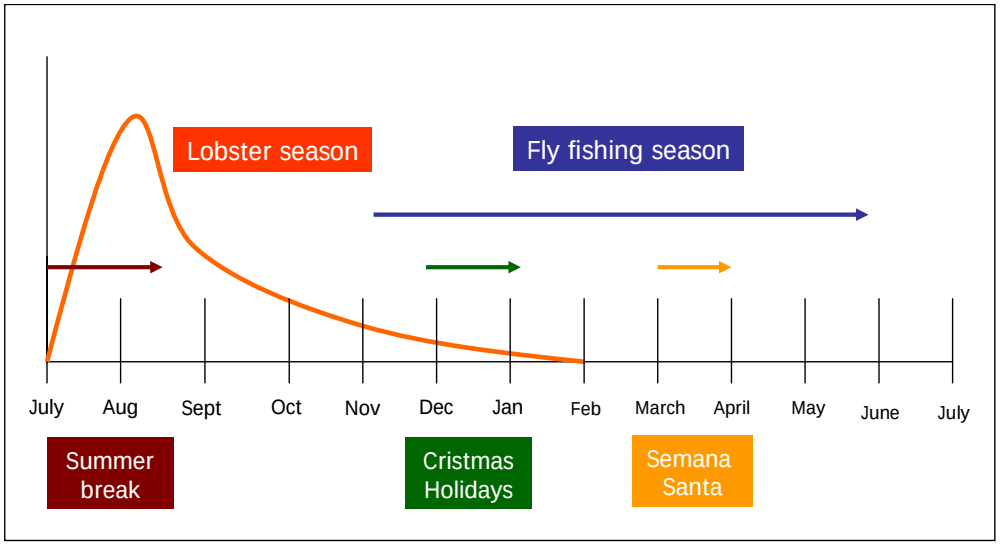
- ✓ Old fishermen, who were retired, are now being integrated into the tourism sector. Most of them are members of cooperatives—they own boats but they do not work as guides—, and they still belong to the fishermen's cooperative, but their sons are the ones who catch the lobsters—. This means that old fishermen are not only receiving an economic benefit form the lobsters captured in their *campos*, but also by the tours that ride on their boats.

  On the other hand, it is still common to see fishermen sons joining their fathers in fishing activities, working as *chalanes*, hoping to get a *campo* of their own one day. Nevertheless, most of young people studying outside the community do not show interest in lobster catching because they have improved their skills in English, administration and accounting, and they want to be involved in less demanding and more lucrative activities.

  The former can let us create a prediction to visualize the possible effects produced after the first generation of fishermen, who have founded and created the fishing model in Punta Allen, retire from the activity or die. Monitoring various indicators will show trends and information that could tell us, for example, what could happen if the operative rules of the cooperative and the objectives they were created for would not be followed any longer, and which could be the causes generating this change. This is the only way in which negative effects might be prevented o reverted; through the generation of strategies and adaptation actions.

- ✓ Figure 21 shows how tourism fills the gaps left by the closed season for lobsters. From July to February, the lobster season keeps fishermen busy. By the time catches are much lower, the fly fishing season starts. During this season, Christmas Holidays and *Semana*

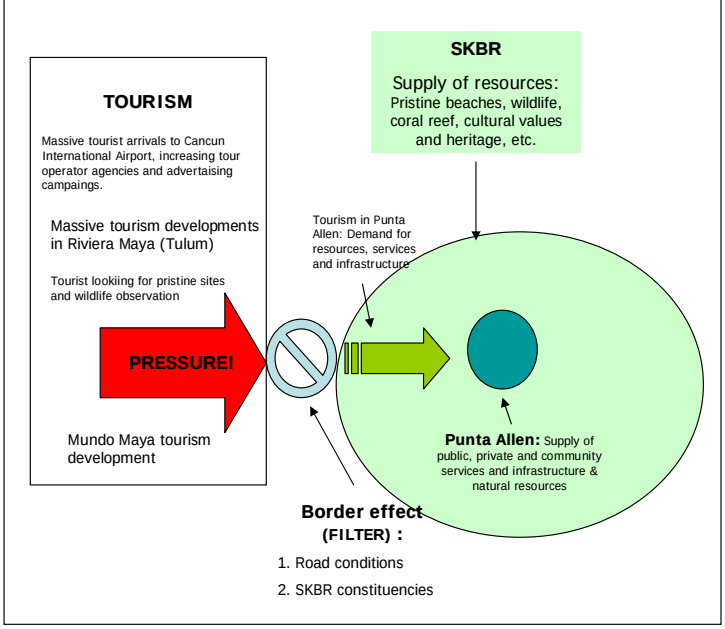
Santa [Easter or Spring Break] also represent a good opportunity to offer tourism activities. At the end of the fly fishing season, summer break and the lobster season start.



- ✓ Even when lobster fishery is the most important economic activity in terms of income generation, tourism has become the first employment generating activity. Deeper research is recommended on the economic aspects (supply, demand, market structure, market prices, etc.) of both income generating activities—lobster fishery and tourism—.

- ✓ Tremendously increasing visitation rates produced an unbalanced development between the supply of services and activities, and the demand for them. Problems with the road that connects Punta Allen with Tulum—and the Mayan Riviera, where most of the tourism comes from—and then September 11th-, caused an important descend in visitation, according to co-ops. Tourism cooperatives started to cut down their prices and an unhealthy competence was generated. At one point, the economic benefit for tourism activities was almost inexistent. This was not the case for private enterprises that have their own trucks to bring tourists down from Tulum and Cancun, so the unbalance became even bigger. For all this, it is not surprising that conflicts among cooperatives and private enterprises are arising.

  The trends for the years to come seem to indicate that visitation rates will increase as Mayan Riviera developments continue to grow. It is necessary to monitor whether this increase 1) could generate a decrease in conflicts between tourism services providers, 2) could increase threats to the environment and to the community itself—damage to marine-related ecosystems, water pollution, excessive waste generation, coastal zone development and international investments are only some examples—, in order to develop a strategy for implementing institutional controls to specify the limits of development, taking into account the capacity of the ecosystems to support tourism-related activities and not responding to the demands.



As tourism gains relevance in the life of community members in Punta Allen, the Reserve has been focusing its efforts in the development and application of rules and regulations to secure the sustainability of these activities. Scientific research, education and awareness programs, as well as stakeholder participation are being the basis for the creation and implementation of these tools. The Public Use Program is the most important tool to control tourism activities in the Reserve, and it has established the limits of tourism development based in a carrying capacity study of the sites. It will establish the management strategy to: 1) control number of visitors and, at a certain point, satisfy the eco-tourism demand, in terms of recreation, education and interpretation activities, and infrastructure; and 2) secure that tourism activities will directly benefit local communities (Bezauri & Arellano, 2001). This program is supported by legal instruments, such as the Ecological Territorial Ordering Program (POET), that establishes different densities of development according to the area of the Reserve; by Zoning Regulations; and by the Signage Program. Other tools, such as research projects to assess the impacts of fly fishing activities in the populations of tarpon, bonefish and permit, and with coral reef and bird monitoring, will strengthen management measures.

Education has been a major issue to secure the development of sustainable economic activities. An Environmental Education Program leader said that resources provided by the Federal Government are very scarce and because of this, it has been very hard to design and implement a formal education and training program. SKBR has offered environmental education to the community for many years. Since 1999 a training course for tour guides has been offered to all those interested in conducting tourism activities in the community. These courses provide the attendants with special accreditation to develop their activities. Contents of the course change every year, and so far, they have covered different subjects: marine mammals, exotic species (*Casuarina equisetifolia*), environmental interpretation and trail design, environmental legislation in PAs, sustainable development, alternative tourism, national and regional biodiversity, quality in services, contact personnel, how to use the GPS, fly fishing training, English, bird identification and co-management. Besides these courses, the Reserve's staff has also worked with women and children in the community, offering courses in composting, and environmental education in elementary and secondary schools.

SKBR has worked hard to find mechanisms, such as agreements with NGOs and exchanges empowered by financing organizations, to secure effective capacity building actions in Punta Allen. This effort is definitely appreciated by the community to the point that there is a general feeling that it has been the best effort made by SKBR to benefit their lives and their community.

Nevertheless, other efforts have been also recognized, such as the implementation of waste management projects, but they have not succeeded because of a lack of continuity, since the Reserve has not enough funds and does not count on a patrimonial fund to guarantee the

operation of the Reserve on the long term. Thus, processes are not followed up and the human capital carrying out the projects is lost.

SKBR Management Plan is old and, in most cases, not useful. That is why SKBR staff is working hard in assessing the effectiveness of the plan's strategies, and in 2002 a deep review and renewal process began. The main goal of this process is making adaptations based on past experiences, and considering future threats, to establish a new MP that may secure a solid base for future management inside the Reserve. As this process takes place, SKBR has been developing new management tools in order to respond to problems and future threats to the Reserve's natural and cultural resources.

Annex

METHODS AND MATERIALS

METHODS

Methods used and developed to conduct this project are based in:

- The Socioeconomic Manual for Coral Reef Management (SEMCRM) (Bunce, et al, 2000).
- Socioeconomic Monitoring Guidelines for Coastal Managers in the Caribbean (SocMon Caribbean) (Bunce, L. & R. Pomeroy, 2003).
- The Impact Evaluation Matrices for situation indicators and social, economic and environmental describers (Chuprine & Sisfontes, 2000) See Tables 27-29.

Following the SEMCRM recommendations, the socioeconomic assessment of Punta Allen was conducted as follows:

1. **Preparatory Activities**

1.1. Study area identification
1.2. Identification and level of participation of stakeholders
1.3. Identification of parameters and sub parameters[3]

2. Reconnaissance and Planning

2.1. Secondary data assessment[4]
2.2. Reconnaissance Survey
2.3. Plan the Field Data Collection Phase[5]

3. Field Data Collection

Key informants were selected according to the recommendations of management authorities, and with the experience of the Project Leader in the community. For the questionnaire, note that even when some information is not statistically representative, since the informants were selected and not picked up randomly, these people can help understand the complex patterns of how different people view local conditions and particular issues.

3.1 Reconnaissance Survey. During a three-day visit, several activities were conducted to inform the local inhabitants of Punta Allen about this socioeconomic assessment:

- A brochure with information on the project, ICRAN objectives and its relation with SKBR, was distributed among community authorities, stakeholders, and Punta Allen's general population.
- Introductory and informal interviews with representatives of municipal authorities from Solidaridad in the community, authorities of the fishermen and tourism cooperatives, and key informants such as senior fishermen who have played an important role in community development and history.
- Logistical requirements were identified for the fieldwork.

3.2 Fieldwork.

- *1st Visit: Rapid assessment.* Conducted to collect preliminary data of the present economic, social and environmental conditions of Punta Allen. Semi-structured

[3] See Table 21 for the list of parameters and sub parameters chosen for this project.
[4] See Table 22 for the sources of secondary data.
[5] See Table 23 for the field data collection program.

interviews were made to 17 community key informants[6], including the municipality sub delegate, presidents of fishermen's and tourist's cooperatives, fishermen, teachers from all educational levels, medical services' staff members, representatives of main services' providers (energy, water, sports), and SKBR community promoter. Through continuous observations it was possible to gather information on certain stakeholders' roles and community's main cultural aspects.

- *2nd Visit: Census of Punta Allen.* During 10 days, the field staff (one leader and one assistant) visited all households of Punta Allen. The main purpose of this field visit was to collect data for the Stakeholders Characteristics Parameter. The Census Form used in this study is shown at the end of this section.

- *3rd Visit: Stakeholder perceptions.* A questionnaire form was developed to collect data for all the perception-based indicators. It was first tested in the field and then was applied to a random sample of 53 inhabitants, representing 24% of the total productive population (221 men and women) of the community, most of them fishermen, tour operators and tour guides. In addition, semi-structured interviews, informal communications and observations were used to enrich the results obtained with the questionnaire, and to compare these results with opinions of key informants interviewed during the fieldwork. A database was specifically designed for the Questionnaire Form, using a coding sheet.

- *4th Visit: Marine resources use patterns.* All marine-related activities were observed and recorded for two weeks. SKBR provided maps and different sources of data, mainly on tourism information, tourism cooperatives and sites where activities take place.

- *5th Visit: Market attributes for extractive and non-extractive uses.* Semi-structured interviews were based on the questions proposed in the SEMCRM. Other sources of information were SKBR files, project reports, and interviews with staff.

4. Data Analysis

SocMon Caribbean Guidelines is a specialized method for Socioeconomic Monitoring for Coastal Managers, and it is a companion to the SEMCRM. It provides a prioritized list of indicators, useful for coastal managers, to obtain socioeconomic information. It also provides the questions for data collection and the tables for the analysis. Recommendations for the presentation of results and for the data analysis were followed, according to a list of indicators that were covered with the data collected. Those indicators are listed in Tables 25 and 26.

[6] See Table 24 for the list of names and position of key informants.

Table 21. List of Parameters and Sub parameters selected for this project:
Based on the goals and objectives of this socioeconomic assessment, and following the recommendations of the SEMCRM, a list of parameters and sub parameters to assess was elaborated. These parameters and sub parameters determined the substance of the assessment and were the basis to formulate the questions that were asked in the field.

Parameters	Sub-parameters
Marine Resources Use Patterns	Marine-related activities Reef stakeholders Techniques for marine-related activities Location of marine-related activities and stakeholders Timing and seasonality
Stakeholders Characteristics	Inhabitants and households Residency status Ethnicity and religious background Age and gender Education Social status Household economic status Strategic gender issues
Stakeholder perceptions	Marine resources condition Threats to marine resources Resources management
Organization and Resource Governance	Political context Government administrative structure Non-governmental organizations Use and property rights Management Efforts
Community Services and Facilities	Medical services Educational and religious facilities Public utilities Communication facilities Markets Transportation
Market Attributes for Extractive Uses	Supply Demand Market prices Market structure Market infrastructure and operation
Market Attributes for Non-Extractive Uses	Demand for tourism activities Vulnerability of tourism market Characteristics of tourism stakeholders Market structure

Table 22. Sources of Secondary Data

General sources	Specific Sources	Types of secondary information
Government agencies	Secretary of Agriculture and Fisheries (SAGARPA)	Fisheries legislation, volumes of lobster catches by year.
	National Institute of Geography, Statistics and Information (INEGI)	Census results
	Secretary of Environment and Natural Resources (SEMARNAT)	SKBR management plan, project reports, maps, literature, land property rights and uses.
NGOs	Amigos de Sian Ka'an A.C. Literature on history of the community, project reports.	Experience in the community, project reports, maps, involvement with community.
Research Institutions	Fisheries National Institute (INP), National University (UNAM), ECOSUR, CINVESTAV	Legislation, scientific reports, experience in the community.

Table 23. Field Data Collection Program.

Fieldwork	Time	Parameters	Requirements
1st. Visit: Rapid assessment	2 weeks	All	Aquatic and terrestrial transportation, accommodation, notebook, pencil, tape recorder, computer, camera, binoculars
2nd. Visit	4 weeks	Stakeholder characteristics, Facilities and Services	Aquatic and terrestrial transportation, accommodation, notebook, pencil, tape recorder, computer, camera, binoculars, census forms.
3rd. Visit	2 weeks	Stakeholder perceptions	Terrestrial transportation, accommodation, interviews forms, notebook, pencils, tape recorder, computer, camera
4th. Visit	2 weeks	Marine resources use patterns	Aquatic and terrestrial transportation, accommodation, notebook, pencil, tape recorder, computer, camera, binoculars, semi-structured interview forms
5th. Visit	2 week	Extractive uses and non-extractive uses	Aquatic and terrestrial transportation, accommodation, notebook, pencil, tape recorder, computer, camera, binoculars, semi-structured interview forms

Table 24. Key informants interviewed during the first Field Visit: Rapid Assessment

Name	Position
Poot, Misael	Elementary School Principal
Choc, Casimiro	Founder of the community and political leader
Campos, Mercedes	Nurse
Braga, Manuel	Commissioner of Water Services
Perez, Randy	Ex President of the Power Services
Caamal, Benito	President of Las Boyas Tourism Cooperative
Sandoval, Roger	Ex Sub Delegate of the Municipal Government in Punta Allen
Pérez, José Adrián	Production Commissioner, Vigía Chico Cooperative
Pérez, Rafael	Ex President of Vigía Chico Cooperative
Pereira, Andrés	President of Vigía Chico Cooperative
Perez, Emilio	President of Punta Allen Tourist Cooperative
Cambambia, Maricruz	Secondary School Principal
Ken, Milca	Kinder Garden Teacher
Cameron, Richard	Manager of Ascension Bay Fly fishing Club
Braga, Miguel	President of Gaytanes Tourism Cooperative
Salazar, Rosario	SKBR Community Promoter

Table 25. SocMon Household interview Indicators used for data analysis

Household demographics	
H1	Age
H2	Gender
H3	Ethnicity/origin
H4	Education
H5	Religion
H6	Language
H7	Occupation
H8	Household size
Coastal and marine activities	
H10	Household activities
H11	Households goods and services
H12	Types of household uses
H13	Goods and services market orientation
Attitudes and perceptions	
H16	Perceptions of resource conditions
H17	Perceived threats
H18	Awareness of rules and regulations
H21	Participation in decision-making
H23	Perceived coastal management problems
H24	Perceived coastal management solutions
H25	Perceived community problems
H26	Successes in coastal management
H27	Challenges in coastal management

Table 26. SocMon Key informant / Secondary source Indicators used for data analysis

Community-level demographics	
KS1	Study area
KS2	Population
KS3	Number of households
KS5	Age
KS6	Gender
KS7	Education
KS8	Literacy
KS9	Ethnicity/origin
KS10	Religion
KS11	Language
KS12	Occupation
Community infrastructure	
KS13	Community infrastructure
Coastal and marine activities	
KS14	Activities
KS15	Goods and services
KS16	Types of use
KS18	Goods and services market orientation
KS19	Use patterns
KS20	Levels of impact
KS21	Types of impact
KS22	Level of use by outsiders
KS24	Stakeholders
Governance	
KS25	Management body
KS26	Management plan
KS27	Enabling legislation
KS29	Formal tenure and rules
KS30	Informal tenure and rules, mores and traditions
KS31	Stakeholder participation
KS32	Community and stakeholder organizations

Table 27. IMPACT EVALUATION MATRIX: Situation indicators and social describers

CATEGORY	VARIABLE	INDICATOR	DESCRIBER
Social	Feeding	Nutrition	Availability of the quality and quantity of necessary nutrients in the diet
	Health	Health care services	Availability of the quality and quantity of health care services in terms of medical attention infrastructure (preventive and remedial), and medication.
	Water supply	Access to service	Availability and quality of infrastructure for drinking water supply.
	Education	Educational services	Availability and quality of infrastructure or physical facilities, number of classrooms, number of educators and service.
	Housing	Access to a house.	Availability and quality of housing and its relationship with the users.
	Security	Citizen security	Presence of factors of citizen insecurity such as: drug addiction, criminality, prostitution, administrative corruption, political corruption, etc.
	Participation	Participation mechanisms	Availability of institutional mechanisms to increase participation of social groups (organized or not), for decision making on local development.
	Organization	Response Capacity	Existence of social organizations capable of promoting self management and attention of local needs.

Table 28. IMPACT EVALUATION MATRIX: Situation indicators and economic describers

CATEGORY	VARIABLE	INDICATOR	DESCRIBER
Economic	Income	Buying power	Availability of the necessary income to satisfy needs of families (goods and services)
	Infrastructure	Situation	Existence and situation of infrastructure for economic development (roads, ports, airports, electrification, telephony, etc).
	Credit	Access	Availability and conditions of credit sources for economic activity.
	Commercialization	Mechanisms	Availability of mechanisms and conditions for commercialization of products
	Technical Assistance	Access and quality	Timely and appropriate access to the needs of the economic sector
	Means of production	Conditions	Availability and quality of means of production such as: land, technology, instruments, and materials.
	Employment	Absorption	Economic activity absorbs the family's labor force
	Productivity	Performance	Relationship between the means of production and the products

Table 29. IMPACT EVALUATION MATRIX: Situation indicators and environmental describers

CATEGORY	VARIABLE	INDICATOR	DESCRIBER
Environmental	Basic sanitation	Solid waste management	Availability and sanitary ways for solid waste disposal
		Body wastes disposal	Availability of sanitary ways for body wastes disposal
		Used water disposal	Availability of sanitary ways for used water disposal
		Sewage water disposal	Availability of sanitary ways for sewage water disposal
	Water	Sources of water supply	Availability and quality of water supply sources
	Soil	Quality	Prevailing conditions in terms of soil quality and its requirements for production
	Wild life	Presence	Availability and diversity of wild life

ANNEX II. FORMATS

INTERNATIONAL CORAL REEF ACTION NETWORK
&
SIAN KA'AN BIOSPHERE RESERVE

Census Form
PUNTA ALLEN, QUINTANA ROO

Family _____ Date and time _____
Interviewer _____ Respondent # _____

Age	Sex	Civil Status	Education Level	Primary Occupation	Monthly-based perceptions	Secondary Occupation	Monthly-based perceptions	Tertiary Occupation	Monthly-based perception	Medical Insurance	Languages	Religion

1. How many people live in this household? _____

2. Does any member of this household belong to a formal organization?
   a. Yes Who and to which? _____
      _____
   b. No

3. Does any member of this household study or work outside the community?
   a. Yes, Who? Age, sex and activity. _____
      _____
   b. No

4. Does any member of this household is paying a loan (credit)?
   a. Yes Who? What kind? _____
   b. No

5. Does this household counts on any other source of financial support (e.g. scholarships)?
   a. Yes Who? What kind? _____
   b. No

6. Services and benefits that you obtain through this household income are:
   a. Housing
   b. Food

c. Education
d. Transport
e. Medical services
f. Vacations
g. Others _____

7. Is this house:
   a. Rented
   b. Borrowed
   c. Own and payed
   d. Own paying

8. How many rooms does the house have, besides the kitchen?_____

9. Does the house have a bathroom?

   a. Yes What kind? _____
   b. No

10. Your kitchen works with:
   a. Gas
   b. Wood

11. Does any member of this household have any kind of property in or outside the community?
   a. Yes Who, what, where? _____

      _____

   b. NO

12. Services in the house

Water	
Septic tank	
Power	
Radio / CD recorder	
TV	
Sky or Direct TV	
VCR	
Refrigerator	
Laundry system	

INTERNATIONAL CORAL REEF ACTION NETWORK
&
SIAN KA'AN BIOSPHERE RESERVE

Socioeconomic Assessment of Punta Allen
Questionnaire Form

Date and time _____ Respondent No. _____
Interviewer _____ Occupation _____

Resource Perceptions:

1. Nowadays conditions (conservation status) of the coral reef are:
   a) excellent b) good c) not good not bad d) bad e) very bad

2. Nowadays conditions of other marine resources of the community are:
   a) excellent b) good c) not good not bad d) bad e) very bad

3. How is conservation status of the coral reef today, comparing it to how it was 15 years ago:
   a) much better b) better c) same d) worse c) much worse

4. How is the conservation status of other marine resources today, compared to how it was 15 years ago:
   a) much better b) better c) same d) worse c) much worse

5. How is the availability of lobster today, compared to how it was 15 years ago?
   a) much higher b) higher c) same d) lesser c) much lesser

6. How is the availability of finfish today, compared to how it was 15 years ago?
   a) much higher b) higher c) same d) less c) much less

7. Which are the three main reasons to take care of marine and natural resources of the community?
   1)_____ 2) _____ 3)_____

Threats and problems

8. What are the top three events or factors that have contributed to the damage of marine resources in Punta Allen?
   1)_____ 2) _____ 3)_____

9. What are the top three threats to the community?
   1)_____ 2) _____ _____ 3)_____

10. What are the top three problems in the community?
    1)_____ 2) _____ _____ 3)_____

11. What do you think are the possible solutions to these problems?
    1)_____ 2) _____ _____ 3)_____

12. What are the top three threats to marine resources?
    1)_____ 2) _____ 3)_____

13. What are the top three problems with marine resources?

1) _____ 2) _____ 3) _____

14. What do you think are the possible solutions to these problems?
    1) _____ 2) _____ 3) _____

Sian Ka'an:

15. Do you know what a Protected Area is?
    a) Yes b) No

16. Do you know whether your community is inside the limits of a Protected Area (Reserve)
    a) Yes b) No

17. What do you think that is the main objective of Sian Ka'an Biosphere Reserve (SKBR)?
    _____

18. What two things do you think SKBR has done, that have worked well for the community and its resources?
    1) _____ 2) _____

19. What two things do you think SKBR has done that have NOT worked well for the community and its resources?
    1) _____ 2) _____

20. What two things do you think SKBR can do to improve its work regarding the community and its resources?
    1) _____ 2)_____

21. Are you consulted on natural resource management decisions made by SKBR and its representatives?
    a) Yes b) No

22. To what extent do you participate in decision-making by SKBR?
    a) Very active participation b) Active participation c) Some participation
    d) Little participation e) No participation

23. What two things do you suggest that SKBR could do to improve community participation in decision-making?
    1) _____ 2) _____

24. Have you participated in a training workshop or course offered or promoted by SKBR?
    a) Yes b) No

25. To what extent do the contents of these workshops and/or courses were useful for you to improve your economic activity or to have a better understanding of natural resources?
    a) Essential c) Very useful b) Useful c) Little useful e) No useful