

## FINAL REPORT

### Manatees in Ciénaga de Paredes (COLOMBIA)

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#### Introduction

Two manatee species are found in Colombia: *Trichechus manatus* and *Trichechus inunguis*. The first one is widely distributed along the Caribbean and Orinoco regions. The later is restricted to the Amazonian region. Both have been categorized as endangered mainly by hunting, habitat destruction and fisheries interaction.

Although in the last years it has been an increase in the interest for research and conservation of these species, the conservation efforts have been small and isolated. This is the reason why Fundación Omacha in association with the Ministry of the Environment have been articulating a process that wants to connect the ideas of the Regional Corporation (local environmental authorities) on this respect. Part of these initiatives is the monitoring of the manatee population at “Ciénaga de Paredes” (Paredes marsh), a water system of approximately 700m<sup>2</sup> located on the right margin of the Magdalena River. In this region, the local community has been developing efforts in order to manage the manatee population for 14 years, with very low technical assistance. The main problem for the animals in this marsh is that the water level is very low during the summer months, and sometimes the animals stranded in the mud and they needed help to be transported to deeper places.

This situation became more serious in October 2002, with an oil spill of more than 500 barrels in La Gómez waterfall, 30 km from the mouth of the marsh, covering the majority of it surface. The cause of the spill was an accidental explosion of the pipeline by vandals to steal oil. Approximately 95% of the vegetation of the marsh margins was contaminated and the fishing resources wiped out (Figure 1 and 2).



**Figure 1.** People cleaning the area of the oil spill by hand



**Figure 2.** Vegetation full of oil

In response to this emergency, Fundación Omacha, la Corporación Autónoma de Santander (CAS) and the Ministry of the Environment went to the region in order to implement a contingency plan. First of all, with financial resources from ECOPETROL (the national company for oil resource management), clean up activities were contracted with the local community. 70 people intervened on this process; man and women, manually recovering the aquatic vegetation contaminated and the oil remaining in the surface (Figure 1).

The cleaning activities were performed for almost two months, when the worries about the water level, since additionally to the possibility of stranding the lack of food resources and the sediment contamination increased the probabilities of

high mortality in the manatee population. Victoria Holguín, from Fundación Omacha, traveled to the region to give technical advice to the local community and to monitor the manatee population. This initiative got the support from a number of organizations and institutions, as Sirenian International.

### **Main aim of the project**

To monitor the Ciénaga de Paredes manatee population, during the low water season and determine possible risks for this group.

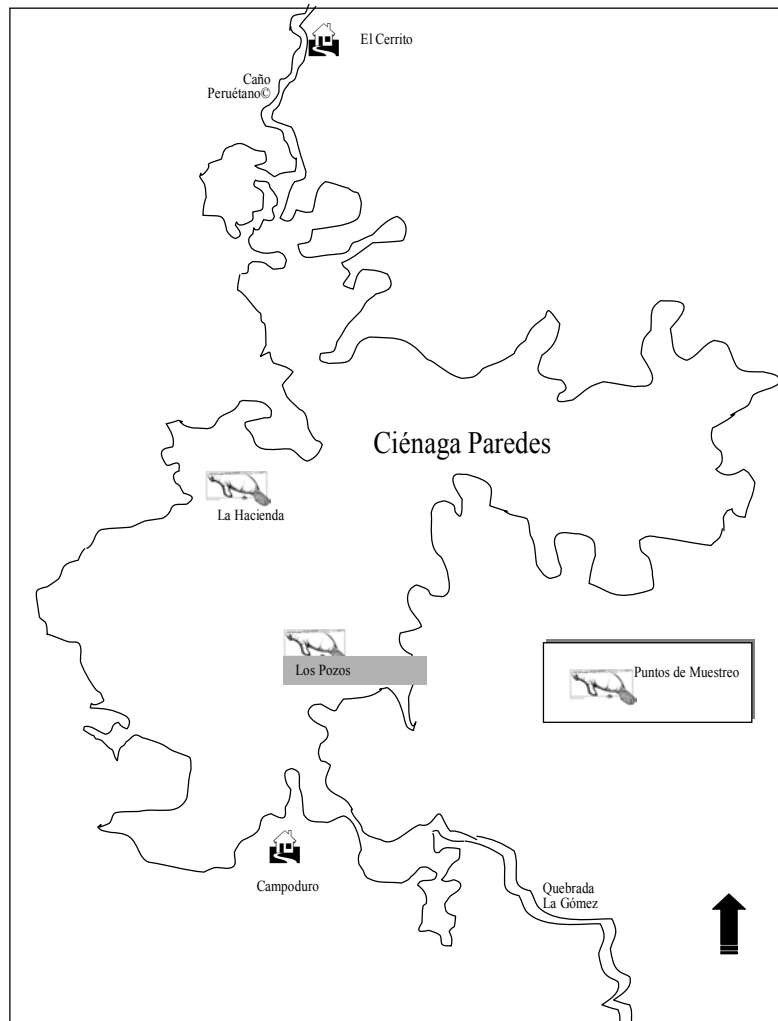
### **Specific objectives**

- To evaluate the presence and number of manatees in “Ciénaga de Paredes” by direct observations, from canoes or land based points.
- To do an initial evaluation of the intervention conditions of the distribution sites of the species and determine the main causes of this intervention.
- To develop environmental education activities with the local community in order to improve their commitment and interest in conservation for these species in this particular region.

### **METHODOLOGY**

This study was developed mainly in the “Ciénaga de Paredes” (marsh) and “Caño Peruétano” (channel), important because of the presence of these animals (Figure 1). The information for this study was obtained from four main sources:

- Workshops, talks and education campaigns with the general public and children
- Interviews with local fishermen
- Direct manatee observations
- Indirect evidence: feeding traces and faecal material



**Figure 1** Map of the Ciénaga de Paredes study area.

### **Workshops, talks and education campaigns with the general public and the children**

Between February 1<sup>st</sup> and 8<sup>th</sup> of April 2003, a work base was established in the village of Campo Duro, Puerto Wilches municipality. Educational campaigns were initiated about the protection of the manatee habitat with workshops and talks for the community, the schools Campo Duro and El Cerrito, fishermen associations, small farmers and palm plantations workers. The objective was to make local people aware and interested about the well being of the manatees, gathering information about the species at local level and its environment by semi-structured interviews with local fishermen. Five workshops for adults and six for children were developed in each community for a total of 22 workshops.

The workshops were also an open space to think and discuss the ecosystem and species conservation problems at local level and to obtain their suggestions in an exchange of knowledge, to possibly obtain future solutions to this problems and questions.

All the community was invited to these activities, as well as the local authorities, represented by the “juntas de acción comunal” (Community Committees), as well as other associations, to explain the current legislation on manatee conservation and to work towards its future reinforcement and application.

### **Semi-structured interviews with local fisherman**

Interviews were done with the communities of Campo Duro and El Cerrito, as well as informal conversation groups (see Annex 1). The interviews compiled in a qualitative way the knowledge on the biology, behavior, sighting locations, feeding, threats, cultural aspects and traditional uses, as well as existing conservation knowledge by the local communities about the manatees.

A total of 40 interviews were developed in both communities. They were directed to the people that had some knowledge on the species, either by sightings or captures of individuals. In general they were performed with experienced fishermen, since they are the ones that have more historic knowledge about hunting activities and presence of the manatees in the region.

### **Direct manatee observations**

In order to be able to observe the manatee, waiting in silence for the manatees was performed from wooden canoes in Los Pozos channel, in a zone with a high concentration of animals during this time of the year. It is important to clarify that because of the strong summer conditions and drought the communities of Campo Duro and El Cerrito had to cave a water hole inside the marsh to allow more space for the manatees. The water hole dimensions were 70m x 30m (2100m<sup>2</sup>), with an average depth of a100cm.

*Ad libitum* observations were performed for 50 days in the place with and average waiting time of about four hours, for a total of 2002 sampling time visiting the water holes where the manatees were present. Additionally, 10 sampling hours were performed in Peruétano channel, where manatees were previously reported and the places where feeding tracks were found. Group composition, sex and the number of individuals sighted were reported as well as particular characteristics. Behavioral observations were undertaken with special emphasis on reproductive events. Different physical characteristics of the places were recorded, as depth, time of day, and zone. Data was entered in specific formats (Table 1). Everyday during the summer, fishermen brought food for the animals, as Churre (*Paspallum fasciculatum*) and Taruya (*Eichornia crassipes*).



## **Faecal Material**

The surveys were also used to look for faecal material but collection of this material was only performed in one location known as "Los Pozos" during the daily monitoring of the manatees. 20 faecal samples were collected during the two-month period and were preserved in AFA solution for its later analysis, as suggested by Colares (1990).

## **RESULTS AND DISCUSSION**

### **Manatee population**

#### **Abundance**

The local community says that there are 40 animals in the marsh during the winter months, down to 20 animals in the summer, when approximately half of the population migrates to Peruétano channel looking for deeper waters in order to prevent stranding. Locating the animals is easier in the summer time, since the survey area is smaller and the animals prefer to stay in deeper water with higher vegetation abundance. Groups of up to 10 animals can be located, but it is more common to find groups of two or three animals dispersed in the area. The marsh dries out up to 70% of its total capacity and the calculated depth during the summer months is between 1 m and 2.72 m.

The animals are confined in an area 2100 m<sup>2</sup>, with an average depth of 1 m, ranging from a maximum and minimum depth of 1.20 m and 67 cm during the time in which the study was conducted. To guarantee the survival of the manatees, the locals had to cave a water hole in the marsh (Figure 2)



**Figure 2.** People from the community caving in "Los Pozos". Photo by V. E. Holguín.



During February and March, observations of a minimum of two hours were done in a locality called “Los Pozos”(7° 26′ 151″ N, 73° 46′ 589″ W). The sampling region was divided in four quadrants, four sub-regions to make the counting of the manatees easier. 50 observations were made from the canoe, representing 202 hours of sampling effort with a total of 667 total manatee sightings (Table 3).

**Table 3** Summary of direct observations

Method	Number of sightings	NMI	Mean NMI	Age class	
				Mean/Adults	Mean /calves
Fixed observation point	667	12	10	7	3
Boat survey	0	0	0	0	0
Total	667				

During the study time, we confirmed that, during the dry season, “Los Pozos” gives shelter to a group of 11-12 animals. This group was followed intensively and constantly, taking advantages of the conditions of the place. The fishermen also assert that part of the manatee population in the marsh goes to Peruétano channel looking for safer places (Zapata Com. Pers).

Detecting their breathing intervals basically did monitoring of the manatees in this place. Breathing on vertical position was the most frequent breathing behavior. Sometimes a portion of the head and nostrils were also visible (Figure 3). Almost in every occasion it was possible to listen to the sound of their breaths.



**Figure 3.** A manatee shows its mouth when breathing. Photo by. V. E. Holguín.



Due to the amount of animals found in this place, it was difficult to follow only one animal continually. In some occasions it was possible to determine long dives (17 minutes in the case of adults, 2.6 for calves).

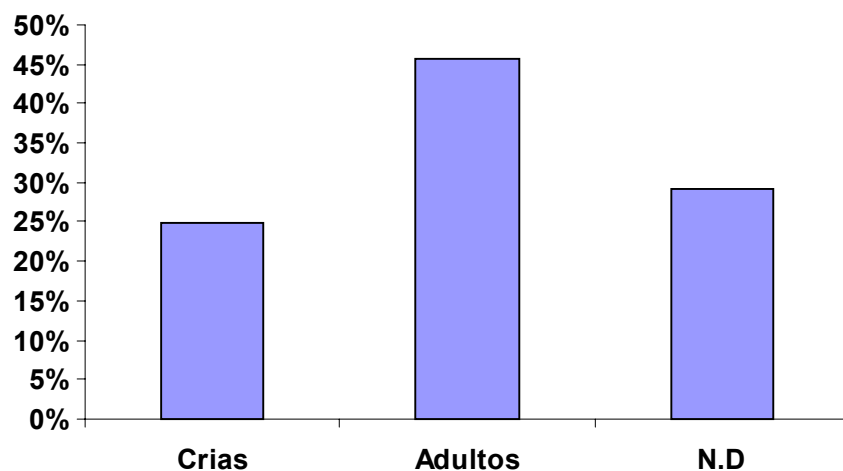
The animals did not surface any other body part, only in some occasions when they were looking for food offered by the community, when they surface in a semi-vertical way, showing a bigger portion of the head (Figure 4).

Coloration of the animals varied from light gray for the adults to dark gray for calves and sub-adults.



**Figure 4.** A manatee was looking for food in the area. Photo by V. E. Holguín.

About the classification of the individuals depending on their age group, only 3 calves and 6 adults were clearly identified. Others were difficult to classify due to the low body exposition. They were classified as adults and sub adults (Figure 5).



**Figure 5** Percentages of age group found.

In spite of the constant presence of people in the area during the caving in “Los Pozos”, animals remained calmed and they didn’t show any sign of perturbation. Only in rare occasions splashing were observed without an apparent reason and during this behavior the animals would take the tail out of the water or made a wake.

In general, the people interviewed said that although the hunting controls are organized in both communities; the number of individuals is smaller than some years ago. They think hunting affected the population and only now numbers are recovering. Other believe the lower numbers might be a reflection of movements made by the animals to the lower parts of the channel or to Lebrija River, possibly as a result of threats as water pollution, sedimentation processes and the oil spill.

### **Distribution and habitat use**

The manatees found in Los Pozos, showed preference for the deepest areas, corresponding to the areas where the locals placed the artificial feeding areas. This might explain why the distribution of the manatees depends of food location.

Regarding the distribution of the animals in the marsh, the majority of reports say that during the dry season animals go to “Los Pozos” and others to Peruétano channel, looking for the deepest places in the channel that might be as deep as 4m. During the high water season, the animals are distributed randomly in the whole marsh and they that were in the channel go back to the marsh.

The local community fears about these displacements, because they think manatees that migrate to the channel might have a higher risk to be hunted or that they might go to Lebrija River and not come back to the marsh.

During the surveys made along the channel, in only two times feeders were determined in the two first weeks of February. With this result, we were unable to determine the distribution of manatees depending on the location of natural feeding areas. However, the last two weeks in March, the fishermen reported a sighting of a group of animals feeding in an area called “Los Turros” located at two hours by boat from Cerrito village. (Zapata pers. comm).

For the fishermen, the distribution of manatees is defined by different factor as:

- Hydrological patterns of the marsh.
- Feeding areas.
- Human perturbation.

In general, the present distribution of the manatees coincides with reports from the fishermen from a historic perspective. In the marsh, as well as in Peruétano channel, animals have been reported either by direct sightings or feeding tracks (see Figure 1).

## Feeding

Fishermen from both communities bring food for the manatees during the dry season, including different plants as Churre (*Paspallum fasciculatum*) and sometimes Taruya (*Eichornia crassipes*). The food is taken by canoe to artificial feeders improvised inside “Los Pozos” (Figure 7).



**Figure 6** Artificial feeders. Photo V. E. Holguín.

During the observations, it was not possible to determine a clear feeding pattern: manatees would feed anytime during the day despite the presence of people in the area.

The only clear pattern determined was that during the day whether manatees would not eat the total amount of food provide, but at night they would eat all of it. This crepuscular and nocturnal behavior contrasts with the arrhythmic daily pattern of activities described by other authors (Hartman 1979; Reynolds & Odell 1991).

A list of 20 possible plant species that might be part of the manatee diet was elaborated with the help of the fishermen. There are still plants in the process of being identified.

From the reported plants, feeding tracks were found in three species: “Churre” or “Tapón” (*Paspallum fasciculatum*), “Taruya” or “Buchón” (*Eichornia crassipes*) and “Tabaquillo” (*Polygonum hidropiperoides*). From this list, 11 species were also reported by Castelblanco & Aguilar (2002) as part of the manatee diet, also confirmed by feeding tracks (Table 4).

Feeding on “Tapón” and “Taruya” were also confirmed by direct sightings in “Los Pozos”.

**Table 4.** Plant species reported as components of the manatee diet in Ciénaga de Paredes.

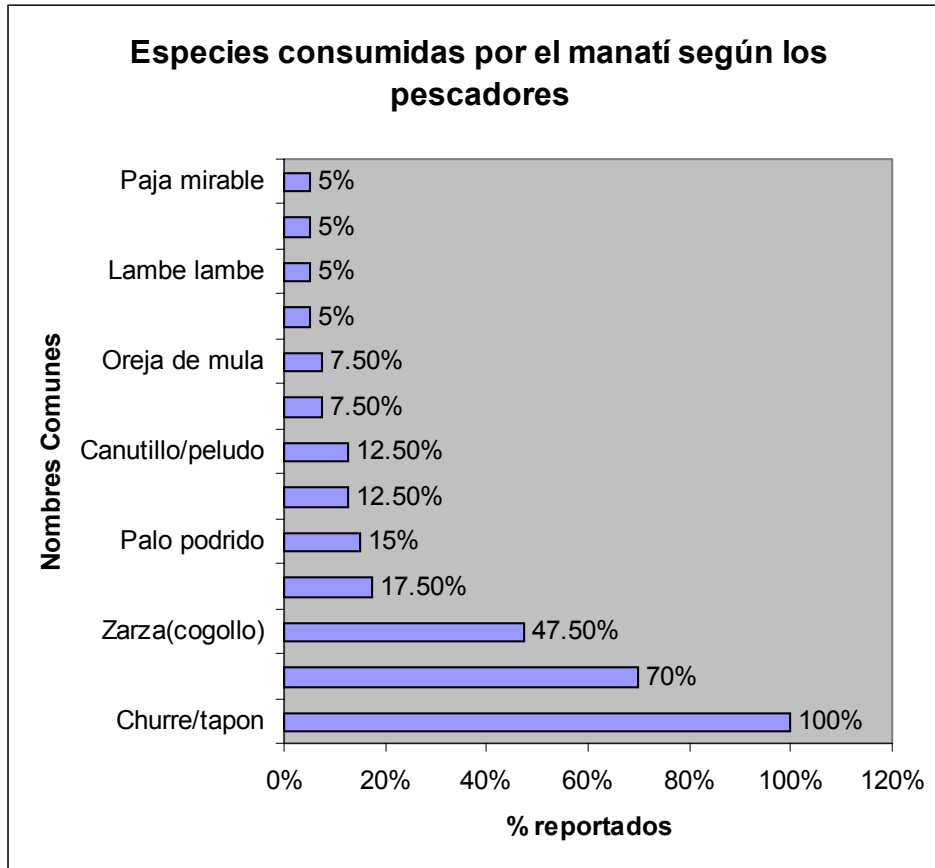
Common Name	Family	Species	% reported
Churre/tapon	Poaceae	<i>Paspalum fasciculatum</i>	100%
Taruya/buchon	Pontederiaceae	<i>Eichornia crassipes</i>	70%
Zarza (cogollo)	Mimosáceae	<i>Mimosa sp.</i>	47.50%
Tabaquillo	Polygonaceae	<i>Polygonum hidropiperoides</i>	17.50%
Palo podrido			15%
Molenillo			12.50%
Canutillo/peludo	Poaceae		12.50%
Gramalote	Graminiaeae	<i>Paspalum repens</i>	7.50%
Oreja de mula	Pontederiaceae		7.50%
Agalla	Najadeceae	<i>Najas sp</i>	5%
Lambe lambe	Poaceae		5%
Brequiparada	Poaceae		5%
Paja mirable	Poaceae		5%
Alemana	Poaceae		2.50%
Cuartillo rojo	Poaceae		2.50%
Tripa de babilla			2.50%
Tripa de pollo	Onagraceae	<i>Jussiaea sp</i>	2.50%
Aruña gato			2.50%
Pasto bejuco	Poaceae		2.50%
Majate	Lentibulareaceae	<i>Utricularia foliosa</i>	2.50%
Hojas de guamo			2.50%
Frutos en los bajos			2.50%

From the people interviewed, the manatees would feed mostly on “Churre” or “Tapón” but they also reported “Taruya” or “Buchón” as highly preferred by the animals. The majority of the plants correspond to grasses (Figures 8 and 9).



**Figure 7** “Churre” feeding area Photo by. J. P. Giraldo.

Apart from the plants, the people interviewed also said that the manatees would feed on decayed wood and dry leaves during the dry season. Only one person said that manatees would feed also on fruits on certain places in the marsh.



**Figure 8.** Plants reported with the higher frequencies.

It is evident that during the whole year there is high food availability for manatees, since both in the marsh as well as in the Peruétano channel and la Gómez waterfall there is high abundance of the aquatic plants.

### Perceptions and cultural tradition

The local community is proud of having manatees in the marsh and they take care of them in a dedicated way. They are conscious of the endangered status of the species at international level and now that the community has been favored with the help they get from taking care of the animals they even do it with more interest.

They also reassure that there has been many years since the last manatee hunted because they started to be conscious about the population decline and

since they are the “mother of the water”, if they disappear, the marsh will disappear.

There is not a cultural tradition that lets them create a strong bond with the manatees, because they don't know any legend about their origin or that it might be related with the animals.

## **Hunting**

All the people coincide that from 20 year up to now, there has not been manatee hunting in the region, since a pact established by the locals.

When hunting was allowed, specialized hunters did it, three people in the region, none of them alive today.

In general all the people explained how the hunting was done and the hunting weapons used. The animals were harpooned and then they were taken to land where they would knock them in the head or shoot at them. The meat was distributed in the community and the bones and skin were discarded.

Locals are conscious that manatee hunting is forbidden and most of them said that if somebody killed a manatee, the groups in charge of “execute the law” would take them into account so that it was better to take care of them. Also, because of this, the harpoon and the trammel-net are forbidden in the region, two of the main causes of *Trichechus manatus* mortality related to fisheries in Colombia (Montoya *et al* 2001).

The community controls hunting, guided by “Morita” (José Manuel Zapata), president of the association ProEcomanati. This association wants to implement better living conditions for the people in the marsh region and the protection of natural resources, having as their flag project the manatee conservation work (Montenegro 1995).

Hunting might not constitute a present threat for the species, as it is habitat destruction.

## **HUMAN INTERVENTION: Pollution and sedimentation, a problem with social roots.**

During the workshops, there was a space to debate on information about the species with the community, their perceptions and the main causes of threats for the species.

For both communities is clear that the main threats are the sedimentation and pollution of the marsh. Also, the African palm farming and the increase in grassland for cattle are contributing to the habitat deterioration. For them the biological value of the habitat is clear, as they also recognize the value of the species at national and international level as well as the benefits they could get from this.

Ciénaga de Paredes shows a great degree of sedimentation, especially on the opening channel, with the consequences of a decrease in its size and depth. Also, there has been a human effect on the margins of the marsh, where constant fires in a 20 m radius from the margin. In some places, especially in the channels connecting different lagoons in the marsh, vegetation cover is better preserved.

Water level has decreased due to the amount of sediments coming from La Gomez waterfall and the lack of mobility of the sediments to the opening of the marsh and the lack of mobility of the sediments to the opening of the marsh and Peruétano channel.

Fishermen said that the depth has decreased from 5 m to 1.50 m at present. During the dry season, the water coverage can decrease up to 50% compared with the water coverage ten years ago. This means a change in conditions that might endanger the living condition for the manatees in this area.

Nevertheless, the community got organized, thinking about the conservation of the species, trying to restore the damage made to the environment, caving every year a water hole in the marsh with enough depth to allow the animals to stay in it during the low water season (Figure 10).



**Figure 9.** February 2003. The community was caving the water hole. Photo V. E. Holguin.

They are also a lot more careful about fishing, since the fishing resources have highly diminished in the last times.

The African palm industry affects the water resources polluting the water with residues from the oil extraction and agrochemicals, and also, increasing the amounts of sediments in the marsh, where some channel are so shallow that canoes cannot navigate on them.



The predominant agricultural model is based on cutting forest and turning it in grasslands for cattle. These processes have also contributed to sedimentation increase.

Conflict solving between the fishermen, land holders, farmers and employees of palm industry is done *in situ*, on the territory and the differences on their interest prevent that a joint conservation is developed for the region.

In the other hand, the oil industry has been historically responsible for deforestation, especially in the production fields, as well as pollution with oil and emission of toxic gases. This industry has been damaging the environment for a long time without measuring the environmental effects of its activity. One can suppose that high pollution levels affect the fish resource, since they require factor as oxygen level, nutrients and temperature to develop their functions, a warrant for reproduction and trophic chain maintenance. As an example, the oil spill last year caused a great impact on the marsh, both on the fish and plant communities, as well as endangering the life of the manatees.

There are four months and a half of fishing productivity in the region, the rest of the year poverty hits strongly. Some fishermen grow cassava during the dry season, complimenting their diet with fish, hunting and agriculture, but not all of them have this possibility.

The weather conditions have changed in the last years, altering the dry and rain season rhythms and it is not that easy to predict the water level in the rivers, channels and in the marsh has before.

### **Proposed alternatives**

One important aspect of this work is that is has promoted the community associations to be able to look for new opportunities, different to fishing, in order to have other sources of income for the locals. This has opened the view that they might even prefer other activities in the future that might be more reliable during the dry season. One possibility could be the work on crafts that might reflect their special relationship with the manatees.

### **Conclusions**

In this pre-evaluation stage, it was determined that sedimentation processes and pollution that undermine its future stability are affecting Ciénaga de Paredes.

Also, the region is undergoing an agricultural conflict, with many different positions, from landowners to small farmers and there is also the growing of commercial African palm.

Ciénaga de Paredes is affected by the economic dynamics of the region, gets pollution and sediments from this economic activities, as well as black waters from nearby urban centers like Campo Duro, as well as other factors, like over fishing and use of other wildlife in the region. In the short term, this is already

causing big changes in the normal cycles in the marsh, and there is not a long term mentality about the effects of these sources on the environment and its effect on the human population that depend on it. Although this region is "rich on natural resources the majority of the population lives in extreme poverty. Fishermen represent the least developed sector and the most socially vulnerable, and they want to lift their voice since they are losing their way of living.

Future work should consider and develop a management and conservation plan for the marsh. This needs to work hard on determining the tendencies in the region and gain the support of most of the social actors in the region so that it might be successfully implemented.

To summarize, the conditions that Ciénaga de Paredes reunites for the species are adequate in terms of food resources and low hunting pressure, but there is a need for the community to develop new alternatives to mitigate the impact on the margins of the marsh due to constant fires and deforestation.

There is also a need to establish conservation and management strategy that promotes the protection of the water sources that feed the marsh as well as protection for the margins to prevent the increase in sedimentation.

The interest of the local communities about the conservation of the marsh is the best advantage for the manatee population in this region, since the prevention of hunting determines that there is one less source of human pressure on the animals, something unique compared to other places in the country.

Since the habitat destruction causes are human related, there is a clear need to continue with the education work with community involvement and the government entities concerting and developing project for management of these resources.

The creation of a network for the protection of the Antillean manatee in the region could help to publish the work already done and the threats for the manatees, as well as to coordinate any emergency that might happen in the future.