CONSERVATION AND MANAGEMENT PROGRAM FOR THE AMAZONIAN MANATEE (Trichechus inunguis), IN THE COLOMBIAN AMAZON BASIN

BOSQUE COLOMBIANO ORGANIZATION

RESUMEN

The Amazonian manatee (Trichechus inunguis) is listed as Vulnerable (VU) based on population declines and fragmentation by at least 70% in the last 25 years, mainly due to continued levels of hunting in most of the region, coupled with the incidental increase in calf mortality in recent years, global warming trends and increased climate variability, coupled with increased economic and population growth, and habitat loss and degradation associated with fishing and trafficking river.

Through this program, the BOSQUE COLOMBIANO ORGANIZATION makes known the threats, strategies and priorities to work with 4 populations of 108 manatees in the Colombian Amazon basin, in the Ticuna indigenous territory; in order to achieve their management and conservation as focal species used in the design, planning and management of their habitat, such as special protection areas, since their requirements to survive represent important factors to maintain ecological conditions.

Figure 1. Amazonian manatee with her calf. **Source:** Corpoamazonas

1. BIOECOLOGICAL INFORMATION

1.1. Taxonomy

Genetic diversity of T. inunguis has been found to be higher than any one of the three major clusters of T. manatus (Garcia-Rodriguez et al. 1998, Vianna et al. 2002, Caballero and Giraldo 2004), possibly functioning as a panmictic population (Cantanhede et al. 2005).

1.2. Conservation status

Trichechus inunguis is here listed as Vulnerable based on a suspected population decline of at least 30% within the next three generations (assuming a generation length of 25 years) due primarily to ongoing levels of hunting throughout most of the region, coupled with increasing incidental calf mortality in the recent years, global warming trends and increased climate variability, along with increased economic and population growth, and habitat loss and degradation associated with fisheries and river traffic.

1.3. Geographic Range

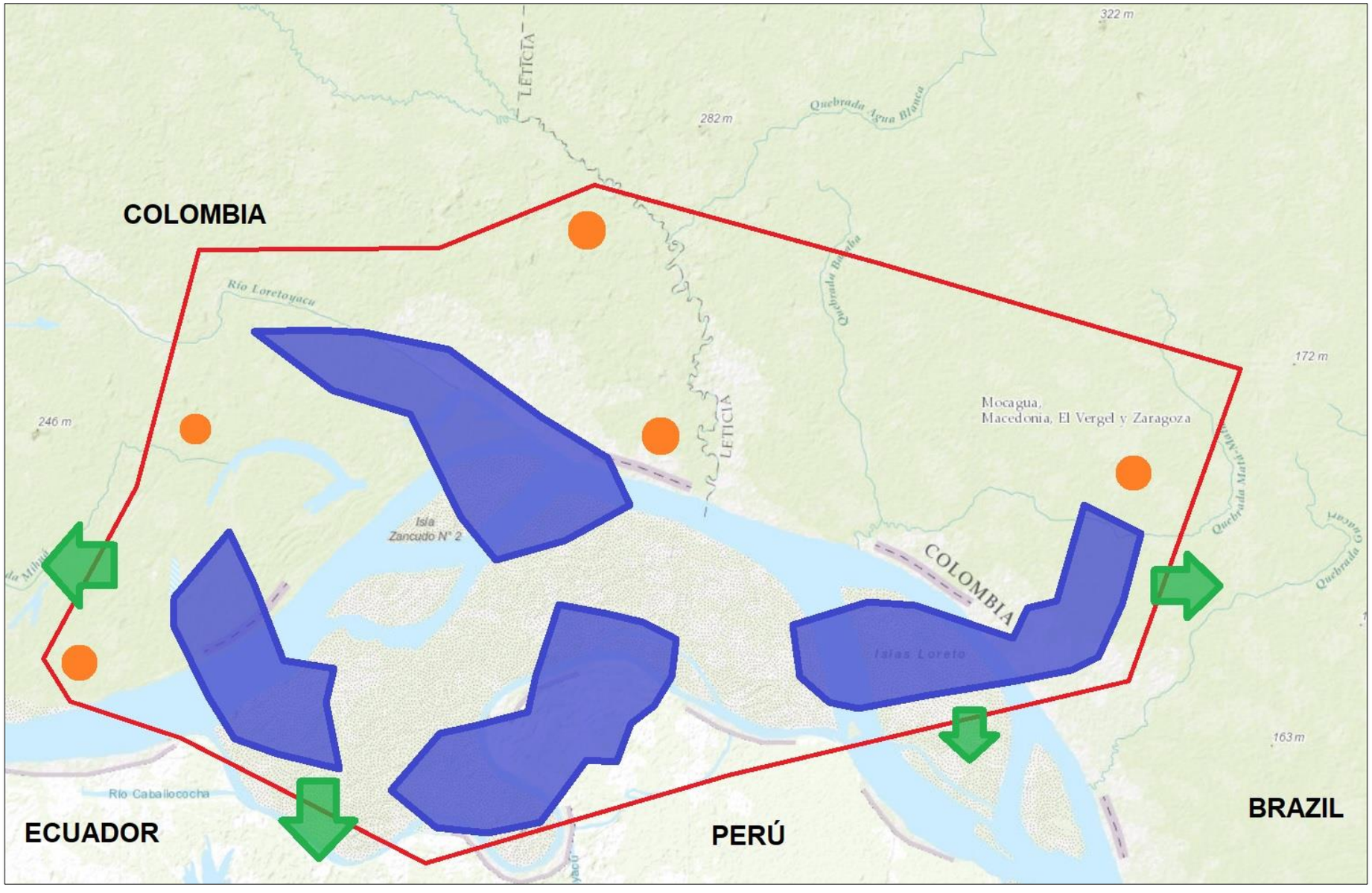
Amazonian Manatees occur in South of Colombia, and are endemic to the Amazon Basin. Amazonian Manatees occur through most of the Amazon River drainage, in river and lake systems, from the headwaters, in Colombia (Domning 1981), Ecuador (Timm et al. 1986) and Peru (Reeves et al. 1996) to the mouth of the Amazon (close to the Marajó Island) in Brazil (Best and Teixeira 1982, Miranda 2014) over an estimated seven million square kilometres. However, they are patchily distributed, concentrating in areas of nutrient-rich flooded forest, which covers around 300,000 km² (Junk 1997), but are limited by troubled waters (rapids and falls) and aquatic vegetation (Best 1983).

In Amazon basin most records are from the extreme northeast, below 250 m altitude. From north to south there are records for the Güeppi river (tributary of Putumayo, in the border with Colombia), the Aguarico river and its Cuyabeno and Lagartococha systems, where most of the records come from (Denkinger 2010, Utreras et al. 2011a, Utreras et al. 2013) and in tributaries such as the Yanayacu, Cocaya and Zancudococha lagoon; in the Napo region they are found in the Añangu, Challuacocha and Yuturi lagoon systems, as well as in the Tiputini river and Yasuní basin, including the Jatuncocha and Tambococha lagoon systems (Utreras et al. 2011a).

1.4. Populations

Although there are no records in the Guyana, the species may occasionally penetrate into southern Guiana close to the boundary with Brazil (Bertram and Bertram 1963)

PROJECT MAP



CONSERVATION AND MANAGEMENT PROGRAM FOR THE AMAZONIAN MANATEE (Trichechus inunguis), IN THE COLOMBIAN AMAZON BASIN

INSTRUCTION

	Program area
	Amazonian manatee populations
	Ticuna indigenous communities
	Illegal biodiversity trafficking routes

SCALE

1cm = 25Km2

Source:
-Bosque Colombiano, 2020.
-IMAP, Wildlife central conservation map; 2021.

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This possibility is enhanced by a Manatee rescue done by INPA in Takutu River border Brazil and Guyana (D. Souza pers. obs).

Most of the waters inhabited by Amazonian Manatees are very murky and, probably as an adaptation to the past and ongoing hunting pressure, Amazonian Manatees are extremely secretive. Tremendous research efforts have been made, but there are no reliable population estimates available, although numbers are almost certainly lower than historical figures due to centuries of hunting. Analysis of feeding patches, direct sightings of T. inunguis and interview surveys have been used to try to estimate population numbers with limited results, due to opportunistic sightings and small samples without standardized effort. Traditional mark-recapture studies are not appropriate due to the species' secretive nature. More recently there have been efforts to estimate populations with the use of rotary or side-scan sonars, but still with inconclusive results (Brice 2014, Francisco et al. 2015), which hinders the development of conservation strategies for the species. Magor empirically estimated a minimum population of 10,000 Amazonian Manatees for the Amazon basin (Husar 1977). Based on the analysis of mtDNA control region, Cantanhede et al. (2005) suggested a genetic estimate of the effective female population size of T. inunguis of approximately 455,000 individuals, indicative of a recent large population size. Genetic studies do not show a population structure throughout the region (Cantanhede et al. 2005).

In Colombia, due to conservation efforts with local communities, a reduction in hunting levels and an apparent increase in Amazonian Manatee population in specific sites has been noted in the last few years. In the Colombian Amazon, the population may have stabilized, but hunting continues on the Peruvian side of the river and this affects the Colombian population. During 2010-2015, Natütama registered 3 to 4 new calves every year in Colombia. Fishermen insist that there are more Manatees now, mainly because they see groups of 7 to 10 Manatees more often (Kendall et al. 2014). Systematic monitoring with former Manatee hunters recorded 364 sightings around Puerto Nariño in 2014, including five different calves (Castelblanco-Martínez et al. 2015).

A study conducted 1996-1999 in Cuyabeno Reserve (Ecuador) contradicted Timm et al.'s (1986) prediction of extinction in 10 years. However, relative abundance in Cuyabeno River was 0.01 animal / h effort and 0.007 animal / h effort in Lagartococha River. A total 40-49 animals were sighted in the Cuyabeno Reserve between 1996 and 1998, where they are considered rare (Denkinger 2010). The use of sonar produced estimates ranging from 0.8 to 3.0 individuals / 10 km in three sites (Parque Nacional Yasuni, Lagartococha and Cocaya lake systems); no animals were detected in 58 km of the Cuyabeno lagoon system (Utreras et al. 2013). Brice (2014), using side-scan sonar observed 24 individuals in 70 hours of sampling in the same region. In Ecuador the species is considered Critically Endangered (CR) according to IUCN criteria C2a(i), which indicates an estimated population of less than 250 mature individuals, and no subpopulation with 50 mature individuals (IUCN 2001).

Guzmán (2014), also using a side scan sonar, recorded 14 Manatees in 65 km of rivers and

lagoons, or 2.15 ind / 10 km in the Lagartococha river, on border Peru-Ecuador, an area partially surveyed by Utreras et al. (2013). Bodmer et al. (2006) believed the population in the Pacaya Samiria Reserve was stable due to a slight increase in counts between 2003 and 2006. However, Soto (2007) points out that the estimation method has not yet been proven.

In some sustainable development reserves (SDR) in Brazilian Amazon, hunting has been decreasing over the recent years. This is probably a reflection of the conservation actions that have occurred in the region, and the lack of interest among young fishermen for hunting the Manatee. The frequent records of sightings of adults and females with calves during the rainy and dry seasons in the Piagaçu-Purus SDR (Souza 2015) suggest that populations of T. inunguis may be stable or increasing in these regions.

Sixty-two per cent of hunters interviewed by Calvimontes (2009) in Amanã SDR (Brazil) believed the population is decreasing, although they attribute this to Manatees having moved away (due to habitat alterations and increasing levels of noise) rather than hunting. Calvimontes also reported that most hunters are turning into farmers, which should decrease the pressure on the species. Seventy-three per cent of interviewees in the Belém region (mouth of the Amazon) considered the Manatee population is decreasing, due to hunting, pollution, boat traffic and noise (Miranda 2014). Half of the respondents in Franzini et al.'s (2013) study believed Manatee numbers are declining.

Seventy per cent of interviewees in the Ucayali region of Peru believed the population is decreasing (Silva et al. 2014). In a preliminary survey of Manatees in the Lagartococha region, in 6.9 km of canoe transects Hidalgo (2010) observed 16 Manatees and 25 feeding patches, which lead him to evaluate that Manatees in the Lagartococha river basin may be stable due to the almost null human presence.

The progressive increase in the number of young calves arriving at rehabilitation centres in Brazil in the past five years has also led several researchers to suspect that the species may be undergoing some recovery, or that the increase is simply a reflection of the awareness campaigns implemented, with a concomitant increase in the number of rescued calves (Rosas and da Silva pers. comm. 2005). Alternatively, it may also suggest that calf takes are on the rise.

Although Manatees are widespread through a large area, there is a high level of uncertainty about population size, as no reliable method for determining abundance has been defined so far. Whatever the current population size, the overall population trend is most likely to be decreasing, given the species' slow reproduction (sirenian populations grow at an annual rate of approximately 5-6%; Marsh et al. 2004, 2011) and levels of exploitation (Marmontel et al. 1992). In summary, although the population may be stabilizing in some parts of the Amazon region due to local awareness building and other conservation efforts, the overall trend is of a decreasing population.

1.5. Habitat And Ecology

Amazonian Manatees inhabit environments in lowland tropical areas below 300 m asl, where there is a large production of aquatic and semi-aquatic plants; they also favour calm, shallow waters, away from human settlements. They are the only sirenians restricted to freshwater

systems. T. inunguis occurs in waters with temperatures above 23oC (Gallivan et al. 1983), living in the three types of water in Amazonian rivers (white, black and clear), being more abundant in white waters, where there is greater primary production (Best 1984, Rosas 1994).
Individuals engage in long seasonal movements, moving from flooded areas during the wet season to deep water bodies during the dry season (Arraut et al. 2010, Kendall et al. 2014). While the whitewater rivers (murky water) provide them with plentiful food, deep lakes function as refuges during the low-water season, where animals are less vulnerable to hunting.

Only one calf is produced at a time. Although no specific studies are available for the species in the wild, it is believed that the reproductive cycle is similar to the West Indian Manatee's, with a long gestation and lactation period (up to 24 months), and a birthing interval of 2 to 3 years (Best 1983); age at sexual maturity is suggested to be between 6 and 10 years (Rodrigues et al. 2002). Generation length is 25 years, based on what is known for T. manatus.

1.6. Threats

The commercial large-scale capture of Amazonian Manatee was the main reason for the reduction of the populations of the species. The main current threats for Manatees are hunting for meat consumption (Denkinger 2010, Brice et al. 2011, Utreras et al. 2013, Sandoval 2015), entanglement in fishing nets and habitat alterations.
Illegal hunting, for both subsistence and local use, is considered the main threat to Manatees in the Amazon. Manatee populations have supported a tremendous take in past centuries and, although not at commercial levels, hunting still takes place throughout the region (Barbosa et al. 2010a, b; Franzini et al. 2013; Silva et al. 2014; M. Marmontel pers. obs). Most hunting is practiced with the use of traditional harpoons, but in Ecuador Manatees may be caught in traps set for Arapaima (Hidalgo 2010). Hunters usually sell products to neighbors and nearby communities, but the meat is sometimes sold in local produce fairs or markets in the interior, or by order directly with the hunter. Public markets in Brazil (Manaus, Manacapuru, Beruri, Novo Airão, Tefé, Silves, Itapiranga, Itacoatiara, Santarém, Belém, Monte Alegre and Almeirim, Benjamin Constant, Atalaia do Norte) and Ecuador also illegally offer the meat for sale. Meat is sold in natura, or as "mixira" or subproducts such as sausage. The mixira, which is the meat preserved in its own fat, is one of the products that prolongs the pressure on the species, since it commands a high price.

Take estimates are available only for a few sites where conservation and research projects are taking place. Between 2002 and 2004, 64 Manatees were estimated to have been killed in the Amanã-Castanho area (3,000 km^2) of Amanã SDR (Calvimontes 2009), most of them adult males. Between 2011 and 2015, the hunt count for the same area was 42 Manatees. Some 195 Manatees were estimated to have been killed between 2011 and 2015 in the Uatumã River valley (Brazil) through the expeditions of Project Protecting Life in Uatumã (S.M. Lazzarini pers. comm. 2016). In the Urucu region of Brazil 20 Manatees were captured between 2004 and 2007, 14 harpooned and 6 entangled (Franzini et al. 2013). Pantoja (2015) estimated 92 Manatees hunted in the area of the lower Javari river, Brazil, between 1980 and 2014. Based on interviews conducted in the Piagaçu Purus SDR

(Purus river, Brazil), approximately 460 Manatees were killed in the protected area between 2004 and 2014 (Souza et al. 2014). Based on 48 interviews, 36 manatees were captured in the Region of the Middle Madeira and Aripuanã Rivers (Amazon, Brazil) between 1986-2004: 89% poached and 11% entangled (Castelblanco-Martínez et al. 2007).
The Natütama Foundation, which has a year-round Manatee monitoring program in place since 2002, registered three Manatees hunted in Colombia from 2003 to 2013 (Kendall 2013) and more than six in Peru from 2010-2015. Manatees are still being hunted in the river Putumayo upstream from Tarapaca and above the mouth of the Igaraparana, according to interviews with local Colombian fishermen, who say most of the hunters are Peruvian (S. Kendall pers. obs.).

In the Pacaya Samiria Reserve (Peru), Soto (2007) estimated an average of 35 Manatees killed in the basins of the Punahua, Ucayali and Marañon rivers.

Incidental mortality, orphaned calves, and illegal captivity

In addition to specific gillnets to hunt Manatees, the high use of fishing nets in the Amazon has increased incidental calf mortality in the past few years. These events have been documented in all Amazonian Manatee range countries (Reeves et al. 1996, Orozco 2001, Franzini 2008, Souza 2015), and this is now a major threat for the species (Marmontel et al. 2012).
When calves survive drowning in nets, they may be kept alive for later sale as pets, kept in pools or areas close to water bodies, and sold or given to influential persons. The number of rescued calves every year has been increasing, but the number recorded represents a small sample of occurrences in the Amazon.
Between 2008 and 2010, in the Brazilian state of Pará, 28 stranded Manatees were rescued, of which only one was an adult (Sousa et al. 2010). An important threat in Pará is the use of fishing corrals, as they are usually built over submerged aquatic vegetation beds, where Manatees feed, and have already trapped a Manatee (M. Sousa, pers. com. 2016).
Presently, several institutions in Brazil (Instituto Nacional de Pesquisas da Amazônia, Centro de Pesquisa e Preservação de Mamíferos Aquáticos, Mamirauá Institute and Zoofit) care for over 150 Manatees in captivity, mostly orphans. Between 2005 and 2015, INPA received an average of 10 calves per year. Of the 98 animals rescued during this period, 30% were accidentally caught in fishing nets (D. Souza pers. obs). In the past 10 years CPPMA received 39 calves for rehabilitation (S.M. Lazzarini pers. comm. 2016).

From 2010-2015, 3 calves died in nets or captivity in Peru (S. Kendall pers obs). It is estimated that two Amazonian Manatees are presently in captivity in Colombia (Castelblanco-Martínez et al. 2015).
Between 2007 and 2010, Centro de Rescate Amazónico (Iquitos, Peru) rescued 28 Manatees (Perea et al. 2011), and until 2013 successfully rehabilitated 25 individuals (Landeo-Yauri et al. 2013). Since 2011 the Centro released and monitored 11 of those rehabilitated animals (Landeo and Castelblanco-Martínez 2015, Velásquez Varela et al. 2015).

Habitat alteration and disturbance

Other anthropogenic actions have resulted in pollution, loss, alteration, degradation and fragmentation of habitats used by the Amazonian Manatee (Rosas and da Silva pers. comm. 2005, Kendall et al. 2014).

Changes in the aquatic environment as habitat degradation due to deforestation, pollution, contamination of the rivers by mercury for the gold exploration (Amorim et al. 2000), pesticides and heavy metals from agricultural waste and oil spills are potential hazards to the Manatee´s food supply (Rosas et al. 1991). These elements are absorbed by aquatic weeds and may directly affect the staple diet of the species (Rosas 1994). Roots of floating and rooted aquatic plants (Paspalum, Eicchornia, Salvinia) have been shown to be important methylation sites (Guimarães et al. 2000). Over 300 dams are planned for the Amazon (Winemiller et al. 2016), two of which are mega-enterprises in Brazil (Madeira and Xingu rivers). The building of dams can interfere with habitat quality, altering water speed, nutrient load and dynamics of macrophyte production (Junk and Nunes de Mello 1987). Brazil has extensive plans for navigation (Fearnside 2001, Brazil, PR, 2011) with dams allowing the opening of the waterway in the Tapajos river (Fearnside 2015) planned for soy transport, giving access to the Amazon river and the Atlantic ocean (Brazil, PR 2011, Millikan 2011). Amazonian Manatees are very sensitive to noise, and intense boat traffic on the Amazonian rivers can affect their behaviour and habitat use.

Oil spills may be a particular problem in Ecuador (Brice et al. 2011, Utreras et al. 2013, Brice 2014), where oil exploitation has been permitted in important refuges for the species (Utreras et al. 2013). The use of fertilizers and weed control products in extensive monocultures (Utreras et al. 2013), incidental captures in fishing nets, the use of dynamite, the increasing use of motorized boats including in the Cuyabeno and Jatuncocha systems where there are nature tourism activities (Utreras et al. 2011a, b) are additional threats in Ecuador. On the Peru-Colombia border, wood extraction activities are clogging lakes and stopping normal migrations of Manatees in the Atacuari area (S. Kendall pers obs).

Amazonian human populations are generally at low densities except in the large capital cities, but all of the issues above could be magnified by the increase in human population. Tourism and transport are interfering more and more with low water resting places in the area around Puerto Nariño (Kendall et al. 2014). Around the city of Belém and estuary of the Amazon River, boat traffic is intense and even ferries and cargo ships may interfere with Manatee movement (Miranda Leão et al. 2014).

Natural disasters, drought, climate change

Extreme droughts may help make the Manatee an easier prey item for hunters, by causing isolation and entrapment. During the 2010 drought in the Piagaçu-Purus SDR (Purus River, Brazil), 180 Manatees were estimated killed (Souza et al. 2014), but only a few cases of Manatees trapped by drought in the eastern Peruvian frontier area were recorded, and none in Colombia (S. Kendall pers obs).

2. MANATEE MANAGEMENT AND CONSERVATION PROGRAM AMAZONIAN MANATEE (Trichechus inunguis)

2.1. Vision

By the year 2025, the conservation and sustainable management of the amazonian manatee (trichechus inunguis) will have been achieved in Colombia, with the active

participation of national and local environmental authorities, NGOs, the private and public sectors, based on scientific and traditional knowledge, for the benefit of the Ticuna Indigenous communities that live in the basins where the Amazon manatee are distributed.

2.1. Overall Objective

The Management and Conservation Program for amazonian manatee (trichechus inunguis), in Colombia, seeks to guarantee the survival of these species, implementing conservation, research, assessment, and management strategies, through inter-institutional coordinated work and with active participation of the community, in the basins where it is distributed.

2.2. Specific Objectives

- Amazon rivers, and of the habitats based on the available information, defining priorities for their research, assessment and management, taking into account the social, economic and cultural reality of each of these areas
- Promote and work on the restoration of habitats (wetlands) where they live the manatees.
- Support and strengthen the efforts of the scientific community and consolidate collaboration between them, local communities and other actors, in order to guarantee the permanence of manatee populations in Colombia.
- Generate guidelines that lead to the regulation and coordination of manatee conservation, management and research activities in Colombia that the environmental authorities may accept.
- Generate and adopt regulatory mechanisms in order to guarantee the conservation, protection and management of the manatee in Colombia, taking into account the idiosyncrasy of the areas where the species are distributed.
- Adopt and implement the legal mechanisms established in international treaties regarding the conservation and management of wetlands and wildlife.

3. LINE OF ACTION I. RESEARCH AND MONITORING OF THE POPULATION

Objective 1.

Generate the necessary knowledge to conserve, manage and stabilize manatee populations in Colombia.

Expected results Real knowledge of the conservation status of the amazonian manatee (trichechus inunguis) in Colombia and their respective migrations or seasonal movements, throughout the different basins.

Goal 1.

Promote lines of research and monitoring of manatee populations in Colombia.

Actions

- Evaluate the conservation status of the manatee populations *amazonian manatee (trichechus inunguis)* in Colombia, over a minimum period of 10 years.
- Analyze population trends, habitats and determine demographic structures cases of the populations.
- Standardize methodologies and techniques for the evaluation of the populations of these species in the different basins.
- Promote research aimed at "rescue" the traditional knowledge associated with the manatee, and critical ecosystems for their survival.
- Monitor the state of conservation of the wetlands where the species are distributed, taking into account the changes suffered by the construction of infrastructures.

- Carry out field surveys to establish the actual distribution limits of the species, and likewise locate the areas of possible feeding, reproduction and development activities to determine their frequency of use.
- Review the reference scientific collections or remains of the species, in order to collate the identifications and georeference the manatee collection or sighting sites in the different basins where it is distributed.

Indicators •

- State of conservation and vulnerability of manatee populations in the country, evaluated, defined and published.
- Models for the evaluation of defined population trends.
- Population and habitat monitoring methods, established and standardized.
- Actual distribution of species in Colombia, established over a period of time definite.
- Number of copies reviewed, if possible marked and georeferenced.

4. LINE OF ACTION II. SUSTAINABLE MANAGEMENT

Objective

1 Arrange and implement the management measures of this plan, in order to recover the populations of the manatee *Trichechus inunguis* in Colombia.

Expected results

Management measures arranged and implemented.

goal 1

Implement management measures to support manatee conservation actions in Colombia.

Actions

- Identify, protect and manage essential habitats, feeding areas, development and migratory corridors, in the areas with the presence of the manatee *Trichechus inunguis* in Colombia.
- Evaluate the levels of manatee mortality caused by the effect of artisanal fisheries, subsistence hunting and incidental mortality not associated with artisanal fisheries.
- Implement a project to work on manatee strandings in Colombia.
- Establish the genetic identity of the manatee population *Trichechus inunguis* in Colombia and clarify their phylogenetic and taxonomic relationships to guide management actions.

Indicators

- Number of critical areas where manatee populations carry out feeding, reproduction or migration activities that are protected or managed in a sustainable manner.
- Mortality of manatees *Trichechus inunguis* due to of fisheries reduced.
- Project for attention and management of manatee strandings formulated and in execution.
- Geographic management areas defined from demographic and population studies.
- Number of stranded or captured manatees evaluated clinically (sex, morphometry and health condition).

Objective 2

Assess captive manatee populations in Colombia.

Expected results

Animals evaluated and with release alternatives in order to continue their normal development.

goal 1

Evaluate the clinical status of the captive and semi-captive manatee population in Colombia

Actions

- Clinically evaluate captive and semi-captive manatee populations.
- Work on the legalization of the possession of these animals.
- Prepare and implement a standard protocol for the maintenance and handling of animals that are in exhibitions or whose ownership is legalized (size of the pool, volume and quality of water, food and health, among others).
- Evaluate the alternatives for releasing these animals.

Indicators

- Number of animals clinically evaluated.
- Number of animals whose possession is legalized.
- Document with the maintenance and management protocol for mantids.
- Number of animals tagged and ready to release and released for monitoring (telemetry, PITS)

Objective 3

Reduce the capture of manatees for maintenance in captivity and semi-captivity in Colombia.

Expected outcome

Eliminate captive and semi-captive capture of manatees.

Goal 1

Reduce the capture levels of manatees *Trichechus inunguis* for commercial, captive or semi-captive purposes in Colombia.

Actions

- Promote the use of gear that reduces accidental or direct catches, that encourages the commercial exchange of live individuals, and adopts management practices that reduce mortality.
- Identify the fisheries that capture individuals for commercialization.

Indicators

• Management measures implemented to reduce the capture and trade of manatees in the country.

3. LINE OF ACTION III. ENVIRONMENTAL EDUCATION AND CO PARTICIPATION COMMUNITY.

Objective 1

Strengthen environmental education and community participation programs, aimed at the conservation of the manatee and its habitats in the Amazon.

Expected results

Environmental education programs and community participation processes coordinated, strengthened and implemented throughout the basins where the species are distributed.

goal 1

Structure, develop and promote education and public awareness programs that contribute to the conservation and management of the manatee in Colombia.

Actions

- Coordinate and integrate regional efforts aimed at raising awareness among the population about the need to protect and conserve the ecosystems of the basins, as essential habitats for these species.
- Integrate environmental education and the problem of endangered species such as the manatee, in formal education systems at all levels.
- Plan educational programs in a concerted and participatory manner with the rural and fishing communities that in one way or another are related to the manatee in Colombia.
- Develop evaluation mechanisms to determine the efficiency and coverage of the comprehensive environmental education programs and improve collaboration and coordination inter-institutional
- Implement environmental education programs that consider the ecological importance, economic and cultural value of the manatee for the different basins where it is distributed.

- Training local communities in the different regions to lead programs is protection and conservation of the manatee in each zone of the country.
- Promote training and training events on manatee management and conservation techniques at times when accidental or directed captures occur in the different basins where the manatee is distributed.

Indicators

- Regional actions identified and strengthened for the conservation of the manatee in Colombia.
- Comprehensive environmental education programs coordinated, implemented and replicated in the different basins where the *Trichechus inunguis,* in Colombia.
- Mechanisms for evaluating environmental education programs defined and implemented.
- Number of effective training events held.

Goal 2

Strengthen community participation for manatee management and research in Colombia.

Actions

- Promote and facilitate community participation in campaigns for the conservation, research and management of the manatee *Trichechus inunguis,* in Colombia.
- Support and strengthen local and regional efforts aimed at the conservation of the manatee in Colombia.
- Provide technical support to regional programs and initiatives for the conservation of *Trichechus inunguis,* in Colombia.
- Prioritize and strengthen the work carried out by ecological groups and NGOs for the conservation of the manatee in the different basins where it is distributed in the country.
- Establish, maintain and strengthen mechanisms for the exchange of experiences between NGOs, communities and different sectors of society regarding the protection and conservation actions of the manatee *Trichechus inunguis,* in Colombia.

Indicators

- Number of communities involved in campaigns for the protection, research and management of the manatee *Trichechus inunguis,* in Colombia.
- Manatee protection campaigns carried out.
- Number of communities and ecological groups for the protection of these species, organized and functioning.

4. LINE OF ACTION IV. INFORMATION AND DISCLOSURE.

Objective

1 Generate information and dissemination mechanisms on aspects related to the manatee *Trichechus inunguis,* in Colombia.

Expected results

Information and dissemination mechanisms implemented.

Goal 1.

Information base on the natural history of the manatee *Trichechus inunguis,* their ecology and conservation status established.

Actions

- Design and implement a database on publications, manuscripts, research projects, degree projects, among others, related to these species in Colombia and make it available to the scientific community and the general public.
- Compile, analyze and synthesize the information related to the manatee in Colombia and identify knowledge gaps that can be created in the different basins where they are distributed.
- Strengthen the mechanisms for the exchange of information, experiences and material related to the manatee in Colombia.
- Promote a single data management system that allows strengthening the information network on manatees in Colombia, based on the knowledge and work already carried out in the different basins of the country.

Indicators

Information facilitation mechanism implemented.

Data center and educational aids structured and functioning.

Goal 2

Design and implement dissemination mechanisms related to the manatee in Colombia.

Actions

- Structure and implement outreach programs on the problems, importance, protection measures and management of the manatee in the different basins where the manatee species are distributed in Colombia.

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