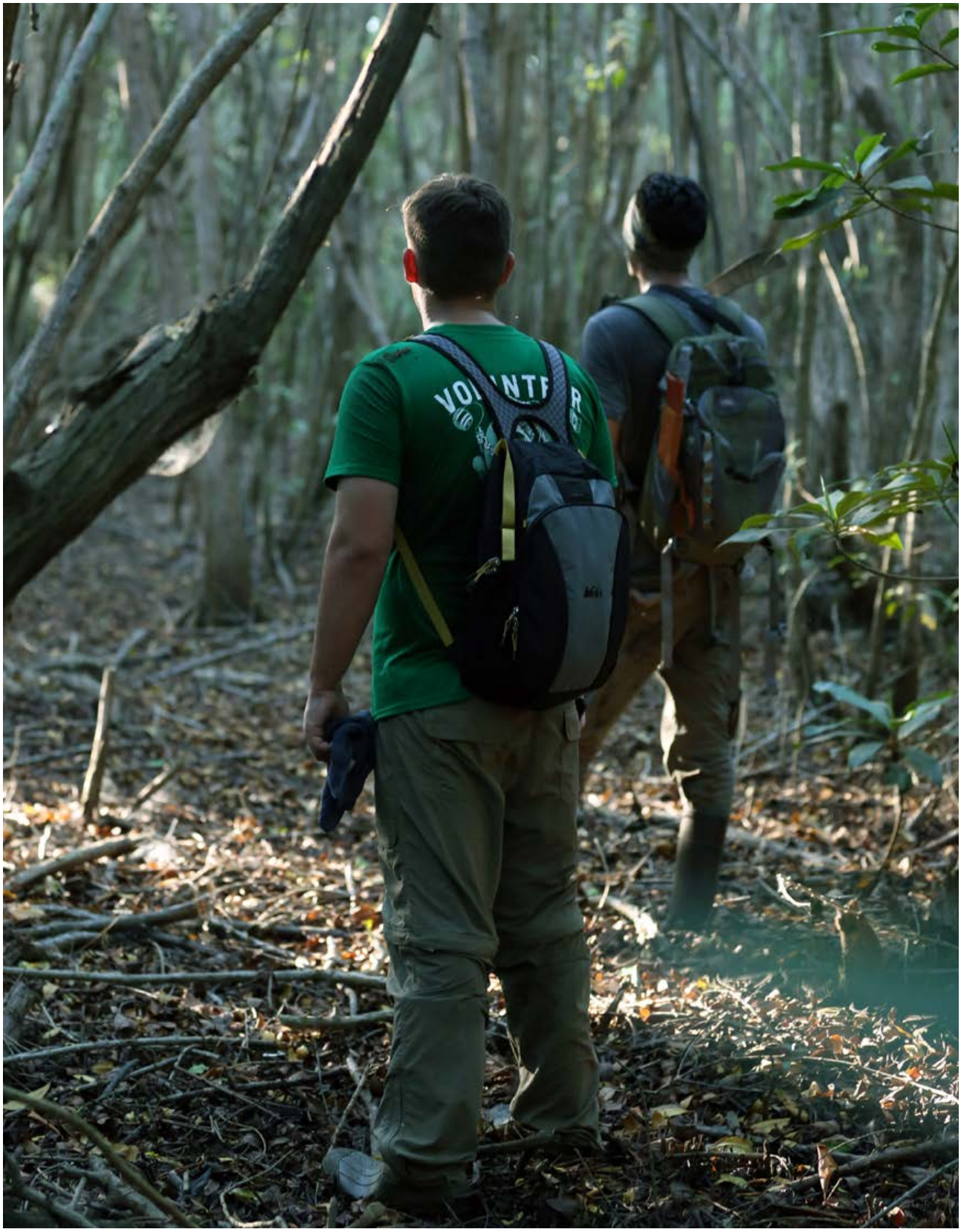
Conservation Management Plan, 2017

Mexico



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1. Overview

1.1 Description of Mexico:

The landscape of Mexico is varied and rich just like its traditions and culture, with almost two-thirds of the country's terrain consisting of mountains and highlands from three significant ranges. Deserts dominate the north and there are tropical rain forests in the south. It has 10,143 km of coastline, of which 7,338 km face the Pacific Ocean and the Gulf of California and 2,805 km face the Gulf of Mexico and the Caribbean Sea. Mexico shares borders with the USA in the north and Belize and Guatemala in the south. Mexico is the 13th largest country in the world and the 5th largest in America. Mexico is a privileged country for its biodiversity and is in fourth place among the countries with mega-biodiversity along with Brazil, Colombia and Indonesia.
Mexico homes between 10 and 12% of the species on the planet. The majority of these mega-diverse countries are totally or partially found in the tropics. Due to the geographical features of Mexico, the country can be split into two biogeographic regions, Nearctic and Neotropical. These two regions intertwine in Southern Mexico making it an incredibly important area for biodiversity.

Mexico is situated on top of three large tectonic plates, making it one of the most seismological regions on earth. Mexico has many active volcanoes with Volcán de Colima, situated near Guadalajara, erupting in 1994, and several others that have been dormant for decades. Popocatépetl and Ixtaccíhuatl ('smoking warrior' and 'white lady', respectively in Náhuatl) occasionally send out puffs of smoke clearly visible in Mexico City. There are also earthquakes throughout the country, of which some are more destructive than others.

The Tropic of Cancer runs through the country and divides it into tropical and temperate zones. Land to the north has cooler winter months and to the south, there are much more even temperatures all year round that only differentiate with variations in altitude. There are pronounced wet and dry seasons, the general wet season is from June to mid-October, and the hurricane season, on both coasts, runs from June to November.

Conservation in Mexico is not a modern concept. In pre-Hispanic times the ancient Mayan people declared large areas of strictly protected zones within their exploited areas. In the fifteenth century large areas in the Valley of Mexico were reforested and then in the sixteenth-century zoological parks and botanical gardens were created by the emperor Moctezuma II. In modern times the Mexican government still declares protected areas. During the 1930s, 82 areas were declared as national parks and forest reserves, and at this time a specific government sector was created to help with its protection. Although this level of protection decreased over the next two decades in the '80s and '90s, another 35 areas were protected including many marine and island areas. In Mexico, there are various types of protected areas: federal, state, municipal, community, and private. However, only 5% of the land mass of Mexico is actually under any type of protection. The Projects Abroad Conservation Project is located in a little town called Cuyutlán in the state Colima on the Central Pacific Coast. Three-quarters of the state of Colima consists of mountains and hills but the coastal area has mangrove forests, deciduous rainforests, scrubland and lagoons. The main activities in the area are agriculture especially lime production.

1.2 Map of Mexico and Colima to show the camp location (Cuyutlán):

1.3 Tecomán:

Tecoman is the nearest city to the Project Abroad camp area. In Tecoman you can find hospitals, supermarkets, cinemas etc. The temperature of Tecoman city always fluctuates a few degrees above the average temperature of other adjacent areas not so densely built up due the effect of 'hot spot' This is where the temperature of cities increases as the vast energy consumption eventually becomes heat which then reverberates off asphalt and rooftops, which act as solar collectors.

1.4 Cuyutlán:

Cuyutlan is a small pacific town, home of the green wave (as the town claims) located in the municipality of Armeria, in Colima, Mexico. Its name comes from the Nahuatl which means 'coyote'. It is a long stretch of black sand that extends over a

wide beach. The shoreline of the beach changes constantly throughout the year. The beach can be flat during winter and with a sharp fall-off into the ocean during summer. Its surf and currents also vary, in summer the currents and surf are strong, and waves can be very high and dangerous. During winter, the surf and currents decrease in intensity as well as the waves. The drive from Tecoman to the Camp in Cuyutlán takes 25 minutes. The facilities of Project Abroad in Cuyutlan have an excellent location. It's near to downtown and also near to where the morning activities take place, which is 'The Tortugario'.

The Tortugario is the main facility in which Project Abroad collaborates. This facility has space for the turtle hatcheries and also keeps 12 adult marine turtles in tanks for community awareness as well as for research projects. They also keep juveniles of green/black turtles for research. Other conservation projects include the iguana breeding project, mangrove nursery house, crocodile breeding project and the facility is also involved in the protection of the "Palo Verde estuary", which encompasses a mangrove ecosystem that contains a high biodiversity of reptiles, birds, insects, mammals and plants. The Tortugario is well regulated by the government environment agency (SEMARNAT).

It's a big place with little staff and their income depends mostly on visitors and donations. This facility requires a lot of upkeep so the volunteers make quite a difference and their input and help is valuable and well appreciated. Most of the activities are zoo like tasks such as keeping the animals and their habitats clean and healthy.

2. Cuyutlán Flora and Fauna

2.1 Flora:

Our natural local flora is limited due to the surrounding farmland. However, the estuary has a mangrove forest consisting of four different mangrove species: Rhizophora mangle (red mangrove), Laguncularia racemosa (white mangrove), Avicennia germinans (black mangrove, mother of salt) and Conocarpus erectus (buttonwood mangrove).

There are some naturally occurring palm trees lining the coastline, however, there are big agriculture fields that are for harvesting the coconuts. The shrubs lining the dunes are also left to their natural state and keep the structural integrity of the dunes stable.

2.2 Fauna:

Our most abundant species on the beaches of Cuyutlán are the olive ridley sea turtle (Lepidochelys olivacea). However, we also have nesting leatherbacks (Dermochelys coriacea) and black (Chelonia mydas agazzisi) sea turtles.

We regularly find the following three mammals on the beach as they predate on the sea turtle eggs:

- White-nosed coati (Nasua narica)
- Common possum (Didelphis marsupialis)
- Northern racoon (Procyon lotor)

The mangroves support many mammals, including the Neotropical river otter (Lontra longicaudis), collared peccary (Pecari tajacu) and white-tailed deer (Odocoileus virginianus). The bird life found on the estuary is more extensively documented and its function as an important stop-over for migrating birds means that there are many species to be found. These include herons, egrets, coots, gulls, pelicans, ducks, divers, sandpipers, doves, orioles, kingbirds, jacanas, grackles, blackbirds, cormorants, anhinga, spoonbills, hawks, kites and ospreys.

The American crocodile (Cocodrylus acutus) is also found in the lagoon and the Mexican crocodile (Cocodrylus moreletti) is found where we work at the captive breeding programme for crocodiles.

3. Threats to the Area

3.1 Sea Turtle Poaching:

The main threat that directly affects our camp area and makes our presence in Cuyutlán so important is the threat poachers pose to the survival of marine turtles. Without our assistance in retrieving all the nests laid on Cuyutlán beach, future generations of sea turtles would be taken before they are able to hatch and reach the sea. Our volunteers help rescue these nests and our presence also limits the number of illegal activities on the beach. The other threat that these poachers pose is that they kill the adult turtles so they can take the eggs quicker by cutting the eggs out of the laying females. So not only are we helping to protect future generations but also our present population of sea turtles.

The olive ridley turtle is currently in a very fragile position on the pacific coast of Mexico. Conservation efforts will help decrease the fragility of the species but any negative effects on the species can potentially change their 'vulnerable' status to 'endangered' on the IUCN red list criteria.

3.2 Mangrove Deforestation:

The forest surrounding our local lagoon is a mangrove forest, which in turn is surrounded by farmland. As most of the farmland that borders the mangroves is remote, there is little or no supervision of the protection of the mangroves and as such, there is undocumented deforestation to create more land for profitable farming. Mexico has already lost 65% of existing mangrove ecosystems since the 1970s according to estimates by the National Institute of Ecology (INE). Most alarming is that every day 4.43 hectares is lost, an area similar to six football fields, representing every year losses of 2.5% of remaining mangroves. The INE indicates that if annual loss rates remain constant, by 2025 there will be a decrease of 40-50% of the mangrove area that was present in 2000.

3.3 Mangrove and Ocean Pollution:
Another threat to our local ecosystem is the run-off of industrial pesticides and fertilisers from nearby farms. There is a huge irrigation system that runs through all the farmlands and runs directly into the lagoon and a river just north of camp that flows into the ocean.

3.4 Hunting:
Although there is not a perpetual hunting problem within the mangrove system, this is because the area is so inaccessible. If an animal presents itself as easy prey, they will be taken. This happens mostly with iguanas, deer, peccary and many of the smaller animals that are easier to take.

4. Turtle Project

4.1 Summary:
Sea turtles have survived many natural disasters, which caused the extinction of other species at different stages in their evolution. They have successfully adapted to their environment and are important members of marine ecosystems worldwide. But this tenacious survival instinct and ability to withstand natural changes and disasters is failing to withstand the pressures exerted by humans. Any artificial pressures exerted on wild populations are usually quick and unexpected and do not give the species a chance to adapt and survive.

Turtles belong to the clade Sauropsida and within this group, we find the order Testudines (Quelonia), in which sea turtles are grouped into two families Chelonidae and Dermochelonidae. Of the seven species within these two families, only three nests on the coast of Colima: olive ridley (Lepidochelys olivacea) the black turtle (Chelonia mydas agassizi), and the leatherback (Dermochelys coriacea). The olive ridley turtle is typical of the Pacific and Indian oceans, being the most common on our western coast. To date Projects Abroad has released nearly 1.5 million turtles back into the oceans (and counting)!

4.2 Aims:
• Save as many nests per season and move them to a protected area.
• Keep the hatcheries of sea turtles located on the nesting beach in optimal conditions and strengthen the existing conservation programme at the Centre for the Conservation of Sea Turtles 'El Tortugario'.
• Reduce the impact of illegal extraction of both eggs and adult turtles

4.3 Methodology:
Patrol the beaches at night on the quad bikes with an experienced member of staff. On patrol, turtle nests are located by following the turtle tracks moving up the beach. A track with disturbed sand at the highest point of the trail has a nest. If there is a hole dug and left open then the track is called a false crawl and abandoned by the female and ignored by the patrol. When a clutch of eggs has been laid we recover, noting the time, date, location, number of eggs, and if the adult turtle is present, take notes on the physical condition of the turtle and the measurements of the carapace. The eggs will then be brought back to 'El Tortugario' and reburied at the same depth that the turtle laid them, the sand that surrounded the eggs is also buried with the eggs as this has fluid secreted by the mother that provides additional protection against bacteria found in the sand.

After the eggs have been buried, the figures from the data sheet are entered onto a database, allowing us to collate information on how many eggs we have collected. A minimum of 45 days after collecting the nest, turtle hatchlings will start to climb their way out of the nests. The turtles are collected and placed in a container to release on the beach when they are in their most active state. Hatchlings are released after emerging and once the rest phase is over. In nature, hatchlings emerge in the early hours of darkness so by dawn they have come quite a distance away from the nest before being seen by many predators. As a result, the nests are checked at regular intervals throughout the night. The run down the beach for the hatchlings can vary but generally, they are released on the beach approximately 6 meters from the water line and are left alone to get to the sea. This ensures that they have the time to collect some of the necessary parameters to return to their natal beach. When all the hatchlings have hatched, the nest is cleaned and the number of dead turtles and infertile eggs are counted. This is subtracted from the number of eggs buried, giving us the number of turtles that were successfully released. These figures are then entered onto the database, giving us our success rate.

5. Estuary Bird Survey Project

5.1 Summary
The lagoon of Cuyutlan extends approximately 32 km from Manzanillo to the town of Cuyutlán. This last northern section is called the Palo Verde estuary. This place has been categorised as a Ramsar site. The Ramsar convention is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Palo Verde estuary was awarded this status on 20 February 2009. The estuary has an important mangrove ecosystem that contains a high biodiversity and birds as one important component. For this reason, we are performing a census that will indicate what species are present and how many individuals, what areas are more used, what areas of the estuary are richer in species and if there is an effect of human variables in the distribution of the birds.

5.2 General Aim:
• Create a census that gives information about the species and abundance of birds in the different habitats throughout the Palo Verde estuary.
• Create a species list for the birds found in the estuary.

• Determine the areas with the highest richness.
• Determine if human factors alter the distribution of certain species.

5.3 Specific Aims:

• Create regularly visited fixed observation points in the lagoon.
• Know the abundance and the diversity of bird species that can be found in the different habitats within the lagoon.
• Observe local migrations of species between the different habitats and the seasonality of the movement.

5.4 Methodology:

We used fixed radio point counts. This method consists of selecting points randomly around the lagoon. Once in this point, the counting and identification process occurs and we spend 10 min per point. All that can be seen in a 360° visibility and in a radio of 200 m is recorded (if possible). We identify species, numbers, location, habitat and type of vegetation among other factors, which are all recorded in the field and then put into our own database. These points are distributed along the lagoon (census on a boat), and census around the lagoon (census on foot inside the mangrove forest and agriculture fields too).

We hope to process this data and start to use the factors collected to apply an ecological tool called species distribution models. Species distribution models are tools that have been used more often in this decade in ecology due to their ability to predict and to show data in an explicit map. Different information can be extracted from this. For example, the areas more sensible to impact, areas where it is more likely to observe one particular species, places that species use more than others or habitats that have a higher diversity, number of species or more abundance. It's a useful tool for conservation purposes. One characteristic of the species distribution models it's they need a large database to be feed to the mathematical models. The volunteers are pre-trained in the identification and ways to estimate and count the most conspicuous birds and are also involved in recording the data.

6. La Colorada Crocodile Centre

6.1 Summary:

In the state of Colima, there are two species of crocodile - the American (Cocodrylus acutus) and the Mexican (Cocodrylus moreletii). The American crocodile historically resided in the area but the accidental introduction of the more aggressive Mexican species from government breeding centres has caused the numbers of the American crocodiles to deplete in affected areas. The crocodile breeding centre at Laguna Colorado was one of these breeding centres and is now working to confine the Mexican species to the lagoon whilst working to reintroduce the American species back into areas where the numbers have dropped. Fencing from the surrounding areas now isolates the lagoon and we hope to continue our involvement in the running of the centre and help with the new breeding project for the American species and their future reintroduction.

6.2 Aims:

• Determine the number of crocodiles that exist in the Laguna Colorada and evaluate if the populations are stable.
• Help in the maintenance and day-to-day running of the centre.
• Create, within the current infrastructure, a museum about the species of reptiles found in the area for the education of both school groups and other visitors.
• Aid in any proposed relocations of problem animals.
• Take biometric data of captive-bred crocodiles to assess growth rates and suitability for release.
• Create a species list of birds for the lagoon to demonstrate its importance as a site of high biodiversity.

6.3 Methodology:

To determine the number of crocodiles in the lagoon, night surveys are carried out when the moon is at its minimum exposure. A paddle boat (for minimum disturbance) is taken out onto the lagoon; using a powerful torch the entire surface of the lagoon is scanned and all crocodile eyes spotted are recorded.
Calculating the distance from eyes to the snout and multiplying by a factor of seven estimates the size of each crocodile. This way the crocodiles can be divided into size categories. Over time we can use this data to monitor changes in the populations in the lagoon and assess whether captive individuals can be released into the area. One of our commitments to the crocodile centre is to help in maintenance and cleaning. This involves cleaning the pools of the captive animals and maintaining the elevated walkway that circumvents the lagoon. This walkway is essential for monitoring the animals and provides us with access to different habitats around the lagoon and the associated fauna. The crocodile centre is often approached by local residents that are having difficulty with 'rogue' crocodiles near their homes or on their farms. We help in the safe capture and relocation of these animals into an area that has been evaluated and deemed suitable for the introduction of an adult crocodile. At no time are volunteers in danger during the capturing process and will only become involved when the animal is safely under control. Baby crocodiles born in captivity must be carefully monitored for growth rates, weight and general health. This biometric data is very important and the young hatchlings are kept at a 28 degrees Celsius and fed twice a week to maximise their growth rates to allow a quick release back into the wild. Volunteers help in this process and are involved in the whole process from birth to release.

We are currently undertaking an extensive bird survey at the crocodile lagoon as we aim to compile an accurate species list over the space of an entire year with all the differing seasons. The lagoon is vital to the local fauna as during the dry season the water levels are maintained and this attracts many unusual species that come down from the nearby highlands. Data collected on the birds of the area is essential in understanding

these local migrations and further emphasises the importance of the lagoon as a biodiversity hotspot. The survey is performed by walking the circumference of the lagoon using the specially designed walkway and identifying each individual bird using both binoculars and photography coupled with extensive field guides.

The aim for the beginning of this year is to create a museum on all the reptiles and birds in the area to increase the education and environmental awareness of the tourists and school groups that visit the area. There is currently a large unused room that only has a few crocodile skulls and a replica of a crocodile nest at the centre, so the Projects Abroad volunteers will help to create poster boards giving information to visitors. This information will describe the life-cycle of crocodiles, their evolution; the different species found in Mexico and describe other reptile species found in the area (e.g. turtles, iguanas, snakes). A short video loop will be created to help with different learning methods. A section of the room will be taken up with the display of the different bird species found in the lagoon, and at what time of year to find them.

7. Secondary Project: American Crocodile (Crocodylus acutus) Breeding Programme

7.1 Summary:

As mentioned above the American crocodile (Cocodrylus acutus) has been outcompeted by the Mexican species (Cocodrylus moreletii) in many areas within the state of Colima and we are keen to help set up a release programme to re-establish their numbers in areas where they have become rare. The lagoons Almela and Cuyutlan in the Colima region of Mexico have been identified by the Colima environmental office as areas with declining populations of American crocodiles and as such would be our first choices for repopulation. Monitoring of these lagoons has demonstrated that there are no invasive Mexican crocodiles currently living there and so the American species should be able to recover quickly when breeding numbers increase.

7.2 Aims:

- Incubate and hatch American crocodile eggs from two or three different clutches for the first year of breeding.
- Keep the young individuals in a contained habitat for a year to grow large enough for release.
- Safely release the juvenile crocodiles into the wild.
- Keep monitoring the sites after release to ensure the health of the population.

7.3 Methodology:

The breeding season for American crocodiles is at the beginning of the dry season, which is around March. The clutch sizes are from 30-60 eggs. At the beginning of March, the breeding pair of American crocodiles at the Colorada crocodile centre may produce a clutch of eggs. Last year they did not produce any eggs so a backup to this eventuality is to search the shores of Laguna Chupadero in the El Caiman area for a nest. This is an area free of Mexican crocodiles but with a stable population of breeding American adults. Only one nest will be taken for the breeding project but any nests that are found on the shores of Colorada lagoon will be taken for protection. After hatching, skin samples of the individuals and the clutch found on Colorada will be taken and sent to the University of Manzanillo to compare and see if the Colorada clutch is viable for release as there have been some cases of cross-breeding between the two crocodile species. The eggs will be hatched using the facilities currently available at the Colorada crocodile programme.

They will be kept there for the entire time before their release into the wild. They will be kept for a year to grow into juveniles that are better able to defend themselves from any predators. Then, when the individuals are deemed large enough, they will be released into the chosen lagoons and monitored as they adapt to their new habitats. Long-term studies will investigate how the population evolves and whether there is an increase in wild-breeding adults.

8. Beach Clean-ups

8.1 Summary:

Coastlines all over the world become polluted with rubbish every time the high tides recede. Whilst we cannot prevent rubbish being dumped at sea we can educate locals not to throw rubbish away on the beaches. Bits of plastic, broken bottles and other garbage are hazardous to animals and people alike without even considering the aesthetic issues of seeing beautiful beaches covered in debris. To date, volunteers and staff have collected and recycled over two tonnes of rubbish from the beaches under our supervision here in Mexico.

8.2 Aims:

- Walk the turtle beaches regularly collecting rubbish to be brought back to camp for recycling and safe disposal.
- Environmental awareness campaigns using posters, bins and school presentations to try and educate people on the damage discarded rubbish can cause.
- Weigh and record the amount of rubbish collected.

8.3 Methodology:

Using protective gloves, volunteers and staff will patrol the beaches and collect any rubbish found. The beach is split into sections and each one will be monitored in order so that the entire stretch is cleaned before we start over again. Volunteers will separate rubbish for recycling back at camp and plastics, glass and paper will be managed appropriately and taken off to recycling plants. Volunteers will help design posters and signs to be placed at strategic points along the beach where locals picnic and visit. These will be accompanied by large bins for rubbish disposal which we will empty at least once a week.

9. Mangrove Reforestation Project

9.1 Summary:

Mangrove forests are hugely important ecosystems worldwide as they form natural barriers against fierce ocean storms, crashing waves and threats of erosion. Their unique root systems provide safe nursery areas for thousands of species of fish and crustacean, and many pelagic fish species specifically migrate to mangrove forests to lay their eggs. Mangrove conservation has become a global effort and we feel that we can help here in Mexico as well.

The limiting borders of the Cuyutlan lagoon and the estuary of Palo Verde support four different species of mangrove trees and these areas are in constant contact with local residents. Areas cleared for agriculture cannot be recovered as the land is now being used for farming, and whether legal or not we cannot retake the land without backing from the authorities. However, the coastal border of the estuary and the lagoon suffers from illegal extraction whereby locals cut down the trees for firewood. Our long-term presence in the area means that we can designate certain sites for reforestation and the locals will respect our work and stay out of the area.

9.2 Aims:

- Designate reforestation sites based on accessibility and level of degradation.
- Collect germinated seeds from wild mangroves and plant in a nursery. Saplings will be transplanted back when they reach a pre-determined height.
- We must cultivate plants from all four species and, if possible, concentrate on the rare black mangrove (Avicennia germinans) as numbers have decreased drastically.

9.3 Methodology:

We will collect germinated seeds from areas of higher mangrove densities where illegal extraction has yet to have an impact. These seeds will be brought back to a nursery site and planted in seedling bags along with soil taken from the lagoon shore. The shade netting of the nursery will resemble the conditions of the wild habitats and plants will be watered and nurtured until around 50cm tall. Saplings will then be replanted into the reforestation sites, with care taken to put the plant into the ground with the soil from the seedling bags. Further research will be done on the best way to cultivate the saplings and on deciding which species should be planted where. As some of the mangrove species grow in clusters and others individually; some prefer saltier water and others fresh; we must create a map for each reforestation site dictating the location of each species within the area