

# EL EDEN ECOLOGICAL RESERVE



A Non-Governmental Protected Area

## Our mission

To develop a research model for conservation, management and restoration of biodiversity, ecosystems and ecological processes of the mesoamerican tropical rain forests.

## Our vision

To be a model of non-governmental natural protected area focused on experimental research, environmental education and technical extension that can be replicated in other tropical areas of the world.

# El Eden Ecological Reserve



## A Non-Governmental Protected Area for Research in Biodiversity Conservation and Management

**El Eden** is the first private ecological reserve devoted to biodiversity conservation and research in Mexico. It was founded in 1993 by a small group of conservationists, headed by Dr. Arturo Gomez-Pompa who invested their own resources to acquire a property in the wetlands and forests of northern Quintana Roo.

### WHY?

- 1 To identify, protect and preserve high-priority ecosystems.
- 2 To develop models and options for biodiversity management.
- 3 To provide an adequate space and infrastructure devoted to research.
- 4 To promote private participation in nature conservation by setting an example.
- 5 To establish a collaboration and supportive relationship between education and research institutions.

The operation of the facilities of El Eden is financed by contributions of its members and friends and income from the lodging activities and an incipient ecotourism project. There is a close collaboration with the University of California Riverside, and Mexican education institutions to implement a long-term collaborative research and education program in biodiversity conservation. El Eden has several on-going research projects funded by agencies such as the US National Science Foundation and the US Department of Agriculture on topics such as ecological restoration and bioprospecting. El Eden Ecological Reserve is a pilot project of the Tropical Forest Program of the Government of Mexico and is a member of the new LTER (long-term ecological research stations sponsored by NSF) research network of Mexico.







# The Site The Site

**The site** of El Eden, in the state of Quintana Roo, México, is located within the boundaries of the largest freshwater wetland of the Yucatan Peninsula, in the outstanding bioregion known as "Yalahau" (which means "where the water is born" in Mayan language) at the northeast tip of the Yucatan Peninsula. It is the most important over-wintering site for migratory birds in east Mexico. In addition to El Eden, this region includes the protected areas of Ria Lagartos, Isla Contoy and Yum Balam.

The Yalahau area contains a complete representation of all the ecosystems -more than 250 000 ha of well-preserved natural environments- and most of the biodiversity of the Yucatan Peninsula and the Caribbean -swampy and marine environments, different varieties of wetlands, mangrove swamps, savannas, coastal dunes and different types of tropical forests- an ideal condition for conservation and research activities.



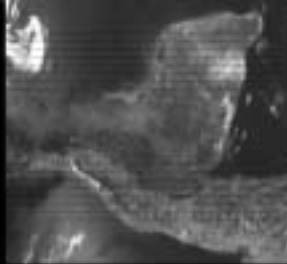
Furthermore, there are important Mayan archaeological vestiges. An archaeological survey conducted in one of the Yalahau wetlands contained within El Eden has provided evidence for a previously unreported form of ancient wetland manipulation.

This area is also of great importance due to the large number of fauna endangered species that inhabit it such as the jaguar, the puma, the ocelot, the "tigrillo" the "jaguarundi", the tapir, the ocelated turkey, the "hocofaisán", the spider monkey, the swamp crocodile, the manatee, the flamingo and the jabiru stork among others. Some endangered tree species are the "guayacán", the "chico zapote" and the "siricote"; as well as palms like the

"Kuká", the "Nakax", the "Xiat", the "Tsipil", the "Sak'kulul" and a great variety of endemic orchids.

The closeness to the city of Cancun, the most important resort area of Mexico, gives this region a great challenge for its conservation and a unique opportunity to protect it.

# Location Location



**El Eden** is located 30 miles to the NW of the City of Cancun and 15 miles to the north of the town of Leona Vicario, in the County of Lazaro Cardenas, Quintana Roo, Mexico. The Cancun-Merida highway has to be taken to reach it. It has an extension of 2,000 ha and it is located at  $21^{\circ} 13' N$  y  $87^{\circ} 11' W$  at an altitude of 5 to 10 m above sea level.

The climate is hot and humid, characterized by an extended winter/spring drought, with a wet period commencing in June or July. The average annual rainfall is about 1,400 - 2,000 mm. The yearly average temperature oscillates between 23 and  $28^{\circ} C$ . The climate is strongly coastal influenced by the Gulf of Mexico, the Caribbean Sea, and the North Atlantic.







# Ecological diversity

The area has 6 main ecosystems:

## Semideciduous tropical rain forest (10-15 meters canopy)

A highly diverse ecosystem in the non-flooded soils, with many species of primary trees, shrubs, lianas, and epiphytes. The "chicle tree" (*Manilkara achras*) is one of the dominant species.



## Secondary semideciduous forest (7-10 meters canopy)

This is the most common ecosystem in the non-flooded soils. It is a second growth vegetation originated by natural -hurricanes- or human -agriculture and forest fires- perturbation of the tropical forests.

## Seasonally inundated forest

A very interesting forest that becomes inundated 3-4 months a year. The "tinto" tree (*Haematoxylon ampechianum*) is the most abundant species in this forest.





## Palm grove

In this ecosystem endemic palm species dominate the landscape, such as the "Kukâ" (*Pseudophoenix sargentii*), the "Nakax" (*Coccothrinax readii*) and the "Xiat" (*Chamaedorea seifrizii*).



## Savanna

The reserve has the largest protected natural savanna known in Mexico. It is a grassland with many small scattered trees that becomes flooded 3-4 months a year. The dominant families are *Gramineae* and *Cyperaceae*. The most notable tree species are: the "nanche" (*Byrsonima crassifolia*), the calabash tree or "jícaro" (*Crescentia cujete*), and the tasiste palm (*Paurotis wrightii*).

## Cenote

These are small or large permanent water bodies that formed crevices and sinkholes on the rocky limestone outcrops of the region.

They form a complex network of underground crevices and tunnels with occasional windows to the outside.

These ecosystems are almost unknown and a great diversity of aquatic life exists in them: fish, crustacean, protozoa, diatoms, algae, etc.







## Wetland

This is one of the largest ecosystems in the reserve. There are many different types according to the period they are covered with water, from permanent water bodies to temporal ones.

## Fauna

Most of the fauna of this area has a neotropical origin. The great number of species that we can find is in direct relation to the diversity of aquatic and terrestrial environments that form the territory.

Moreover, the area in which el Eden is located is considered to be the most biologically diverse in the Yucatan Peninsula.



Initial inventories have revealed 127 vertebrates, among them 200 species of birds, 58 species of reptiles, amphibia and 38 mammals. These inventories include species such as the jaguar (*Panthera onca*), the swamp crocodile (*Crocodylus moreletii*) and the ocellated turkey (*Agriocharis ocellata*) as well as some species of monkeys and the "temazate" deer. It is estimated that El Eden and the surrounding area may have 80% of all vertebrates of the State of Quintana Roo. Some of them are endemic and endangered species.





# Facilities Facilities



A 20 km rustic trail road leads all the way to the reserve from the Cancun-Merida highway.



The research facilities include a field station, a 12 m height observatory tower, three lab areas, a greenhouse and permanent areas for experimental ecology studies. There are also rustic trails and permanent plots for biodiversity monitoring in the main habitats of the reserve.

A full solar-panel system supplies the research station and dormitories with energy. Funds for the lab, the greenhouse and the solar-panel system were provided by the World Wildlife Fund (WWF), the United Nations Development Program (UNDP) and the National Science Foundation (NSF).

The central hut "*La Sabana Research Station*" was built to accommodate scientists and occasional visitors with the basic facilities such as kitchen, baths, dormitories, a meeting room and a radio communication system. Four rustic "palapa-dormitories" are available for visitors and workers.



Recently, a concrete hut with 2 dormitories and 2 labs was built. -sponsored by the Procuraduría Federal de Protección al Ambiente (PROFEPA) (Office of the Judge Advocate General for Environmental Protection). The hut also serves as a hurricane shelter.

# Research programs



**Agroecology:** The main objective of this area is the development of new agricultural systems based on organic agriculture techniques, ecological science, and traditional Maya systems of food production.

**Archaeology and ecological history:** The whole area has been revealed to be an important rural settlement of the ancient Maya. We know very little about their settlements and the food production systems they used to support a large population in these apparently "infertile soils" and "unproductive ecosystems". Recent discoveries by the archaeological research team at El Eden suggests the presence of a complex system of rock alignments (dikes) in the wetlands. This is an indication that the ancient Maya were using managing methods for the wetlands.

**Biodiversity studies:** The main objective of this area of research is to study the different kinds of biological diversity of the reserve (ecological, biological, genetic and chemical) and the influence of natural and human disturbances on this diversity.

**Chemical diversity:** A survey of the diversity of secondary compounds of plants and their biological activities. This program attempts to find an entire array of new compounds with medicinal or industrial biocide potential.

**Biological Diversity:** An assessment of the biodiversity of El Eden is an ongoing project. This program attempts to do a comparative inventory of the species of a selected group of the flora -algae and vascular plants-, animals -vertebrates, mollusks, nematodes and insects, and microorganisms -fungi and myxomicetes- in different ecosystems of the reserve.

**Restoration ecology:** Tropical secondary forests are very poorly known. Their management has been mentioned as the only possibility for survival from human disturbances; however, there are no long-term projects attempting to manage and/or restore these ecosystems. This projects will set a series of enrichment planting experiments with different management approaches with the goal of finding the role of canopy density and micorrhizae to achieve the best techniques and approaches to grow native trees. Our objective is to produce a useful forest with high biological diversity.

**Landscape ecology:** This project will develop a broad ecological overview of the region and its major threats, using the most advanced technologies in computerized geographical information systems and satellite imagery.



# Work done to date



**During the** last few years, El Eden has established research projects aiming at the development of environmental services evaluation methods and secondary vegetation restoration approaches, carried out in permanent experimental plots. Restoration of tropical rainforests affected by hurricanes and fires, by enriching secondary vegetation with primary species, is a very important issue.



There are inventories of most plants, vertebrates (fish, reptiles, birds and mammals), invertebrates (mollusks and insects), fungi, mixomicetes and algae on the different ecosystems. They are available to the general public electronically at our web site.

Some of the most important studies have been published in three books:

- Gómez-Pompa, A., Allen, M.F., Fedick, S.L., Jiménez-Osornio, J.J. 2003. *The lowland Maya area: Three millenia at the human-wildland interface*. The Haworth Press, Inc. U.S.A.
- Guzmán, G. 2003. *Los hongos de El Edén, Quintana Roo: Introducción a la micobiota tropical de México*. INECOL-CONABIO. México.
- Fedick, S.L. 1996. *The managed mosaic: Ancient Maya agriculture and resource use*. University of Utah Press. U.S.A.

Researchers and students have free access to the libraries of El Eden at La Sabana Research Station, our main office in Cancun and our office in Xalapa, where most of the research papers are found.

In 2004 the University of Veracruz and El Eden Ecological Reserve, signed an agreement through which there will be financial and administrative support through the Center for Tropical Research of the University of Veracruz (CITRO).

El Eden Ecological Reserve is going through an institutional restructuring and strengthening process sponsored by the United Nations Development Program. The funding will also help to implement training activities for our staff, to promote the reserve in various conferences and to divulge our work.





# Problems to be addressed

Everybody is currently talking about environmental services, biodiversity conservation and ecological restoration, but there are very few research stations in the Mexican tropics doing long-term studies in biological conservation.

Conservation of nature in governmental protected areas, such as biosphere reserves and national parks, has been the only way to ensure some biodiversity conservation for the future. However, there are other options which complement these efforts. Private and Community Ecological reserves, are playing a very important role in conserving, managing and restoring biodiversity, outside governmental protected areas.

We know very little about how to manage protected areas for conservation and restoration of biodiversity, this should be addressed through long term experimental ecology research. We need to be free to intervene in the ecosystems to evaluate their response to change. A privately owned research area will facilitate this type of work.





# Who we are Who we are



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### **Pictures provided by:**

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**Centro de Investigaciones Tropicales**  
<http://www.uv.mx/citro/>

**El Eden Ecological Reserve:**  
[http://www.uv.mx/citro/el\\_edén/](http://www.uv.mx/citro/el_edén/)

**HabitatNet:**  
[www.sprise.com/shs/habitatnet/About.htm](http://www.sprise.com/shs/habitatnet/About.htm)

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