Project: “Atlantic Forest restoration in the buffer zone of Iguazú National Park (Misiones, Argentina)”.

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Summary

There is a present need for the restoration of the Upper Paraná Atlantic Forest, its productivity and environmental processes at landscape scale, but there is no previous experience, related to the socioeconomic and ecological characteristics of each region, available to undertake this costly task.

The **general objectives of this project are 1)** To evaluate different techniques of forest restoration so as to determine the most appropriate methods (at ecological and economical level) to be applied in the region, **2)** To develop a model for the recovery of the forest productivity based on the sustainable use of the palmito (*Euterpe edulis*- Palmae) and the yerba mate (*Ilex paraguariensis*- Aquifoliaceae). These native species represent an important economic resource for local inhabitants, **3)** By implementing 1 and 2, to restore forest surfaces in a key area for conservation, thus contributing to re-establish patches connection.

This project began to be developed at the end of 2001. During the first three years, a tree nursery was built and restoration experiments were set up in the buffer area of the Iguazú National Park (province of Misiones, Argentina). The information obtained through such experiments allows to adjust restoration techniques for forests of the area. In 2005 we will to carry out more restoration experiments using methods different from those used in the first stage, which will allow to answer key questions to implement the more efficient alternatives for the area.

Already done activities

Treatments in plantations of yerba mate (**Photos 1, 2, and 3**), cattle breeding fields (**Photos 4, 5 and 6**) and degraded forests borders (**Photos 7 and 8**), located in the buffer area of the Iguazú National Park, have been carried out to obtain information on the factors and processes which influence restoration and rehabilitation of the forest.

Explanation of the content of the pictures

Restoration of the forest in areas cultivated with yerba mate (*Ilex paraguariensis*)

The yerba mate is currently cultivated as a monoculture (“yerbales”). Formerly, this species formed dense patches within the forest, which disappeared due to their overexploitation. Therefore, the yerba mate can develop under the shade of other species.

To increase the forest surface area and the profitability of yerba mate plantations, native tree species were planted in different yerbales. The **objective** of treatments is to evaluate growth of perennial and caducous/semiperennial native species, planted in different proportions. The production of yerba will also be evaluated in each treatment.

Saplings of native tree species used in this restoration treatments was raised in a greenhouses built on a farms located in the buffer zone of the Iguazú National Park (**Photo 1**).

Saplings of 42 different native tree species was planted in monocultures of yerba mate (**Photos 2 and 3**).

Local people was train to work in different activities involved in restoration and rehabilitation of forests.

Photo 1. A tree nursery was built in a farm located in the buffer area of the Iguazú National Park. In this tree nursery the saplings of native species used in restoration treatments in monocultures of yerba mate were grown.

Photo 2: Wells for planting native species saplings within monospecific plantations of yerba mate. Saplings of 42 different native tree species was planted in monocultures of yerba mate

Photo 3: Monitoring of sapling native tree species planted in monocultures of Yerba mate after 1 year of plantation. You can see a sapling of *Parapiptadenia rigida (*1.50 m high).

Restoration of forests in abandoned cattle breeding fields

We are testing restoration designs in which we eliminated "barriers" for regeneration (compaction and pastures). In the treated parcels we have planted native species saplings). The **objectives** of these treatments are 1) To analyze how much the presence of pastures and soil compaction influence forest regeneration and to evaluate if it is really convenient (at an economic and ecological level) to eliminate them before planting, 2) To analyze the mechanisms through which these "barriers" act to limit the system regeneration.

Restoration of degraded forest borders with plantations of "yerba mate" (*I. paraguariensis*)

The borders of the forest remnants are generally invaded by native bamboo species (*Chusquea ramosissima* and *Merostachys clausenii*) or Tala (*Celtis sp),* that prevent regeneration and stressing "the border effect", mainly the tree felling.

When restoration designs are proposed, it is important to manage the borders, not only to decrease the border effect in the same patch, but also to decrease the Tala effect on the "matrix". For example, if plantations of native trees are carried out at sites adjacent to fragments, with their borders invaded by Tala, it is more probable that new plantations would be invaded by that species.

Treatments in fragment borders were installed to analyze some techniques for their management. Treatments consisted of eliminating the Tala of fragment borders and planting yerba mate saplings where the Tala was eliminated and also in the perimeter area next to it, within the forest.

The **objectives** of these treatments are 1) To evaluate the production of yerba mate in cleared sectors, 2) To evaluate the effectively of the Tala elimination method, 3) To analyze natural regeneration in this forest borders.

These treatments was re-measured in 2004. The survival of seedlings of yerba mate was high and the natural regeneration was very important in all these borders.