

Land Use and Biodiversity on Chacras in Northeast Argentina

1. Introduction

While relatively narrow longitudinally, the Central and South American portions of Latin America alone cover a broad range of latitudes and accompanying climates, from tropical in the north to polar in the south. Argentina, which is situated in the south of the South American continent, is a major agricultural producer, counting beef cattle, wheat, corn, etc. among its products, and therefore is home to many secondary natural environments such as farmland. At the same time, there are four natural World Heritage Sites in Argentina. It is a treasure chest of diverse natural features, from subtropical forests to glaciers. The present report draws upon the example of subtropical areas around Iguazú National Park, which is one of the most renowned specimens of nature in the country, and illustrates how the natural resources on areas of land owned by families is managed in a sustainable manner, resulting in the maintenance of a high degree of biodiversity.

2. Overview of the survey

(1) The natural environment of Argentina

Argentina has an area of 2,780,000 km² (placing it 2nd in Latin America and 8th in the world). It extends about 3,800 km from north to south, and has climates ranging from subtropical to polar. It is an agricultural nation, with beef cattle, wheat, corn, and soybeans among its major products. Much of the population is concentrated in the north, and conversely the south has a lower population density. Most of the country has been developed as farmland, with forests now only covering about 10 percent of the country.

(2) The natural environment of Misiones

The province of Misiones, which occupies an area of about 30,000 km², is located in the northeast of Argentina and protrudes out in a peninsular shape, flanked by the neighboring countries of Brazil to the east and Paraguay to the west. Climatically it is subtropical. In the north of the province is the country's only remaining subtropical forest (the Selva Paranaense). At about 70 percent, forest coverage is higher in Misiones than other provinces. In addition to vast untarnished natural expanses, one can also see many plantations. In the northern part of Misiones, the cultivation of yerba mate (*Ilex paguariensis*), which is used to prepare the traditional mate drink, is quite popular.

Nature reserves and other protected parkland makes up approximately a third of the province. At the northernmost point of the province are the famed Iguazú Falls. The falls and the surrounding areas are part of Iguazú National Park.

(3) Survey methods

The survey that formed the basis for this report was conducted between the 18th and 25th of November, 2009, and targeted mainly the province of Misiones, but also included Argentina's capital Buenos Aires, and the state of Paraná in Brazil. Members of the government of the Argentine Republic, the provincial government of Misiones, the town of Andresito, and people at the Argentine Natural History Museum and the Argentinean office of the Japan International Cooperation Agency (JICA), were interviewed. For field surveys, landowners and National Park officials in the Cabure-i area of Andresito, Misiones were asked about the history of farming methods and land use, as well as about issues they faced. Furthermore, visits were made to Paraná, Brazil, which has similar climatic and topographical characteristics as Andresito but little forestland and very different patterns of land use from the former. On-site surveys were performed by Ginzo Aoyama and Mitsuhiro Toda of the Japan Wildlife Research Center.

3. Survey results

(1) Chacras

A chacra refers to a farm-centered land use paradigm commonly seen in Argentina in which land is broken up into plots according to purpose that results in a kind of mosaic pattern when seen from above. A chacra is basically a piece of land owned and managed by a single family. The focus of a chacra is the family house and farmland, but chacras often have secondary forests or tree rows, plantations, natural sources of running water, etc. In its narrowest sense the word "chacra" means "farm", but it connotes not large-scale farming operations, but rather the distinctive mosaic-patterned small farms interspersed with secondary forests and other such features.

(2) The history of the development of chacras and their present status

Until around the turn of the last century, in the region around which the borders of Argentina, Brazil and Paraguay intersect, there existed a vast expansive of primeval forest called Selva Paranaense. The bulk of the primeval forest, however, was subsequently lost, becoming a victim of the pressures to develop farmland. Now only a 60,000 ha tract, located mostly in Misiones, Argentina remains. (Information from the Iguazú National Park Visitors' Center).



Landscapes of the chacra in Andresito

Incorporated in 1980, the history of Andresito, Misiones as a town is relatively recent. Chacras in Andresito were developed in the 1960's, before the incorporation of the town. The virgin forest that

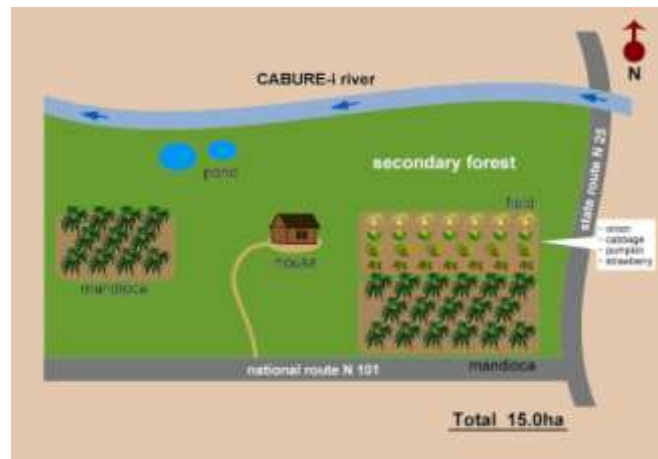
was present till then was cleared to make way for agriculture and secondary forests. There were political motives behind this development, namely, the government of the Argentine Republic encouraged the settlement of the northern part of Misiones as a way to curb the influx of illegal immigrants from Brazil and Paraguay. People were urged to settle in the area through enticements of land provided by the government, and were then encouraged to manage and monitor the land they settled on. (The above information was obtained through interviews with the mayor of Andresito).

(3) The sustainable use of land at chacras and support mechanisms thereof

1) The structure and composition of chacras

One family manages and maintains one chacra. Typically, one chacra is a nearly square-shaped area of land that has 250m on each side, consisting of about six ha and having on the property a secondary forest, farmland, a farmhouse, etc. in Misiones. Chacras in the town of Andresito are generally larger than those of other areas, with single families occupying lands of about 15 ha.

To give readers a better idea of how land is used on chacras, we shall illustrate one example of a chacra in Andresito's Cabure-i area, which was part of the current survey (Photos 1 & 2). The overall land area of this chacra is 15 ha, which is in line with the average for the town of Andresito. The farmhouse is located near farmland, and the entirety is surrounded by a secondary forest/tree-line formations. In the north part of this chacra are located a stream and ponds. This farmland yields rich harvests of mandioca plants (*Manihot esculenta*, or the cassava). Mandioca are often cultivated in savanna-type climates, and although it is not occupy a substantial spot among Argentina's agricultural products, it is commonly seen in the markets of Andresito, which is characterized by a subtropical climate. These cassavas can be harvested a mere two months after planting. Two varieties (white and black mandioca) are grown on this farm, in addition to a wide variety of produce, including citric fruits,



a map of the chacra(top) and a cross section (bottom)

strawberries, lettuce, tomatoes, and onions.

The secondary forests surrounding the fields are not used much, except occasionally as fuel. The pond at the north end of the chacra is currently not being used, but there are future plans to cultivate carp, tilapia, pacú (*Piaractus mesopotamicus*, freshwater fish in the characid family), or other fish.

2) The labor that maintains the chacras

The 15-ha chacra introduced here is managed by the landowner, who happens to be a woman. She sometimes pays residents of Andresito to work her farm. Most other chacras are managed and maintained exclusively by family members or with the help of a few outside workers.

Table 1. The biodiversity of chacras

group	example of common species	common name of Spanish
tree	<i>Enterolobium contortisiliquum</i> <i>Cecropia adenopus</i> <i>Patagonula americana</i>	Timbo Guayubira
Mammalian	<i>Cerdocyon thous</i> <i>Procyon cancrivorus</i> <i>Felis wiedii</i>	Zotto de monta Aguara Pope Gato tirica
birds	<i>Coragyps atratus</i> <i>Glaucidium brasilianum</i> <i>Pitangus sulphuratus</i>	Jote de Cabeza negra Cabure Pitogue
reptiles amphibians	<i>Bothrops neuwiedii</i> <i>Tupinambis teguixin</i> <i>Bufo paracnemis</i>	Yarara china Teyu Sapo cururu
butterfly	<i>Morpho achillaens</i> <i>Phoebis cipris</i> <i>Phoebis philea</i>	

3) The biodiversity of chacras

While they cannot compare with primeval forests, these chacras, with their diverse mosaic-like environments, do ensure a high level of biodiversity. Between farmland and secondary forests are hedge-like rows of trees that serve as excellent habitats for species of butterflies and lizards. There are secondary forests that are as tall as about 15m (though species-wise there are trees among them that can grow up to a maximum of 40m), one can observe stratified structures in these forests, consisting of overstoreys, understoreys, and shrub layers, that offer a broad spectrum of habitats. Many chacras have natural sources of water such as streams and ponds, which double as

crucial habitats for frogs, freshwater turtles, etc.

The creatures most prominent in the Cabure-i area of Andresito are listed in Table 1, according to an Iguazú National Park coordinator with detailed knowledge of the wildlife in the province of Misiones (though not all of these species of flora and fauna were observed during this field survey).

(4) Issues and new initiatives

1) Purchases by large corporations and the decline of mosaic-patterned land use

In the state of Paraná in neighboring Brazil exist vast fields dedicated to growing soybeans and soybeans alone. The town of Andresito has also begun to feel the effects of acquisitions of land by major corporations as well as the advent of the single-crop farming of yerba mate and other crops. There are concerns that chacras and their unique style of use of mosaic-patterned land may rapidly be lost. In addition to domestic Argentinean companies, foreign companies are beginning to buy up land. In order to prevent further corporate land acquisitions, it is important for landowners to gain sufficient incomes from the operation of their chacras.

2) The economic life of chacra farmers

In Andresito we see a much larger average allocation of chacra land acreage per family than the average for Misiones as a whole, a fact which has perpetuated the diversity of products grown there. In the past there were instances of illegal logging operations in Iguazú National Park and the nature preserves around it. To address this problem, projects were implemented by both JICA and the Spanish Agency for International Development Cooperation (Agencia Española de Cooperación Internacional para el Desarrollo, or AECID). The goal of these projects was to treat areas around preserves as buffer zones and improve the economic conditions of the people living in these areas, thereby eliminating illegal logging and creating good and sustainable relationships between area residents and the preserves.

The biggest issue for fostering more self-sustaining and economically independent lifestyles on the part of area residents is the development and expansion of sales routes for agricultural products deriving from chacras. A union was established in the Cabure-i area that supplies the neighboring Iguazú region, which is a major tourist spot, with processed mandioca, green leafy vegetables, and other products. The government of the Argentine Republic has also set aside a budget for federally employed rangers to consult and liaise on agricultural issues. These efforts have made it possible to achieve things through a union framework that would not have been feasible on an individual farm/family level.

Through the cultivation and processing of mandioca and green leafy vegetables not normally suited to transport over long distances, there are initiatives by the union designed to make it possible to manufacture products with added value and deliver them to Iguazú, a much-visited

point of consumption, and achieve a steady chain of distribution. The union has also invited agricultural specialists to lead seminars for farmers, teaching them about distribution mechanisms and processing methods.

3) Sustaining chacras into the future

The chacras of Misiones lie between an urban area and a nature preserve and serve as a buffer zone for both. It can also be said that these chacras are a model of a sustainable yet practical paradigm of land usage in the sense that they allow for sustained agriculture yet at the same time maintain the integrity of regional biodiversity. Furthermore, this region is relatively flat, temperate, and moist, making it ideal as farmland. In the neighboring Brazilian state of Paraná many forests have already been razed, to be replaced by immense soybean fields. During the interviews conducted for this report, some scientists predicted that the chacras of Misiones will similarly be sacrificed over a very short period of time.

In order to preserve the picturesque presence of chacras, it is necessary for farmers to remain on them and continue to manage their land by cultivating it. The most significant issue for making that happen is realizing a steady distribution of the agricultural products from chacras and the incomes they generate. In addition, it is important for landowners themselves, together with governmental bodies, researchers, etc. to recognize that chacras may be just as important as the surrounding wildlife preserves for maintaining biodiversity, and that they are of great significance in terms of their aesthetic contribution to the unique landscape of the country. Based upon this fundamental recognition, these sectors should come together to work at preserving these exquisite landscapes for future generations.