

Chapter 5: Conditions for Sustainable Use: The Case of the Chaguar (*Bromelia hieronymi*) in a Wichí Community from the Argentine Chaco

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The chaguar (*Bromelia hieronymi*) is a plant traditionally used for food and fiber by the Wichí people – hunter-gatherers of the Argentine semi-arid Chaco region. Disagreement over use, sustainability, scarcity and management of the plant exists between the Wichí and other groups, notably technicians and developers.

The most significant change for the Wichí came toward the end of the nineteenth Century when their territory was occupied by both small groups of native cattle ranchers of Spanish extraction (*criollos*) and Anglicans. As a result the Wichí people began living in small settlements or ‘missions’ which substantially modified their relationship with nature and introduced them – albeit marginally – to a market economy. Today the Wichí constitute the poorest population in Argentina.

One of these missions, Misión Chaqueña, is of particular interest. The majority of Wichí families here live off income derived from the sale of crafts that they produce. Crafts are made from Chaco hardwoods, some are made only using chaguar. To harvest the chaguar, women must travel many kilometers into the forest. Therein lies the belief, among technicians and those involved in development projects, that the chaguar is becoming increasingly scarce. An alternative, they suggest, to traveling to the chaguar, would be to cultivate the crop closer to Wichí settlements. The Wichí do not to agree. They do not believe that the chaguar is becoming increasingly scarce and therefore contest any need to cultivate the species.

Within a band or group of families, access to and use of the chaguar is free and unregulated. Only social stigma prevents its misuse or waste. Contrary to what economic theory suggests, unrestricted access neither generates any conflict nor contributes to increased scarcity. Sustainability is put at risk only by ‘macro’ factors, such as a mistaken land tenure policies and ecosystem degradation.

One question raised centers on the demand for chaguar that is limited by the prevailing traditional technology. Harvesting and utilizing chaguar is extremely labor-intensive and increases the cost of the end products. What appears to be adaptive for the conservation of the plant is in fact detrimental to the Wichí. They receive only a negligible income for their work and experience great difficulty selling their products. This puts into question the concept of sustainability as it is usually understood. This concept implies both the permanence of the resource and the equitable distribution of the benefits derived from its use.

Both conclusions exemplify the differing views of technicians and of the Wichí regarding the abundance of the chaguar and the need for a local solution that might entail cultivation of this plant. The Wichí, quite correctly, stress issues related to land tenure and trade of their crafts as the most important aspects that prevent them from living a life of dignity as their ancestors did.

Finally, analysis of the factors – supply, demand and sustainability – reveals a remarkable degree of variability and uncertainty. The fate of the Wichí is particularly uncertain. They are a people in transition, who have had, since the arrival of the white man great difficulty adapting to permanent and sudden changes. They are unsure of their ability to adapt to an evolving society and to make use of a market economy. Resisting change is the only way they know how to maintain their cultural identity.

¹ The author would like to thank Jorge Morello, Jorge Rabinovich and Eduardo Fernandez. Special thanks go to Luis de la Cruz and Marilyn Hoskins for their invaluable and detailed revisions.

1. Introduction

The fiber of the chaguar (*Bromelia hieronymi*) – a non-woody forest plant found throughout the semi-arid Chaco region – has been used since time immemorial by the Wichí people to produce numerous objects for domestic use. *Wichíthlamtés*, the language of these hunter-gathers, and the chaguar plant make up a central part of their cultural identity.

Towards the end of the nineteenth Century the white man began occupying Wichí territory and introduced extensive cattle ranching and logging. Before fifty years had passed, both activities had degraded the ecosystem and displaced the Wichí to small settlements. Although the Wichí who lived in the settlements were protected by the Anglican Church, they nonetheless became precarious occupants on land that had always been theirs, but to which they now had no rights. Misión Chaqueña is one such settlement, one of the largest and most prosperous because most of its occupants live off the profits derived from the sale of crafts they produce. These crafts are mostly made of Chaco hardwoods but also of chaguar fibers.

Chaguar – like most other natural resources, such as fresh water fish, animals and forest fruit – is a resource to which the Wichí have free access within a territory controlled by a band or group. Wichí society has developed a complex relationship with nature. Their special economy of non-accumulation has been the backbone of sustainable and equitable use of these resources throughout the centuries. Degradation, contrary to what environmental economists maintain, occurs when property rights are established.

The present case study is an attempt to determine if the current use of the chaguar in Misión Chaqueña is sustainable. An historic, interdisciplinary analysis was undertaken to identify several factors: Those affecting its availability, supply, demand and those constituting the basis for non-regulation on its access and use.

It is important to point out that this is not a case of successful (or unsuccessful) sustainable management of a natural resource, nor is there any program or project – public or private – to aid the Wichí in such management, save for some timid (and not very successful) attempts to domesticate the plant. The use of the chaguar has not been the object of any particular legislation or complex regulation, nor does it generate conflict (despite it being a resource to which there is open access). The species is neither on the verge of extinction, nor key to the dynamics of the ecosystem. The situation, however, appears to be paradigmatic, because it allows us to visualize how the interplay of external (macro) and internal (local) factors defines the sustainable use of an ecosystem or a resource, and how these factors are revealed only in an historical environmental perspective.

The chaguar has been the object of many botanical studies. Its gathering and processing has also received much attention from anthropologists. We know little, however, about the ecological importance of what can be referred to as the ‘chaguar economy’. Studies on chaguar – its relative scarcity or abundance, its management, productivity, *etc.*, – will be important in the future, given how important the plant is to the Wichí and other populations in the Chaco.

Misión Chaqueña is well known for its wood crafts but not so for its chaguar crafts. The communities situated near the Pilcomayo River, to the north, or in the Province of Formosa, to the northeast, produce higher-quality chaguar objects. This study was undertaken in Misión Chaqueña, however, because it is a community in transition, where the identity of the Wichí coexists with an intense interaction with the market (*i.e.*, through the sale of crafts). The future of the majority of the Wichí and the web of sustainability are more complex and less linear here.

Special emphasis has been put on describing and analyzing the context of both the ecosystem and the socio-cultural characteristics of the Wichí in general and Misión Chaqueña in particular, its economy and its relationship with nature. Matters related to free access and sustainability are addressed in section five, and a summary of how these factors influence the supply, demand, control and access to chaguar are addressed in

section six. A summary of the main conclusions of the study can be found in section seven. Appendices include a short description of a domestication experiment of the chaguar, testimonies from some Wichí regarding the ‘owner of the chaguar’ (a mythical figure who punishes those who waste or misuse the resource) and an attempt to apply the economic valuation methodology of natural resources to the chaguar.

We would like to give special thanks to all those who provided us with information at Misión Chaqueña and three other Wichí communities (Carboncito, La Golondrina and La Paloma) and also to Juan Godoy, Alejandro Dean, Zully de Abila, Osvaldo López and Verónica van Olphen from Fundapaz, a non-governmental organization (NGO) in Embarcación.

2. The Chaco of the Salta Region

Although no records exist that detail the arrival of the first Chaco ethnic groups from the upper Amazon to the central-western Chaco, we know that at the time of the Spanish conquest the territory was already inhabited by groups of hunters, fishermen and gatherers that belonged to two main linguistic groups: The Mataco-mataguayo and the Guaycurú. These were semi-nomadic groups that fished in littoral areas and hunted and gathered inland, especially during the rainy season. Agriculture was a marginal activity for them.

The first military campaigns in this area began around 1859 and consisted of attempts to annihilate the ‘indomitable Indian’ population. As of 1870, the campaigns were intended to subjugate it and gain control of the land, and – even more important – to use the indigenous people as cheap labor for the large farms (*estancias*) in Salta and Jujuy, and later in the sugar mills (Iñigo Carrera 1997:54).

Military campaigns continued during the last decades of the nineteenth and the first decade of the twentieth Centuries (the last campaign took place in 1911). A series of forts were built to mark the white man’s new ‘frontier’. The arrival of the first peasants, most if not all of whom were small farmers from southern Salta and northern Santiago del Estero in search of new pasture for their cattle, occurred under military protection. Farmers were able to acquire land with no resistance from the indigenous population. Such improvised colonization would give way to the process of converting the Chaco to range land that within a period of fifty years clearly produced the environmental degradation so obvious today. Cattle farmers occupied and became owners of Indian territory, expelling the native people and displacing them into marginal areas or ‘reserves.’ Limiting Indian mobility and drastically reducing the territory available to them for hunting and gathering intensified pressure on the environment. The balanced relationship the Indians had enjoyed with nature disappeared.

Free-range, uncontrolled grazing in forested areas was one of the main causes of environmental degradation: The progressive elimination of the herbaceous layer from overgrazing led to grazing of secondary tree growth and interrupted the natural reproductive cycle of the forest. Overgrazing also led to the growth of the spiny bush layer. Once the soil had been stripped of its herbaceous cover and compacted by cattle, tree cover disappeared and large bald areas appeared that gave way to the quasi-desert Chaco landscape we are so familiar with today.

The occupation and privatization of large areas of the Chaco in the Salta region mainly for cattle ranching led to fence construction that restricted the free movement of a population that had always migrated continuously in search of fruit, fish and forest animals. During these last decades, fencing was used increasingly by the cattle farmers to arbitrarily mark the borders of land to which they had no property rights and where their cattle grazed or watered. Fences limited the free access and use of resources historically used by the native population and exacerbated the conflict between the native and the cattle farmer populations.

Hunting, fishing and gathering on the one hand and cattle ranching on the other are two irreconcilable activities at the heart of what is a permanent conflict.

In the semi-arid Chaco, forestry activities started when the cattle ranching economy fell into a crisis. Both activities heavily degraded the landscape. Initially, demand for quebracho ties for railway track construction drove the logging industry, later the demand was for tannin from the red quebracho and hardwood, rot-resistant posts for fencing the estancias in the Pampas and charcoal throughout the Chaco.

If the spread of cattle ranching in the Chaco is the main reason for its environmental degradation and is the activity that has most shaped, and continues to shape, the landscape of this region, the irrational extraction of its best tree specimens is clearly another significant factor contributing to its deterioration and that increases the onset of desertification.

2.1. The Chaco

The Chaco ecosystem is second only to the Amazon in terms of surface area and the most important dry forest on the South American continent. Covering more than one million square kilometers, almost 50 percent (55 million hectares) lies in Argentina and the remainder across Paraguay (35 million), Bolivia (16 million) and Brazil (8 million).

The Argentine Chaco can be divided in three large regions according to rainfall. To the southwest lies the arid Chaco, comprising approximately 8 million hectares with a rainfall that varies from 300 to 500mm per year. To the east is the humid or semi-humid Chaco, comprising approximately 16 million hectares, with an annual rainfall of 750 to 1200mm. To the north and west is the semi-arid Chaco, comprising an area of approximately 31 million hectares, with an annual rainfall of 500 to 750mm per year, considered the most characteristic of the Chaco (Karlin 1994).

The Chaco salteño² is a strip of land located between 60° and 62° latitude to the West. It is 220 kilometers wide and covers 6 million hectares, almost one-third of which (1,455,000 hectares) is fiscal land belonging to the province (Trinchero 1997:118). The Chaco salteño represents 40 percent of the provincial territory yet has a population of some 40,000 (4.8 percent of the total population) – a population density of 0.66 inhabitants per square kilometer.

Available literature cites very different numbers regarding the number of native Indians in Argentina. Rodríguez and Buliuvacich (1997) mention the existence of 446,000 of which 170,000 are Kollas. The Chaco ethnic groups (Wichí, Toba, Pilagá, Mocoví, Chorote and Chulupi) number 152,300, of which 80,000 are Wichí that live in the provinces of Chaco, Salta and Formosa.

Other social groups that live in the Chaco salteño and have an interest in it include:

- Owners of medium-sized and large farms, most of whom are absentee landlords that make use, through third parties, of only a small portion of their land. Others engage in a variety of activities, mostly extensive or free-range cattle ranching in forested areas, wood milling and charcoal production.

²This term refers to the chaco area of the Province of Salta. Salta is one of the poorest provinces in Argentina. According to the Human Development Index, the province is located in 18th place (from a total of 23 provinces), with an index of 0.836, below the national average (0.884). The privation index of Salta (0.164) is double that of Buenos Aires, the capital (Senate of Argentina 1997:183). In Salta, the indigenous population is the poorest population. In 1983, according to the Indian Population Census, 39.5% of the native Indian population in Salta were illiterate. In terms of malnutrition, although, no official numbers are available, a study undertaken by researchers from the Universidad Nacional of Salta in 1994 in two wich communities (one rural and the other on the outskirts of small town) indicated that 100% of the families were calcium deficient, followed by a deficiency in riboflavins, calories, thiamine, niacine, iron and vitamin A. Eighty per cent of the families were protein deficient. The situation is aggravated by the fact that all families with insufficient and normal protein levels also showed calorie deficiencies, which caused the proteins to be used as a source of energy, instead of being used to form tissue (Couceiro de Cadena, 1995).

- Outside investors. During the last several years players from outside the region have begun buying land at relatively low prices, and making large investments, especially in irrigation, for a variety of production enterprises (cotton cultivation, feed-lots, charcoal production for export, *etc.*).

The Chaco is a great plain traversed by erratic rivers. As Morello and Adamoli (1968) note, topographically it is part of the great Chaco-pampas grasslands – a vast grassland region with a minimal slope of no more than 0.02% (a decrease in altitude of 200 meters along a length of 1,000 kilometers). The Chaco has frequently been described as a ‘mosaic landscape’ throughout which forest and grasslands alternate. This mosaic landscape, however, is more characteristic of the more humid areas of the Chaco, and less so of the semi-arid Chaco.

Rains occur mainly from December to February with a long nine-month period of drought. But what characterizes the rainfall in the Chaco region is its year to year irregularity. The strong irregularity in rainfall from year to year – very dry years followed by very wet years – is the main factor of uncertainty for any agricultural enterprise.

The main ecological problems of the Chaco are: Overgrazing, deforestation, diminished vegetative growth, erosion and desertification. Overgrazing is caused by extensive cattle ranching by the cattle farmer/landowners. This interrupts the reproductive cycle of the forest as the secondary growth is grazed, leaving bare and compacted soil. Deforestation, specifically the extraction of the best specimens of hardwood trees, that also contributes to genetic impoverishment of the forest, along with overgrazing contribute to a third problem: The absence of vegetation exposes soils to enormous levels of caloric energy and aggravated evapotranspiration. Water is limited and causes nitrogen and carbon volatilization (organic matter is, in fact, ‘burnt’). Erosion is caused by torrential rains and floods (such as those that presently afflict the Argentine northeast and pampa region) in areas with low forest cover, and the resultant salinization caused by the drying. Finally, desertification, caused by the loss of the tree layer and degradation of the herbaceous layer, leaves a denuded and compacted soil, where bushes start to predominate. The area becomes a *fachinal* (a shrubby layer) and is very difficult to restore.

The Chaco forest does not have the multi-layered structure of a tropical rain forest. However, Sachtler (1977) notes that up to four layers can be differentiated in the original forest:

1. A herbaceous and grassy layer that creates a complete, but not very dense cover, and where chaguar is found.
2. A shrubby layer (*fachinal*) that can grow to 5m in height and which generally covers the surface.
3. A tree layer of secondary species such as the mistol, chañar, algarrobo, guayacan and the quebrachos, 6-8m high that sometimes reaches 10m in height. (Algarrobal, mistol and chañar make up the basic diet of the Indian population).
4. An upper tree layer comprising species such as the white and red quebracho. Trees in this layer can reach 12 to 20m in height.

In terms of biodiversity, the chaqueño forest, like any dry forest, cannot be compared to the forests of the humid tropics. Chaco flora and fauna, however, have been sufficient to shelter, feed, clothe and cure an important group of Indian communities for centuries.

Diana Díaz (1995^a) estimates that the forest surface of the Argentine Chaco has decreased by 54 per cent since 1900. When the forest was altered – by introduced cattle or other exploitative activities – the shrubby layer became dominant, growing at the expense of both the lower layer, which provided forage, and the upper layer, which produced the tall biomass.

The salteño forest, like the rest of the Chaco, has been exploited as though it were a non-renewable natural resource with two or three species of commercial value (basically the quebrachos and the palo santo) being extracted yet processed into products of very low added value *e.g.*, firewood, charcoal, fence posts, railway ties, boards for wagon floors, pallets and stakes (Saravia Toledo 1994^a).

2.2. The Wichí, their Relationship with Nature and their Economy³

The Wichí are the most important ethnic group in the Argentine Chaco and the Chaco salteño. Although the data are not reliable, it is estimated that there are some 80,000 Wichí in Argentina, of which 15,000 inhabit the province of Salta. The Wichí, like other ethnic groups of the Chaco, are – in terms of unsatisfied basic needs and the privation index – the poorest population in Argentina.

Historically, the greatest social organization among the Wichí was the tribe, which coincided with great linguistic units or dialects. Each tribe is made up of a variable number of bands or population units based on degree on parental relationship. The bands are therefore an alliance of extended families, likewise integrated by several nuclear families. The extended family shares the same habitat and, in accordance with the semi-nomadic settlement model that characterizes hunter-gatherers moves seasonally throughout their territory in search of food and water.

It is also at the extended family level that “*decision-making takes place, authority is delegated, and goods are redistributed*” (De la Cruz 1997). The figure of the *cacique* or Indian chief appears in the nineteenth Century in response to the need to interact with the white man and, later, with institutions. Western forms of organization have developed in areas where the church and other institutions have a strong influence – such as the *Centro Vecinal* or *Asociación Civil* of the Misión Chaqueña – though little is known of the value and degree of representation of such organizations.

Historically each band had its own territory⁴ that other bands respected except when the territory was either contested or coveted. Disputes sometimes led to conflict and the formation of new band boundaries. Within each established territory, however, each family and individual of the group had access to any place or resource.⁵ “*Only after hunting or gathering did the resource become the property of the hunter or gatherer that acquired the animal or plant*” (von Bremen s/f:150).

Until the middle of the nineteenth Century, the Wichí lived as hunter-gatherers and fishermen. Consequently, they went where the flora and fauna happened to be. During the rainy season they moved within the forest and during the dry season they fished on the rivers. Agriculture was always a secondary, even marginal, activity. After the arrival of the white man and the cattle farmers, the Wichí economy included salaried work. Individuals worked at certain times of the year on sugar plantations and later at sawmills. During the 1960s they began working on bean and horticultural farms. By the 1990s, however, salaried work grew scarce and their poverty more acute.

This coexistence of economies lasted well enough for a long time. The Wichí took salaried work when it was available and reverted to their traditional activities when it was not. This was consistent with sugar cane harvesting and the operation of sugar mills. “[*It*] ensured that they [*the Wichí*] remain[ed] in the area and put the onus on them to seek their own living during the off season” (Rutledge 1987). It also allowed them to maintain both their traditional link to the land and their skills as hunter-gatherers. But this model of “*inclusion-exclusion of the Indian communities within the dynamics of capital accumulation*” (Trincherro 1995) explains the perceived sense of disenfranchisement of the Wichí. By not being fully engaged in a market economy they

³ This section is based mostly on the work of Luis de la Cruz (1997).

⁴ The Wichí are not nomads but rather semi-nomads. ‘Nomad’ is an anthropological term used to refer to pastoral groups, not to hunters or gatherers. These have traditional areas they occupy, and within them routes or circuits. The ‘supply’ from nature defines the movement, that is, the seasonal occupation of territories.

⁵ Except for the product from the agricultural plot (*cerco*) that will be used by the person who sowed it. The plot ceases to belong to him once the crop has been harvested.

were unable to afford the many goods to which, as a result of their partial coexistence with the white man, they had become accustomed.

To understand the particular Wichí economy, and its basis of distribution rather than accumulation of goods, we must consider other elements of Wichí cosmic vision and their relationship with nature. One is the supreme value of maintaining a harmonious relationship with others, which entails a sense of equality and which is a priority among individuals and families. Another is the ‘minimalist culture’ that characterizes the Wichí. For the Wichí, making use of the environment does not, should not, result in its transformation. Instead, it means using what the environment offers seasonally and making use of the available resources without altering the environment. *“The environment, what is provided, is not transformed, it is there.”* (De la Cruz 1997). Thus production is not important to the Wichí – production is performed by nature. De la Cruz also refers to the *modest pattern of sufficiency*: In spite of the abundance in the environment, consumption is always frugal, even austere, and is in line with what is ‘naturally available.’

However, equal access to resources does not guarantee equal returns. To avoid inequities that result from unequal abilities, luck, strength and so forth among individuals it is necessary to avoid accumulation and promote an economy of redistribution (Regher 1985).

Sensing and knowing this, the Wichí people neither hoard nor accumulate.⁶ They only extract what is necessary for a given day or for the following few days. The counterpart of such an economy is one in which one group accumulates and distributes among those who do not accumulate. The fisherman or the hunter, for example, distributes his catch among other families. Personal power and prestige are upheld by the ability to distribute. *“The person who accumulates constitutes a threat to equanimity, which is the basis of all the knowledge and sociopolitical life of the group. The failure to distribute is inconceivable, because it implies an absolute social isolation, as well as creating a weak personality because there is a lack of trust in the person’s own strength and relationship with the owners to live...”* (De la Cruz 1997:94). Austerity, distribution and day-to-day existence are three dimensions of a same cosmovision, *“...a clear expression of the individual and the group confidence when faced with future adversity...”* (:94).

In this regard, while the resources of the forest and the river were relatively abundant until 1930 or perhaps as late as the 1950. This pattern of austerity or sufficiency that De la Cruz refers to did not generate any unbalance. To the contrary, *“...rather than lack, the productive systems of the Wichí reflected opulence and much free time.”* (1997:97). The latter was often perceived by the white man as laziness.

Free access by all members of the group to forest fruit and animals, as well as to fish in the river, is therefore based on several factors:

- Given that the distribution of goods is more important than production, the person who hunts or gathers those goods is not important.
- Gathering, hunting or fishing takes place only to satisfy daily needs or needs of the following few days⁷.
- Frugality in regard to consumption ensures that free access will not translate into excessive extraction.
- The perception of an abundance of resources in a context of low population density.

Certain taboos and societal norms evolved to avoid excess, and especially the misuse or waste of a resource. Among the Wichí, for example, the ‘owners’ or the ‘keepers’ of the resources are vested with the authority to grant, on specific request, permission to hunt or fish. They also have the authority to punish those who extract more than is necessary or who do not share.

⁶ De la Cruz makes a distinction between *accumulation* and *storage*: Accumulation is the appropriation by a social sector of the left-over product that does not necessarily cover human needs, whereas storage is the conservation of the left-over product that will be socially distributed.

⁷ This, in addition to avoiding the accumulation and hoarding, avoids laziness among a few who would live of the work of those who gather or hunt.

De la Cruz points out that there is a head owner who governs the river world and another who governs the forest world and owners of animals within it (1997:91). Our field research also reveals the existence of an owner of the chaguar (see Appendix A), subordinate to nature's *pachamama*,⁸ a type of mythical figure who punishes those who waste the chaguar.

These factors are important because they allows us to understand why there is no concept among the Wichí of land ownership⁹ nor of ownership of natural resources. In fact it is not that the resources do not have an owner, but instead a particular concept of property of a good, given that implicit in the mandate is the obligation to share, to distribute. No one can be stingy with a good, neither the owner of the forest, nor the Wichí that collect the fruit. Likewise, the person who is not the owner can ask for a share of that good. Thus goods, with few exceptions,¹⁰ are freely accessible.

All this perhaps explains why the Wichí do not invest particular effort in cultivating nor in any activity that bears medium- or long-term results.

3. Misión Chaqueña

Misión Chaqueña is a small settlement in the Chaco salteño. It is situated 45 kilometers along a good dirt road from Embarcación, a small city in an area of Salta where soy, beans, cotton and vegetables are cultivated and where agricultural expansion is more promising. Annual rainfall in Embarcación is approximately 900mm, while in Misión Chaqueña it is about 600mm, precluding agriculture without irrigation.

Misión Chaqueña has some 1,500 inhabitants and since 1995 has held the legal property title to the land there, more than 900 hectares that belongs to the community. It has had both electricity and running water for some years, and now has a school with 400 registered students (Márquez 1999). These characteristics make it a very unusual community¹¹ among the Wichí who, elsewhere in the province, tend to live in much smaller communities (rarely exceeding 200 people), where they are 'foreign' occupiers and lack fundamental amenities (light, water, *etc.*). The particular history of Misión Chaqueña and its neighboring communities of Carboncito and Salim cannot be understood without reference to the Anglican Church.

Religious presence in the Chaco salteño dates back to the sixteenth Century, its objective always having been to pacify and evangelize Chaco tribes. The first to occupy the area were the Jesuits, then the Franciscans and, at the beginning of the twentieth Century, numerous congregations and sects. None of these, however, have been more influential than the Anglican Church.

The arrival of the Anglican church was supported by one of the sugar mills – La Esperanza – and British capital. Land was donated to the South American Missionary Association so that they could found their first mission, Misión Chaqueña (Gordillo 1995:113, Wright 1983). Other sugar refineries supported the Anglican work in

⁸ It is interesting to note that the use of this term shows the cultural influence of the Andean world on the Wichí (the *pachamama* is considered the worshipped mother earth for the Andean people).

⁹ This lack is, among other reasons, what has allowed them to be so easily stripped of their land, a process that is still occurring in the province of Salta, and which continues to be denounced by many human rights and Indian organizations (Survival International, IWGIA, *etc.*): There is even a complaint against the Government of Salta before the Interamerican Court of Human Rights in Washington D.C. The Wichí, until recently, could not understand that the white man claimed to be the owner of the land.

¹⁰ De la Cruz (1997) points out that 'habitable' goods (a house, for example) belong to a family group. The agricultural plot or *cerco* could also fall into this category, although Regher (1985:22) points out that with the arrival of the harvest, the wife of the owner invites "all the women's relatives to harvest and to take as much as they like."

¹¹ Marquez (1999) points out that the term 'community' should not be used for Misión Chaqueña but rather the term 'locality'. Recent migration of its members, the fact that they come from different areas, the absence of traditional forms of organization and the weakening of the distribution economy that characterizes the Wichí may support this idea. What is certain is that the land ownership is communal, but the land in Misión Chaqueña is very degraded and does not seem to play an important role in the economy of its inhabitants.

subsequent years. Some writers, for example Trincheros (1997:130), have pointed out that the objective was to pacify, discipline and concentrate Wichí communities in settlements, which would in essence create a worker population for the sugar mills.

The Anglicans initiated a large scale evangelizing effort, which included their learning the languages of the Chaco (in some cases translating the New Testament in to them) and educating native pastors. According to Metraux, “[t]he Anglican evangelization marks the beginning of a new and transcendental stage for the native groups in the region. The majority of these groups gave up their semi-nomadic life and settled around missions where they set up elementary schools, sanitary outposts and carpentry shops” (1933, cited by Gordillo 1995). Every year, the Wichí migrated to the sugar harvest, returning to the mission to take up their carpentry tasks. Together with evangelization, the other early concerns of the Anglicans were education and health; the missionary took on the task of “preacher, teacher, doctor, translator, policeman and judge” (Wright 1983, citing Leake 1967).

Towards the end of the 1960s the Anglican Church made its first attempts at agriculture. New faith in development had spread worldwide, the sugar mills had not provided work for the Wichí for several years, the resources derived from gathering, hunting and fishing no longer were what they used to be and there was great famine in the area. In the missions the Anglicans initiated small agricultural projects with self-sufficiency in mind. An attempt was made to extend the traditional mini plots (*cercos*) of the Wichí with irrigation and fencing. But at the beginning of the 1970s, these modest endeavors became large-scale agricultural projects. It was then necessary to bring in Wichí from distant areas (San Patricio, 150 kilometers away and Juárez, 200 kilometers away, for example) and create new settlements consisting of agricultural ‘development centers’. Census data indicates that between 1970 and 1980, the population of Misión Chaqueña grew by 83%. The purpose was to introduce the Wichí to mechanized modern agriculture once-and-for-all, generating conditions for an economic base from which they could generate their own development (Cristóbal Wallis, personal communication) and abandon hunting and gathering. The Anglicans bought land, fenced communal lots, supplied tractors, water pumps and an irrigation system, and started to cultivate peppers, tomato, green beans, squash, onions and alfalfa for selling at markets. Saw mills and carpentry shops were built. But there were many technical and marketing problems: Salty water, high temperatures, excessive solar radiation, low prices, marketing problems and little enthusiasm on the part of the Wichí. The 1982 Malvinas/Falklands war substantially impacted on the projects and though many of the Wichí returned after the war, not all did.

This policy of concentrating the Wichí population in settlements or communities survived the projects. Even among those who returned to their original riverbank or forest settlements maintained the practice of living in groups. The attempt to convert the Wichí into farming peasants, however, failed.

In 1993 the Anglican church returned to the area. In 1995 they transferred the land they had acquired some twenty-odd years earlier to the local Asociación Vecinal Misión Chaqueña ‘El Algarrobal’. Meanwhile, however, life at Misión Chaqueña had substantially changed after 1984. With the help of an Anglican layman who had stayed in the area, the entire town was now dedicated to craft production, primarily small objects made of Chaco hardwoods, such as palo santo, algarrobo and guayacán. Many of these – small animals, spoons, bowls, crucifixes, *etc.*, – were exported. Today virtually all of the townspeople are dedicated to making crafts. Production of these hardwood crafts is primarily an activity for the men. The women and children assist with supplementary tasks such as filing and polishing. The women’s main activity is creating objects from chaguar, though these have neither the quality nor the importance of similar objects produced in other areas of the Chaco such as Pilcomayo and Juárez, for example.

The Misión Chaqueña Wichí also harvest beans and are involved in other activities on horticultural farms. Few have left the area. Some are dedicated as before to hunting, gathering and fishing. Others, however, continue to conserve their small plot of land where they cultivate mostly different types of squash. Because of its history and present situation, Misión Chaqueña is clearly a community in significant transition, where the traditional

relationship with nature has changed, where sustainability depends on a few factors only, none of which are controlled by the Wichí.

In 1999, within the framework of a program financed in part by an oil company through the provincial government, a decision was reached to sow a hectare of chaguar in Misión Chaqueña. The idea was prompted by the lukewarm enthusiasm the women showed towards a horticulture project, for which they said they had little time because they had to dedicate their time to making objects of chaguar, for which they needed to travel 10 to 15 kilometers into the forest once every 10 to 15 days to harvest the plants. The idea was that the women might benefit from having chaguar closer to their houses. Appendix B details the project and provides some of the reasons why the results have been poor to date.

4. The Chaguar¹²

The term chaguar is of Quechua origin. It describes a group of six edible bromeliads native to the Chaco that also provide fiber for textiles. Where the Guaraní have had an influence, the plants are called *caraguatá*. The chaguar is a plant commonly found in the undergrowth and the vegetation cover of the Chaco, and is important for soil conservation of this fragile ecosystem as it helps to combat desertification.

Storytellers, travelers and anthropologists have given much attention to the chaguar because of the importance it has for various dimensions of life among Chaco ethnic groups. Other than its use for food¹³, which is slowly being lost, the chaguar is used to make fishing nets, bags, string, ropes, hammocks, mats, covers and clothing (loincloths and leg protectors to be used whilst fishing). Better known are the vests that warriors used to wear in earlier centuries which, allegedly, could not be penetrated by arrows. After the Andeans, the Chaco people have the richest weaving tradition in South America (Pastor Arenas 1997).

Pastor Arenas points out that among the six species of Bromeliads, only three – *Deinacanthon urbanianum*, *Bromelia hieronymi* and *Pseudananas sagenarius* – are used to make textiles.¹⁴ Although difficult to distinguish in the vegetative state, and even when they are in fruit, the species used in Misión Chaqueña has been identified as *Bromelia hieronymi*.¹⁵

Chaguar textiles have been identified across almost the entire Argentine, Paraguayan, and Bolivian Chaco. They are used by all ethnic chaqueño groups – Ayoreo, Chorote, Chulupí and Wichí, though less so among the Pilagá and Toba. They are not used, however, by the white population and the cattle farmers. In fact, cattle farmers, who engage in cattle ranching, consider the chaguar a pest both because it shelters snakes and because the cattle, in avoiding its needles, will not graze near it.

In the 1940s, in both Argentina and Paraguay, several industries developed to extract chaguar fiber to make rope and sacking and which could be used as a substitute for yute, cáñamo and linen. The leaves contain a large quantity of good quality fiber. But, in spite of this, for technical and price-related reasons, these industries soon closed (Luna Ercilla, cited by Pastor Arenas 1997).

¹² For this section we mostly referred to the work of Pastor Arenas (1988, 1992, 1995, 1997) on the chaguar.

¹³ The rosette or bulb of the plant is eaten. The chaguar is stacked and burnt until the edible part is well cooked. Then it is cut and ground, making a type of flour that is converted into 'bread'. The seeds and stolons are also eaten. In Misión Chaqueña the elders remember it being nutritious food, especially in times of scarcity, but the younger people do not seem to have tried it.

¹⁴ Studies completed in the 1940s show that a fourth species, *Bromelia serra*, was the most apt for industry.

¹⁵ In Misión Chaqueña the Wichí are familiar with two species, a dwarf chaguar, called *oletzaj* or *aletzaj*, the scientific name of which is *Deinacanthon urbanianum*, according to Martínez Crovetto, cited by Pastor Arenas (1997) and a medium-sized chaguar, called *chitzaj* or *chutzej*, that, according to Crovetto is *Bromelia hieronymi*. The first allows for much finer work, is more resistant to water and is of better quality, but requires much more work and is not abundant in the area. *B. hieronymi* has longer leaves, and is abundant.

The production of chaguar textiles is clearly an activity for women¹⁶. In earlier times men would use chaguar fiber to make fishing nets and rope, and even now, some harvest the chaguar for their wives. Women travel into the forest in small groups to harvest the chaguar, they separate its fibers, spin it, dye it and knit it. They also sell their products and use the income freely. In Misión Chaqueña, girls learn several harvesting techniques, spinning and knitting when they are 10 to 12 years old. Historically, Wichí women worked on the chaguar only during menstruation, when they were obliged to stay in their houses (with Luis De la Cruz, personal communication).

But, the production of chaguar objects for domestic use, or for fishing, hunting and gathering, an activity that took up only a few days a month, evolved into the production of crafts¹⁷ used by the urban middle class. The objects produced became merchandise.

The chaguar is an invasive plant. It reproduces by stolons. It grows in the forest and in semi-shade and as it reproduces it forms colonies of different ages and sizes known as *chaguarales*.

To harvest the plant the women travel in groups for as much as two days. They camp close to the *chaguarales* until they have harvested sufficient quantities of chaguar for 10 to 15 days of work; perhaps some thirty plants.¹⁸ From each *chaguaral* they harvest only those plants that have the correct size and quality.

To determine whether a plant is good, they pick a leaf, separate its fibers and stretch them to gauge the resistance to tension. With a stick or machete they loosen the plant from the soil and leverage it out of the ground. The longest leaves that are in good condition are chosen, the needles are removed and the leaves are peeled to separate the outside layers from the fiber. The fiber is removed. The shorter leaves and the rest of the plant are left, however, after having undergone such treatment the chaguar plant dies.

Grinding the fiber with a piece of metal, scraping it with a sharp object and soaking it in water once and again allows the women to remove the *parenchyma* completely from the fiber. If this is not done correctly, they inevitably hurt their hands when spinning. The fiber is then left to dry in the sun for a day or two until it becomes white. Spinning is done by joining several fibers and twisting them with a rapid movement of the hands on the thigh that has been covered with ash from a carbonized stone which softens the fiber. The fibers are then dyed using several colors (black, gray and red are the most common) extracted from forest plants. Finally, using a needle, the fiber is knitted.

The quality of the knitting varies a great deal, depending on whether the final product is for personal use or is to be sold. The Wichí believe that buyers cannot distinguish a good quality *yica* (small bag) from a bad one and are not willing to pay a just price for a good one. Thus the *yicas* that are put on the market – made of a thicker fiber and more ‘loosely’ knitted (less dense) – take less time to make and use less material.

The chaguar economy is kept entirely within the family. Although the women go into the forest together, each gathers only material she herself needs before returning to spin and knit with the help of other female family members, sometimes in the company of neighbors and friends (von Koschitzky 1992).

In general, the chaguar is not harvested in the dry season (April to November) because the leaves have withered, separation of the fibers is more difficult and the fibers break easily. When the *yicas* became a saleable craft product, and as the market demand for them grew, this problem was solved by soaking the leaves in water (Pastor Arenas 1995).

¹⁶ Wichí women have no other possibility of generating income. In the extreme poverty they are in, the \$20 or \$30 they may generate from their merchandise are vital to alleviate child malnutrition.

¹⁷ Initially they sold only *yicas* (small bags) that the middle-class urban youth used instead of purses, but, little by little, they became diversified and today they knit curtains, belts, jackets, hot pads and other similar objects. Increasingly we find small pieces of fine chaguar textiles decorating frames, or leather clothing, etc.

¹⁸ This varies according to the other activities of the woman of the house and the time she has available to spin and weave, the age of her children, the help she may receive from other women in the house and the possibility of selling her products.

Among the Wichí, within the territory under control of a band or group of extended families, there is no restriction as to the use of the chaguar, any woman of that band is free to go where she wants to gather the amount she needs. The restriction is mostly due to the fact that, both around Misión Chaqueña and in the neighboring missions of Carboncito and Salim, the chaguar grows on farms of cattle farmers, whom they must ask for permission to harvest the plant and with whom they don't always have friendly relationships. The cattle farmers tend not to oppose Wichí use of the chaguar, and though they do the use of algarrobo pods (the fruit of *Prosopis* sp., the most important food for the Wichí) and the hardwoods, the chaguar is of no use to them and is considered a pest; some even burn the *chaguarales* during the dry season.



Figure 1: Harvesting chaguar.

Figure 2: Knitting with chaguar.





Figure 3: Chaguar crafts.

Figure 4: A chaguar quilt.



There is no municipal, provincial or national legislation to regulate the use of the chaguar. This comes as no surprise, given that the plant has no alternative use, is not on the brink of extinction and does not affect the dynamics of the ecosystem. The Wichí do not manage the chaguar in any respect, nor have they developed any forestry practices regarding this plant. They do not sow it or plant it. They know a great deal about the different species, the uses of each and can distinguish which yields a good quality fiber.

Government technicians and members of non-governmental organizations (NGOs) argue that chaguar is becoming scarce and cite as ‘evidence’ the fact that women must walk many kilometers into the forest in search of the plant (see Appendix B). From the Wichí women’s perspective, the problem lies in the trading of the finished products.

The Wichí sell their products to an established market that has two or three large buyers. These buyers train families to produce certain crafts, order an agreed amount and then buy the products. In the case of chaguar products, each woman must identify her own buyer in a highly uncertain market. Chaguar products are exchanged for used clothing or food. Cash sales are not common. Sometimes transactions occur in the buyers’ house, but more often women sell to local shopkeepers, where they receive flour, sugar or *mate* (tea) in exchange for their products. Better prices for their goods can be found in Embarcación, some 45 kilometers away.

Although the wood crafts of Misión Chaqueña enjoy a recognized and well-deserved prestige, the chaguar crafts of the women there are inferior to those produced in Pilcomayo or Formosa and some areas of Paraguay.

5. Free Access to Resources and Sustainable Use in the Chaco Salteño

Hardin’s thesis (1968) on the Tragedy of the Commons – in which he sustains that open access to a natural resource leads to its degradation – has led environmental economists to insist on the need to establish property rights as the only way to guarantee the sustainable use of these resources.

If this were true, the obvious question is why did degradation not occur under the Wichí who practiced open access¹⁹? Degradation only began after the arrival of the cattle farmers towards the end of the nineteenth Century.

Earlier we tried to answer this question by taking into account the cosmic vision of the Wichí and their relationship with nature which is the basis of their economy. First, we highlighted their spirit of frugality and austerity (resulting in a *minimum sufficiency pattern*) and the accompanying taboos that discourage and even punish, waste and lavishness. Second, we highlighted their principle of neither accumulating nor hoarding, of tending only to immediate domestic needs. Two key elements must be added here: First, the timing of the colonization of the Chaco; a recent event when compared to colonization of other areas in Latin America. Second, the low population density of such an extensive territory, which meant that the resources the Wichí required were abundant until the beginning of the twentieth Century.

In the case of the Chaco salteño, the establishment of property rights began with the arrival of the cattle ranchers. This was followed by forest exploitation concessions and, more recently, by many intensive schemes (for cotton, feed-lots, *etc.*). Contrary to what economic theory sustains, accelerated degradation of this area was not caused by the forms of property and access, but rather by the relationship that each group or social actor established with nature. This interaction determines the possibility, rate and degree to which environmental degradation takes place.

¹⁹ We want to emphasize the fact that, in general, Hardin’s theories have been refuted using examples that show that what appear to open access regimes are really collective or communal spaces where rules that regulate the use of the resources by the members of the community exist. But in this case we are referring to a space where all members belonging to a band that controls a territory can have free access to the resources, the only restriction being the taboo preventing misuse of harvested resources.

With the occupation by the white man and the establishment of individual property rights, the equation that relates man to nature was not simply modified into a relationship of accumulation based on the maximum, rather than minimum, extraction of a resource: All possibility of social control of an individual disappeared. Each cattle rancher today enjoys the liberty of overgrazing his land or *puesto*, each saw mill can extract as much wood it can haul away, each company can cut down the vegetation and degrade the soil at the rate it wishes, and so on. What this refers to is, to paraphrase Hardin, a true “*tragedy of private property*.” In fact, occupation by the white man has impacted violently on Wichí society. It has given rise to significant change, both in the conditions that allowed the Wichí to have a harmonious relationship with nature and in their cosmivision. De la Cruz (1997:57) emphasizes the highly adaptive capacity of the Wichí as a trait that distinguishes them from other indigenous peoples. However, it seems that our anthropocentric culture has had an indelible effect on the Wichí economy, projects and desires, demystifying its apparent opulence. It is unlikely they will recover:

- The white man’s occupation of the territory and use regime essentially led to reduced and degraded land. Today they are for the most part precarious occupiers of private and fiscal land. The traditional relationship of abundant resources and low population pressure has been completely reversed.
- The violent manner by which the Wichí were stripped of their land and resettled resulted in their discovering the value of the concept of property and reasserting their property rights over their traditional lands, as well as over other scarce resources with market value (such as hardwood).
- Evangelization and secularization demystified taboos. There are no owners, only a God who does not seem to punish misuse or waste nature, judging from the level of the white man’s prosperity.

Prolonged contact with an economy that promotes the accumulation and consumption of manufactured goods does away with the precept of non-accumulation, distribution and *sufficiency*.²⁰ Additionally, subsistence activities such as hunting, fishing and gathering become increasingly difficult in a degraded environment. It is now necessary to have a reliable source of *income* and to *produce* for a market.

Within this new context²¹, what is the relationship between free access and the sustainable use of resources?

In this current Wichí transition, it is uncertain what will become of unrestricted access they historically enjoyed. Although they still have unrestricted access to minor resources (fauna, forest food products) the basis for this access is linked to the insecurity of land ownership and to the decreasing economic importance of these resources to Wichí microeconomics. Access to and use of wood, on the other hand, is increasingly controlled, especially in the case of semi-valuable species, and in areas where it is scarce.

The Wichí have cast aside old ways *e.g.*, the value placed on not accumulating goods. New market forces exert pressures for certain products²² (chaguar crafts, for example) derived from that environment. NGOs search enthusiastically for new forest products that the Wichí might be able to use so as to increase their income. In this new context, should free access to resources persist, sustainable use of certain resources – referred to as *promising resources* (Llosa 1996) – is certainly in danger.

²⁰ As is occurring in Misión Chaqueña, as a result of the differentiation among the Wichí imposed by a craft economy that rewards the better craftsmen with larger orders for pieces and punishes the less skillful, who have access to a ‘secondary’ market.

²¹ As Diana Díaz (personal communication) points out, “*of equal or greater importance to the traditional knowledge and technology is the system of rules that regulate access and use of the resources.*” Within this system of rules I include free access, as well as the redistribution, reciprocity, nomadic life and some religious practices. All these, acting as one system, have not allowed a free access system to derive into the well-known tragedy of the commons, but rather, on the contrary, have contributed to the sustainable use of the environment. Moreover, free access as a rule, is a necessity, not because of scarcity but because of the temporal and spatial variability in resource production that characterizes the Chaco. It is important to ask oneself what occurs when this system of rules ceases to be effective. A semi-nomadic life still exists in part, reciprocity very probably is still very strong, however, it seems that the redistribution rule is being lost (possibly as a result of immersion into a market economy). It has yet to be seen how a new set of stable rules can be arrived at in order to avoid resource degradation processes.

²² *E.g.*, Honey collection and collection of young parrots (*Amazonia aestiva*) that can be trained to talk, where trading the production ends up deeply affecting the ecosystem: “*in the case of the harvest of honey and young birds that nest in tree holes, cutting down thousands of trees a year to this end, that later rot without deriving any use from them*” and “*destroying wildlife reproductive habitat*” (Saravia Toledo 1994b).

In the case of the chaguar, two factors limit the possibility of sustainable use occurring. First, the persistence of rudimentary and laborious technology that is used to make chaguar crafts. Second, a national and international market in which the final product is not competitive.

Finally, it is important to emphasize that only an historic analysis would indicate the real prospects for sustainable use of a specific resource within a given socioeconomic context. The sustainable use or not of a resource is not a given situation, a state, but rather the result of a process.

6. Supply, Demand and Control of the Use of the Chaguar

6.1. The Analytic Framework for Understanding the Factors that Influence Sustainability of the Use of the Chaguar

The objective of the framework, created by the SUSG Technical Advisory Committee (TAC) of the IUCN Species Survival Commission (Annex 1), is to “*improve the understanding of the factors that condition (favor or restrict) sustainability of the use of living natural resources.*” Thus the challenge is not to make an inventory of those factors, but rather to generate a model that would allow us to understand these relationships. It must be remembered, the framework points out, that “*sustainability is not an isolated experience in the use of living natural resources by an individual or a community, but rather is the product of the relationship between the numerous factors that intervene in sustainability. It is not a ‘state’ but rather a process in a given direction.*”

Two factors must be highlighted in this affirmation.

- Sustainability is the result of a process. There is therefore an inescapable historic dimension that must be analyzed in order to understand the present situation, which we have attempted in the previous chapters.
- The use of living natural resources, whether sustainable or not, is the result of an interdisciplinary approach that takes several factors into account.

The analytic framework attempts to improve on the traditional model of Supply-Demand-Control by proposing a different and alternative model. This alternative, however, is a longer and more complete listing of the factors, variables and indicators that must or can be taken into account to analyze the probability of sustainable use of a given resource. It does not provide an explanation or interpretation which, in relating these factors to each other, requires for more profound analysis.

We have therefore seen the need to use the classical model of Supply-Demand-Control to analyze the situation regarding the chaguar in Misión Chaqueña.

Three comments should be made about the concerns of the analytic framework regarding the classical Supply-Demand-Control model. The framework:

- Considers that the sustainable use analysis requires the inclusion of both internal (local) and external (macro) social, political and cultural factors. As in the case of the chaguar, this is perfectly possible in the Supply-Demand-Control model.
- Considers the concept of *equity* to be very important, and we agree. This aspect has also been considered, both in the historical analysis and in the current situation.
- Refers to *time*²³ as an important factor in the analysis of sustainability, but does not incorporate it into the model. It instead limits itself to revealing a large number of variables at a given moment.

²³ The analytic framework states that: “*To evaluate the sustainability of an experience it is essential to use appropriate horizons and spatial scales and it is necessary to define, in principle, the level at which the system will be evaluated (for example, local, regional or global) and for what period of time (past and future) it will be analyzed.*”

We will proceed to analyze the factors that influence or regulate the supply of chaguar, then those that restrict or affect the demand for it before addressing matters related to control of and access to the resource. Finally, we will analyze the relationship between the three factors and how they condition the sustainable use of the chaguar (Figure 5).

Two overriding characteristics should be highlighted:

- The incidence of the occupation of the Chaco salteño on the supply, control and even the demand of the chaguar – in other words, the importance of the historic dimension (environmental history).
- The great variability or instability that characterizes many of these factors, the behavior of which, in the short- and medium-term, is uncertain, making it difficult to predict whether future use of the chaguar can be sustainable.

6.2. Factors Regulating the Supply of Chaguar

The opinions of the technicians and the Wichí in regards to availability of chaguar differ considerably. From the perspective of the technicians, the distance the women travel in order to harvest the chaguar is an indicator of scarcity. For the Wichí, that they have never had a problem acquiring the raw material is an indicator of abundance. It is worth noting, however, that given how unimportant this plant is both in ecological and in socio-economic terms, it is unlikely that studies to determine its overall abundance will ever be undertaken.

Beyond this subjective discussion, one thing is certain. The accelerated degradation of the Chaco is impacting heavily on the tree and shrub vegetation that provides necessary cover for the chaguar. A reduction in the amount of shade results in a reduction in the amount of chaguar. Fortunately its numbers have not yet reached a point where supply for Wichí women is at risk. Accelerated degradation is, without doubt, the main cause of its progressive disappearance. By way of comparison, the effect of increased demand for chaguar by Wichí craftspeople is small.

Ecosystem degradation is the result of the process of occupation of the Chaco salteño and the resultant spread of cattle ranching and logging. Once the forest reproductive cycle of the Chaco was interrupted, and the best trees had been felled, a process of desertification began. Additional factors include inadequate land policies of the Province of Salta. Unable to resolve the numerous conflicts between the small cattle ranches and the Wichí communities over land, the policies prolong the uncertainty and precariousness of the occupation of common land. The result: None of the involved parties are particularly interested in preserving the natural resources of the Chaco. This policy of 'inertia' was encouraged by an anti-Indian attitude that persists among politicians in Salta²⁴. Furthermore, the process of degradation in recent years has accelerated as a result of the phenomenon of property concentration in the Chaco salteño, massive deforestation and short-sighted, short-term production. This is possible given the very low prices of land and the absence of a voluntary policy to control environmental damage. Within this context the chaguar will, without doubt, quickly disappear.

²⁴ Civilian and military governments of different political parties have, in recent years, systematically failed to resolve the land problem and 'caved in' to the cattle farmer/white lobby in spite of the limited electoral importance of this group and the limited economic importance of the land in the Chaco that, except for some capital-intensive enterprises, belongs to absent landowners who do not use their land efficiently.

6.3. Factors Limiting the Demand for Chaguar

First, chaguar, fortunately perhaps, has been and is used only by the Chaco Indian populations. Other inhabitants of the Chaco, the cattle farmers, view the chaguar as an invasive plant that is harmful to cattle. Attempts to process the plant on an industrial basis in the 1940s quickly failed (Pastor Arenas 1997). The Indian population of the Chaco is small compared to the size of the territory that it occupies.

Second, traditional, labor-intensive harvesting²⁵ and production techniques that require a substantial amount of effort, result in, in economic terms, low productivity levels.

Third, the end product has only a limited market, at both national and international levels. The macroeconomic policies of the government, as of 1990, have meant that Argentina has one of the world's highest costs of living. A woman can produce no more than 3 to 4 *yicas* a month. Wichí women are not willing to accept less than US\$5 or 7 for each *yica* and consequently perhaps only make US\$15-30 per month. This cost, and the chain of intermediaries between the product and the consumer (who might reside either in Buenos Aires or London), gives the *yica* a market price of US\$10-25. It is difficult for the Wichí to compete with similar products from other countries in Asia and even in Latin America. This is especially so given that only a limited number of consumers have the necessary 'ethnic sensibility' or can recognize the quality of a product both for its aesthetics and craftsmanship.

Other factors impose a greater demand on the chaguar. First, harvesting the plant leads to its death. Second, within the framework of the occupation of the Chaco salteño, different players (the Anglican Church, NGOs and commercial capital ventures) transformed the Wichí economy, increasing the likelihood of crafts, originally produced to meet domestic needs, being sold to others and subsequently increasing extraction rates as the market increased. Third, many women have no alternative income-generating alternative. Temporary employment opportunities are scarce and subsistence activities have decreased.

6.4. Accessing and Controlling the Chaguar

Free and unrestricted access to natural resources within a territory controlled by a band never led to any environmental degradation. The arrival of the cattle farmer, however, and the subsequent privatization of most of the land in the area resulted in the Wichí being congregated into small areas. This changed the traditional use behavior before, groups of Wichí moved seasonally within large expanses of land. Reducing this area led to an overlapping of band boundaries. In those areas where the Anglican Church gathered the Wichí and where they began practicing a semi-sedentary existence, new (albeit reduced) territories began to be defined. A type of communal property regime developed, where access to the resources continued to be free for members of some communities but not for others. Within the communities that had access, access remained free for the majority of the resources (forest fruit, seeds and animals). However, in some missions, such as Misión Chaqueña, access is regulated as resources have become scarce.

As a consequence of this situation greater pressure is placed on those forest resources closest to the settlement, this is known as *localized pressure*.

6.5. Sustainable Use of the Chaguar?

With so many factors to consider, it is difficult to conclude whether the current use of the chaguar is sustainable. Everything appears to indicate that though it is not yet at risk of extinction, there are mega-processes affecting the ecosystem that might lead to a drastic reduction in chaguar availability. The introduction of some techniques to

²⁵ Von Koschitzky (1992) points out that making a textile, "in ideal conditions, which require time and no interruptions" the following time is required: Gathering plants, 1 day; extracting fiber 1-2 days; drying fiber, 1 day; spinning, 2-3 days; dyeing, 4-6 days; knitting, 4 or more days, making handles, 1 day.

facilitate the processing of the fiber would have a dual effect. On the one hand it would noticeably increase productivity of the Wichí crafts. On the other, it would favor a decrease in the cost of those textiles, as they become more competitive in the market and demand increases.

But other factors might, in the short-term, favor a greater availability or supply of the chaguar: A land policy that resolves the conflicts between Indians and cattle farmers, promotes changes in harvesting techniques so that removal of fiber does not lead to the death of the plant and implementation of social policies to provide woman with more income-generating alternative activities.

7. Conclusions

7.1. Local and Macro Factors Determining Sustainable Use

All models that analyze sustainability (the TAC model being no exception) distinguish between internal (local) and external (macro) factors. The reason for this distinction is to develop an interpretive model that, by relating the diverse factors to each other, allows us to identify a scenario for the sustainability of a resource and to determine at what level to act, both in macro and local terms, and whether it is worthwhile to do so.

All factors, of course, do not have the same weight. In the case of the chaguar, and all the Wichí communities, the case study shows that local factors do not negatively condition the possibility of sustainable use. On the contrary, perhaps, if we assess these factors we might conclude that they have a favorable influence on sustainable use. It is the macro factors that have a decisive effect on the supply and threaten sustainability in the very short-term. Today, sustainable use of the chaguar is not threatened by its excessive use by the Wichí, but rather as a result of continuing alterations in the ecosystem and poor and unjust land policies.

This situation has a series of implications in terms of the impact that a development project or isolated activities, such as attempts to domesticate the plant, might have in the area.

7.2. The Wichí, a Society in Transition

As a result of the occupation of their territories and their increasing relationship with white society, Wichí communities are undergoing full transition from a hunter-gathering economy to an increasingly monetary one, be it by producing crafts for markets, being hired as temporary farmhands in bean, fruit or vegetable farms, producing posts or charcoal or more recently, by being involved in government-promoted minimum employment plans. In reality, all Wichí families combine both subsistence and wage-earning activities, but in different proportions, depending on the level of isolation and accessibility of the community. Misión Chaqueña is probably an extreme case of a mission that has been inserted into the market and whose communities have progressively lost their subsistence traditions and activities.

With this transition, there is also an apparent ethnic affirmation movement to reclaim former land and territory. Many Wichí, unlike other chaqueño groups, have remained in their communities, indicating that mechanisms for resisting integration into the national society and reaffirming their identity exist.

All this leads to great uncertainty regarding the future of the Wichí: To what extent can their values – their relationship with nature and their economy of non-accumulation resist attacks by a dominating market economy? The extent to which such attacks can be resisted will have significant consequences on the sustainable use of the chaguar.

7.3. The Non-Timber Forest Product (NTFP) as Promising Resources...for Whom?

In recent years, in conjunction with a renewed appreciation for the knowledge the Indians have of their environment, non-timber forest products (NTFP) have become more widely available. Not only do they reinforce the cultural identity and improve the levels of income of Indian populations, but they also constitute an interesting reason for engaging in conservation and forest management activities and generating an interest in biodiversity, especially in regard to a non-consumptive use of the forest.

It is not always the Indian population, however, that benefits from NTFP commercialization. Jaime Llosa (1996) makes a distinction between “*promising resources in general*” and “*promising resources for the Indians.*” Llosa hypothesizes that there is a limitless amount of biodiversity products for which there is a potential market, but that the conditions under which these products have access to market niches requires a technological development, a marketing know-how and investment effort that the Indian communities lack. Small and medium-sized enterprises or tradesmen acquire these resources. The native population remains subordinate and thus NTFPs are not “*promising resources for the Indians.*” True benefits are most often appropriated by middle sectors, reinforcing the already existing inequity.

Environmental implications may be added to this, given that, if a certain NTFP is ‘successful’ in the market, the intermediaries try to maximize their profits by increasing extraction rates which has consequences on the sustainable use of the resource.

7.4. Free Access, Property Rights and Environmental Degradation

Stemming from Hardin’s *Tragedy of the Commons* and once the distinction between communal property resources and free access resources was made, environmental economists insisted that these inexorably degrade because, given the selfish nature of the individual, the interests of each member are opposed to the interests of the community as a whole, and the only solution is the establishment of property rights, that lead to the right of exclusion of third parties from their access to those resources.

The case of the chaguar indicates that this is not necessarily true. The Wichí – for whom access to the resources is free within an extended group of families – managed to conserve the ecosystem without degrading it for centuries. This can be explained by the reciprocal relationship they established with nature, assuming an economy of non-accumulation based on principles of equity. Contrary to this, the introduction of property rights and land acquisition, and the view that nature was an inert object to be used by man, led to the degradation of the Chaco, and the tragedy of private property.

Today, however, once the Wichí have been resettled on small pieces of land, their impoverished forests no longer support them. The harmonious relationship the Wichí enjoyed with nature has been lost and it seems that free access has accelerated environmental degradation. The need to control scarce natural resources and to establish property rights for selected resources is slowly being recognized by some Wichí. The belated establishment of property rights over the resources does not resolve the current situation because degradation levels in the Chaco are such that only a large amount of capital investment or natural recovery (which would require 20 to 30 years of no cattle ranching or forestry activities or agronomic interventions) can reverse the situation. Conditions to reverse an inadequate land policy are required. This does not require the establishment of new property rights, but rather returning land to the Wichí so that they may participate in the market economy whilst retaining their identity.

7.5. Tension Between the Inside View and the Outside View: Who is Right?

While NGOs and technicians are worried about the growing scarcity of chaguar, and seek ways to propagate it and plant it closer to the Wichí communities, the Wichí women worry about selling their products for a good price. As a semi-nomadic people, distances do not represent the same effort to them as they might to us, and in addition, they can derive a social value from the walk in search of chaguar.

The case study reveals that other approaches to resolve the situation may exist. Economists might ask themselves about the future of a resource to which there is free access in a framework of increasing demand. Others might address underlying problems such as ecosystem degradation, poverty and the cultural impact on the Wichí of their integrating themselves in society.

7.6. Environmental History and Sustainability Analysis

The case study shows the extent to which the process of territorial occupation of the semi-arid Chaco has been a determining factor in the possibilities of sustainable use of the chaguar. The environmental history of this area allows us to understand the factors that determine the supply of chaguar, the reasons why there is a localized pressure on the chaguar and also the extent to which the Wichí economy is becoming commercialized defining other levels of demand on the resource. Historic processes allow us to visualize different scenarios for the future, scenarios that imply different possibilities or levels of sustainability of the chaguar.

7.7. The Technology Variable Defines Sustainability Scenarios

Available technology may be of fundamental importance *vis-à-vis* the sustainable use of a resource. In the case of the chaguar, the technology variable is the determining factor:

- Attempts at industrializing the chaguar in the 1940s failed due to an unprofitable industrialization process. Had they succeeded, the *chaguarales* might have been destroyed, as was the case with others species that were harvested at the beginning of last Century.
- Wichí women's continued practice of labor-intensive harvesting and production methods, and the accompanying low productivity, has restricted increased demand and greater extraction of the chaguar. Should an important innovation occur in the processing of the fiber and in the production of the textile, which does not seem all that unlikely, the sustainable use of the chaguar at a local level will become improbable. Present-day chaguar harvesting techniques mean killing the plant. However, trials are already underway that indicate the possibility of only harvesting the larger leaves. Were the Wichí women to adopt such techniques, continued use of the existing plants might be sustainable.

Technology is, at least in this case, one of the most sensitive and uncertain aspects, and further analysis must be given to this variable when defining different scenarios of sustainability.

7.8. Conservation and Equity

The case of the chaguar demonstrates that, at least in the short-term, equity does not necessarily go hand in hand with conservation of a resource. In effect, the technological possibility of improving productivity of the harvest, spinning and knitting of the chaguar, decreasing the costs, together with the possibility of an improved market, could mean a much greater production of chaguar objects, which in turn, would mean a higher income for the craftswomen but, at the same time, a far greater extractive use of the resource.

In recent years, conservationists have adopted positions showing that conservation coincides with the interest of the people, or demonstrating that this position does not conflict with economic and social development. This common interest is included in the very definition of sustainable development. However, this is not necessarily so, at a specific time and place, where both objectives – conservation and equity – might be opposed. The obvious question is: When does the conservation of a resource or an ecosystem become sufficiently important to postpone better living conditions for a population? Or *vice versa*: Can we think of sacrificing the *chaguarales* in favor of improved living conditions for the Wichí?

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Appendix A: Stories and Testimonies Regarding the Owner of the Chaguar

There is no concept of ownership of either land or natural resources among the Wichí and access to both is free. The existence of ‘owners’ of different spaces (rivers and forests) and for different resources (each animal has its owner) seems to indicate the contrary. But, in reality, in an economy of distribution, having or possessing something implies sharing it, so that even a spiritual owner must share with others, just as the Wichí must share what they have with the rest of the family. Taboos limit extracting more than needed and, above all, misusing or wasting the resource. The reference to God is also interesting and may cast doubt on the existence of those spiritual ‘owners,’ but reinforces the idea that people are not owners of things, and that nobody has a right to be stingy. Access must continue to be free.

The following stories and testimonies were gathered in four Wichí communities in the area of Bermejo, Misión Chaqueña, Carboncito, La Golondrina and La Paloma²⁶. They were recorded in Spanish. The complete story is included given their anthropological value. We start with Griselda, from Carboncito, because her story is the most complete and interesting.

Griselda

“Three years ago, a guy was with me, and a lady, they were telling me that this chaguar has an owner; a woman or a man. And this chaguar, the woman says, lives in the forest... The mother of the forest, they say she is called. And they guard when one goes often, often taking this they say she gets angry. And then she is angry with the person. And they say that sometimes she has an anger attack, with somebody. They say that the man guards them, because they belong to them, the plants are theirs, they say. And sometimes I think of what they say and that they belong to them, but they are not theirs, they are God’s. Because they do not make the plants, God makes them. Every plant there is, God has made it.”

“And then after this woman or man comes, they say that the man that covets chaguar does not think. The woman has long hair. They are under the ground. They are. They say now that they wander about out there, checking one out. And they do that because sometimes one thinks, one does not think of God at all..., and they get mad at the person..., and I see that ..., I think it is like that. Because a short time ago, we went into the forest, there were many of us, we were six. And the following day I got sick. But I felt a noise in the forest, under that forest, but further away. I felt someone knocking those sticks, knocking, and we said what might that be..., would it be a cow..., it was four in the afternoon. We left the forest and it followed us, followed, followed..., until we reached the other side. Other women who are braver said “its nothing”, its the owner of the chaguar, they said. I did not believe that, I did not believe. But after... the next day I got sick. And then I thought that what they were saying was true.

“At first I would dream, I dreamt she says, that there is a woman who says “don’t take this, go that way, these are mine, don’t take any more because these are mine”. She does not want them to be taken because it is not good. Some say they are spirits of the world, others say that the spirit of the people that die do a lot, because they were bad, they did not love each other, they fought, they hated each other, and said that those people when we go where they are, they will guard us, they don’t want anyone to touch, that nobody cut down the sticks, because they belong to them. But we are not afraid of them, we pay no attention to them” Griselda shows us an ant’s nest which is the house of the owner of the chaguar: The elders told her and they told her not to step on the ant’s nest, *“because if you do, you feel heat and a pain in one’s bones and all one’s head, that is what my grandfather told me, he did not want me to get close to there, but now that I am old, I am no longer scared.*

“There is not only one, there are several owners of the chaguar. I don’t ask him permission because I do not see him. I already know there is a God, a living God, and that is the only one we have to ask, to take care of us,

²⁶ La Golondrina and La Paloma are two communities near Hickman, on route 81.

like now, so that nothing happens to us... My grandfather used to tell me, before, the old folk, they did not know then that there was a God, so they worshipped them, the owner of the chaguar. He said they would talk to him, the owner of this land. Now they have mass, as it is called. There is a stick that has a fruit, and they toast it, grind it, and on Saturday, they go to the forest, have mass, and they see as though they see when they are eating that, they don't eat... they put it in their nose, and they sing, they do not talk. They shout, shout. The witch uses that. The witches use the chaguar, they make a ribbon and tie it round their head. They do that because the owner of the chaguar asks them to. He asks the witch. Because they speak to the witch. They are the ones who make him work. The owner of the chaguar eats animals from the forest, the pichi, just as we do.

"There is a guy who died four years ago, he said that the woman is the mother of the forest, he said that ..he/she took her/him to the house, he found her like a woman presents herself, a nice woman, with long hair, blond, a pretty woman, and she would take the guy. But, it so happens that, when she returned, she came back mad, crazy already. Because the guy did not want to stay with her. But he took her they say. When arriving at their house, he served her like a live person, he brought her mate, food like a bride they say... they were two. They served them food. They asked them what type of food they liked, sausage or anything, they offered it to the guy. The guy wanted chorizo (sausage)... but the guy looked at the food like that, it was not chorizo, it was a snake. That was the food of the mother of the forest.

"The owner of the chaguar is a woman and a man. A man without a head, they say. When she is a woman, she takes the man, because she wants him... to live with her. If it is a man he wants a woman, if he finds one he takes a woman. He takes her and no longer returns, because he takes her to the underworld... He keeps her away from people, he does not want her to be with live people, only her and him. Because when she kills her (the mother of the forest kills the person she sees with her partner). She is jealous, she does not want anyone to come close. And she kills them.

"My grandfather did not want us to go to the forest alone, they are scared we would get lost, that they would take us away"

Paulino (Misión Chaqueña)

"In old times, we spoke of the "lewujuy" gods. The chaguar, also known as the lewuki, that is it has an owner... We cannot be wasting, throwing away, misusing because the owner might punish us... Its the same... when we want to preserve the forest gods... its a part of the culture. After the river gods, the hills have gods, the rain has its gods, that for everything lewujuy was mentioned, except the great witch, that worked with witchdoctors, those who cast spells, that also has lewujuy, had their gods..."

Simon (La Golondrina)

"They might have seen (the owner of the chaguar), as they say that there is a pachamama of the forest, that becomes an owner... but there is only one God, from above, that is the owner of everything. The women say, tell... that he is an owner a short person... the person that always takes care of the chaguar. They say that when too much is taken that person already comes out the grandfathers say. They have seen before, no longer."

(Other Wichí present) "There are people who make magic and who, to frighten the women, hide in the forest under the form of an animal" (demystifying the owner of the chaguar and the fact that he is a supernatural being).

(Simon) "One can hear a noise but she cannot be seen... a woman walking fast that disappears... with long hair..."

(Another Wichí) *“There is the pachamama of the forest that is the owner of the chaguar, of everything... the forest, and he guards everything, even the quirquincho (armadillo), and the deer. Like the hunter, one person is very dedicated to the forest animals, they say he also appears to people, there are people who are all day in the forest hunting, hunting and he appears, to scare him away from the forest, so that the person stops bothering the animals...”*

(Simon). *“To eat an animal one has to kill it... but many times it is hurt, that is what he does not like...”*

Santiago (La Paloma)

“It seems that when one is covetous it harms, one gets sick... but very rare... like before one used or cut a lot, or better said wasted, then it seems that they do not like that, that type is the mother of all the chaguares, he covets... like a person... there are nights when he has been seen... I have not seen, someone must have seen. There is a name, the mother of the chaguar... its a woman, a dwarf. They bother because they say the chaguar belongs to them. They don't like it to be wasted. What is taken must be spun. At times he makes people sick or kills them. He does not like to be seen, he is a dwarf, but can also have children.”

Appendix B: Chaguar Domestication Trial (*Bromelia hieronymi*) in Misión Chaqueña

The idea of domesticating the chaguar is not new. Pastor Arenas (1995), citing Luna Ercilla, points out that “some trials of these crops of textile bromeliads were promoted in experimental plots in provinces of the Chaco in Argentina, with promising results” referring to an attempt in the 1940s and 1950s to industrialize it. The Anglicans carried out trials in the 1970s in the frontier with Paraguay. More recently, in the second half of 1999, financing from the Food and Agriculture Organization (FAO) funded an experiment in Bolivia with the Ayoreos Indians.²⁷

A hectare was fenced off to avoid the entry of animals. Because the chaguar grows well in partial shade, a few trees were left in the plot, mainly algarrobos (*Prosopis sp*). The plants were transplanted in October. As chaguar is scarce in the region, they were transplanted from 50 kilometers northeast, where hundreds of plants were harvested. They were taken to Misión Chaqueña in a truck. Some plants were transplanted the same day, to avoid dehydration or stress. Some were put aside to plant when the rains arrived. They were planted 10 days later, though many had already died. Beds 5 meters wide were dug. The chaguar were planted in strips 1 meter apart. Shade was provided for some plants, others were planted so that they would receive full sunlight.

From the technical point of view, results at the end of four months were not good. Many plants dried out, but some survived. The main problems appeared to be:

- The type of soil: They grow well in fine sand but were planted in clay soils.
- Lack of rain: Although the plants have demonstrated that they can live without water for some. The lack of rain killed some of the plants.
- Scorched plants: Plants planted in full sunlight died. Those planted in partial shade showed a greater degree of survival.

The Misión Chaqueña experience is inspired, in principle, by sustainability criteria. Success relates to the extent to which a plant that grows in the wild can be domesticated. When women have it at their doorstep, they do not need to harvest it from the wild and deplete the wild population. They also have time for other activities.

The scant enthusiasm the Wichí of Misión Chaqueña demonstrated for this experiment, however, gives cause for concern. Is the chaguar a scarce resource? The technicians consider it to be, because the women must travel ‘long’ distances to harvest it, which points to an increasing scarcity of this plant. The Wichí, to the contrary, do not consider this to be a scarce resource.

The perception of the amount of effort it takes to go to the forest to harvest chaguar is different for a non-Wichí than it is for a Wichí. For the Wichí, as a semi-nomadic, hunter-gatherer group, walking into the forest to collect chaguar is natural to them and fulfills different functions: It has social value to women who go to the forest in small groups and other resources can be collected also.

During the walk, each woman chooses those specimens that meet her requirements, something she cannot do in a chaguar plantation. In the forest, the chaguar has richer soil, variable conditions and no borders. In plantations, there is less space and more homogenous conditions. Some women also believe that moving the plants from the forest to a plantation is not good for them, both because of the different conditions and because of the excessive handling during the move. Both aspects deserve to be studied in depth.

Economic considerations are also significant. If treated as a crop, the chaguar incurs certain costs – transplanting, fencing of the plot, sowing, care, *etc.* These must be evaluated and compared to traveling into the

²⁷ All the technical details were provided by Juan Carlos Godoy, the technician responsible for this experiment.

forest to harvest the wild plants. Space is also limited, each craftswoman needs between 0.31 and 0.47 hectares of chaguar, a surface area even greater than their agricultural plot which is less than 0.25 hectares.

For Fundapaz, an NGO in the area, the first challenge, even before trying to domesticate the chaguar, is to harvest it in a way that does not require extracting or killing the plant. This is based on an experiment carried out by the National Institute of Agricultural Technology (INTA) in the 1960s.²⁸ The problem is in designing a tool that is sufficiently light, easy to handle and inexpensive to allow women to easily cut the leaves of the chaguar in the forest, without hurting themselves with the sharp needles of the plant.

²⁸ As indicated in the Argentine Encyclopaedia of Horticulture and Gardening (Osvaldo López, personal communication)

Appendix C: Economic Valuation of the Chaguar

One of the most interesting contributions of the analytic framework is the decision to include the economic valuation of environmental resources. In spite of economic attempts to quantify environmental goods and services that a certain ecosystem or natural resource may provide, economists still find this difficult. What is most valuable is the debate and the questions that this type of analysis generates. Referring to the analytic framework: “*The economic valuation of the environmental good must include, as well as the values expressed by the owner or users of the resource, all the opportunities for an alternative present or future use, and the value of the impacts that this use generates in other actors and/or sectors of the economy (externalities)*”, we can undertake the following analysis²⁹:

Direct Benefits:

- Monetary income produced by the sale of chaguar products (both by the Wichí craftswomen as well as their intermediaries).
- Several textile products to satisfy the domestic needs and subsistence activities (hunting, fishing, and gathering, personal consumption).
- Food and medicinal value (personal consumption).
- Value of biodiversity.

Indirect Benefits (*positive externalities*):

- Strengthening the cultural identity of the Wichí³⁰.
- Valuation of the woman within the family.
- Better nutrition for the children (the woman decides on the use made of the income derived from the chaguar).
- Strengthening the links between women (social activity)³¹.
- Greater retention of the Wichí population in their place of origin³².
- Facilitating grazing (cattle farmers, with the elimination of the chaguar).

Direct Costs:

- Labor used in the harvest, fiber removal, spinning, dying and knitting.
- Raw material for the production of dyes and gathering firewood.
- Marketing costs.

Indirect Costs (*negative externalities*):

- Conflict with cattle farmers (in some cases).
- Denuded or badly conserved soils for the extraction of the plant (unimportant effect).

Opportunity Cost:

- Nonexistent with regard to the same plant (has no use for the cattle farmers nor for the rest of society).
- Very low as far as the space occupied by *chaguarales* (because of the low agricultural and livestock value, per unit surface area of the Chaco).

²⁹ The analysis is probably incomplete, we add it here as an example.

³⁰ As we have pointed out, as with language, the chaguar seems to be one of the most important aspects of Wichí identity. Von Koschitzky (1992) also points out the ‘protective function’ the chaguar has for hunters that face the dangers of the forest.

³¹ Von Koschitzky (1992) mentions the chaguar textiles have different purposes, they ‘unify’ communities, and have a role in the close relationships of men and women.

³² Migration to the cities has a high opportunity cost.

The TAC document also proposes, as a way of approximating the economic value of a resource, to analyze the Marginal Social Opportunity Cost (MSOC), using the following formula:

$$\text{MSOC} = \text{MPC} + \text{MUC} + \text{MEC},$$

Where:

MPC = Marginal cost of production (for example, the labor opportunity cost, capital, energy used in production)

MUC = Marginal user cost (future opportunities lost as a result of the reduction of the resource for a present use)

MEC = Marginal environmental cost (for example, damages imposed by the activity on those individuals, activities and the environment)

As of those definitions we can conclude that the MSOC in the case of the chaguar is very low, because each one of those three elements of the equation is in itself low:

The MPC is very low given that there is practically no opportunity cost for the production factors that in this case is the Wichí women's labor (who have no alternative employment).

The MUC is almost non-existent, because the present use of the chaguar does not mean any lost future opportunity (the possible future scarcity is due mostly to changes in the ecosystem, not to excessive present use of the chaguar).

The MEC is almost non-existent because chaguar extraction has no effect on the ecosystem, does not produce any environmental social or economic damage.

If the benefits could then be valued, especially the indirect social benefits previously pointed out, and given that the MSOC is very low, we have a very positive cost/benefit relationship or a very high TEV (total economic value) and the relationship Price/TEV approaches 0 more often than it does 1.

Taking the analytic framework into consideration, the price would not express all the social values of the resource, which means that the exchange mechanism for the good does not correctly and completely assign a value to the resource (for example, in the case of the chaguar, it does not recognize the importance of this resource in the economic, social and cultural life of the Wichí, keeping the population in its place of origin and stemming migration).