PARTNER REPORT

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Transference of the methodology applied to the socio – economic and cultural study of the "Esteros del Iberá" to the study of the "Esteros de Ñeembucú"

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1- Introduction: Basic guidelines to perform socio-economic and cultural studies in the Esteros de Ñeembucú, taking the studies performed in the Esteros del Iberá as a basis

Various activities were carried on in order to analyse the possibility of transferring, from the case of Esteros del Iberá to the case of Esteros de Ñeembucú, the tools and methodologies necessary to make socio-economic and cultural diagnosis regarding the relationship between society and nature :

- Two workshops (February and December 2003) where the facts related to socio-economic and cultural aspects of the Esteros del Iberá were discussed
- Exchange of information and experiences between researchers of the Universidad Nacional de Asunción and of del Pilar engaged in related thematic areas
- Bibliographic research of material referred to both wetlands, focused on socio-economic, cultural, and legal aspects
- Preliminary compilation of socio-economic statistical information of the Department of Ñeembucú and its districts, showed in Annex, with the purpose of analysing the possibility of methodological transference

According to this background, the thematic and conceptual basis on which the INCO-Iberá experience could be transferred to the case of Esteros de Ñeembucú were established. The following points arose:

- The need of a follow-up of the environmental perturbations produced as a consequence of economic development, taking into account aspects concerning biogeography and the belonging to characteristic eco-regions. In the future, useful comparisons of the sensitiveness to natural and antrophic disturbances of the ecosystems, in a temporal and spatial context, could be made considering that Ñeembucú and Iberá wetlands belong to shared eco-regions with common biogeographic aspects.
- The need of a visualization, trough life quality indicators, of the environmental pressures upon the wetlands that could appear due to an increase of the population and inadequate infrastructure.
- The need of a study of the trends of economic development using economic indicators. Most production activities do not take into account natural conditions; in practice, environmental aspects are not included in patrimonial accounts, and thus no costs are assigned to matters of environmental variables. That is why it is important to analyse to what extent economic accounts include social repercussions that could derive from exceeding the carrying capacity of water, land and air, having short term additional income but threatening future income. Since wetlands are one of the most productive environments on Earth, they are suitable for many alternative uses. Nevertheless, not all crops favour the sustainability of wetlands, and the production activities that generate the most employment are not necessarily the most adequate for the conservation of these ecosystems.
- The level of development of legal aspects for the better protection of wetland resources.
- The importance of nature in the historical, cultural and economic development of the inhabitants. The cultural component as an affirmation of the identity and of the local and regional development.

2- Eco-regions, biogeographic and bioclimatic aspects.

Nowadays, the Secretaria de Medio Ambiente de la Nacion considers that the area of the Ibera wetlands is an eco-region itself (Map 1), but many authors consider it as a part of the Humid Chaco. (Map 2).

An eco-region located in northeastern Argentina, the centre of Paraguay, and some small areas in southwestern Brazil. Dinerstein et al. (1995) have classified this region as vulnerable. This type of wetland is only situated in the Province of Corrientes and in the neighbouring departments of south-eastern Paraguay, "Esteros de Ñeembucú" (Ramsar 2002). Nevertheless, according to Ramsar, the area near the Iberá lagoons has remarkable elements of the Espinal eco-region of the Pampas, what can be seen in its arboreal vegetation, "ñandubay" (*Prosopis ñandubay*), "algarrobillo" (*P. alfarrobilla*) and terrestrial shrubs ("espinillos") (*Acacia caven*).

When referring to "esteros", Ringuelet (1962) considers that this name should apply to the environments that have the characteristics described by Carter and Beadle (Carter and Beadle, 1930 and 1931) for the Paraguayan Chaco. He also expresses his doubts with respect to the possibility of assimilating the "esteros" of Corrientes to the ones of the Chaco, and emphasises the need for more information about this areas. Among the characteristics included in the definition of "esteros" (Carter and Beadle, 1930), there is thermic stratification, and a very low concentration of dissolved oxygen. The water of those "esteros" has a very low quantity of plankton (specially phytoplankton), and abundant decomposing organic sediments. (J.J. Neiff, 2001).

Daniele and Navarro (1994) classified this region in Argentina as forests and wetlands of the Humid Chaco.

This ecoregion can be distinguished from other eco-regions because of the species associations brought about by increased precipitation and reduced seasonality.

Precipitation varies between 1,300 mm annually in the east and 700 mm in the west The average annual temperature drops from north to south, from 23° C along the Paraguay border, to around 18° C in the centre of the province of Santa Fe in Argentina The vegetation consists of xenophile forests mixed with palm savannas. The forests are mainly made up of red quebracho (*Schinopsis balansae*) and white quebracho (*Apidosperma quebracho-blanco*).

In the low-lying areas the predominant species are, among others, the black carob tree (*Prosopis nigra*), "churqui espinillo" (*Acacia cavens*), "tala" (*Celtis tala*) and "cina-cina" (*Parkinsonia aculeata*) (Burkart et. Al. 1999).

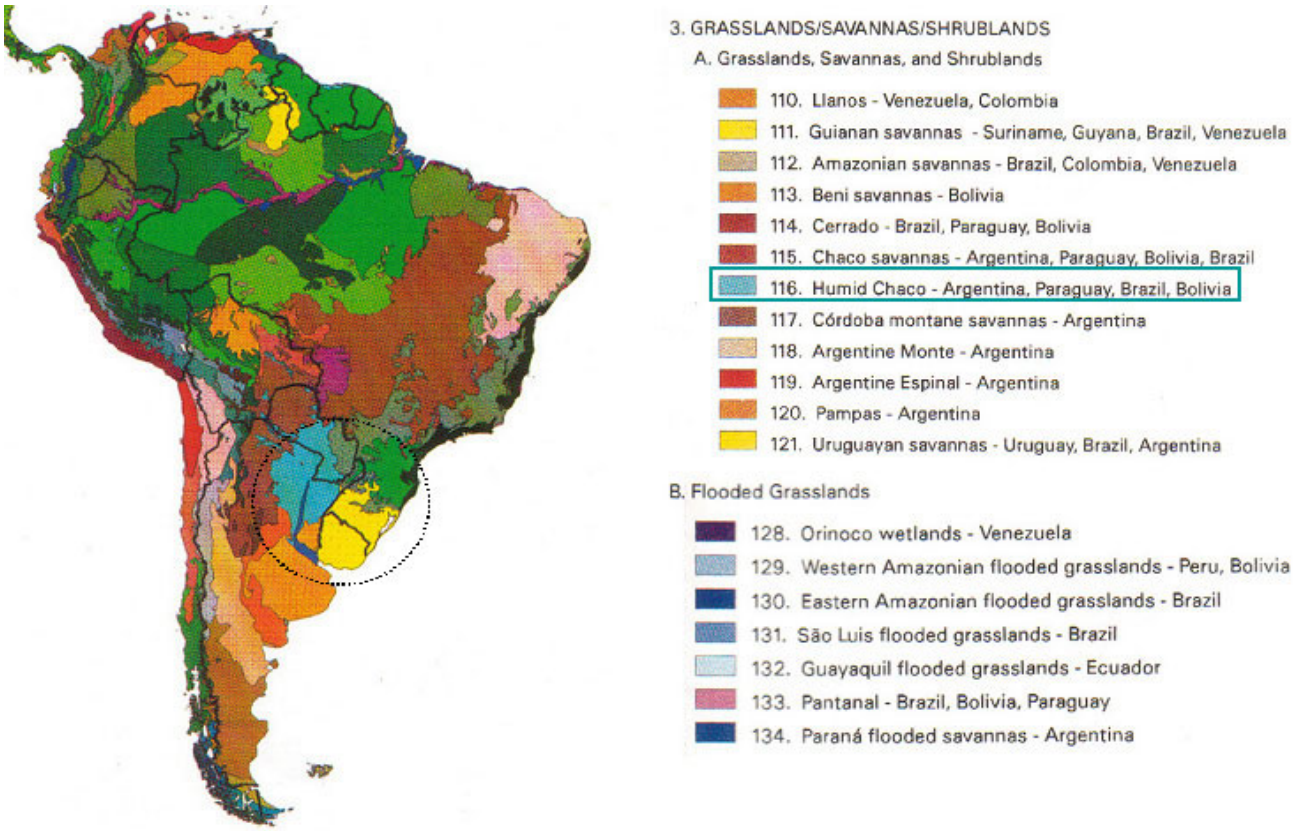
In the prairies areas the vegetation is diverse, depending upon the soils: *Eliomirus miticus* in the areas similar to that of the forests but at slightly lower elevations, *Sorghastrum agrostoides* in soils that are flooded for short periods, and *Panicum prionites* at the bottom and in the steep sides of the depressions without permanent water. (Burkart et. Al. 1999)[1].

[1] Source: www.worldwildlife.org

Map 1: Argentine Eco-regions

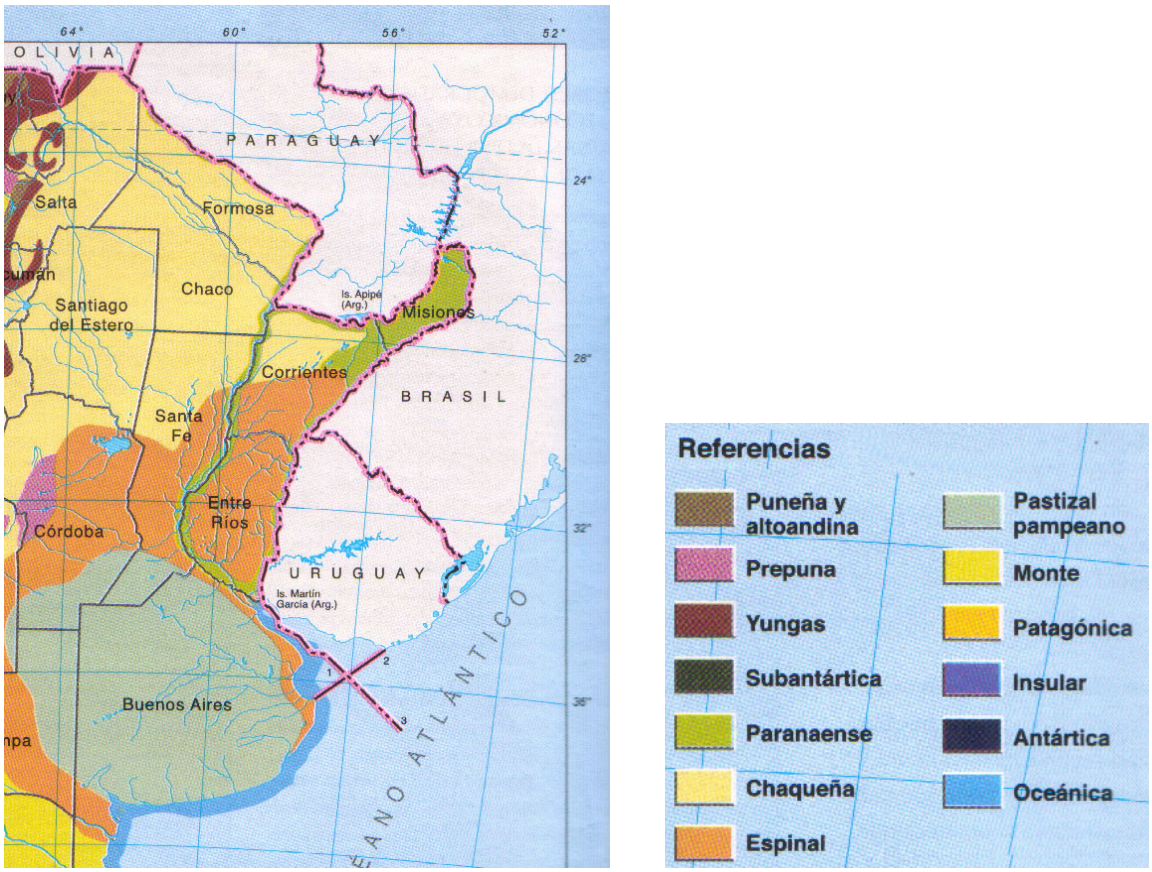
http://www.medioambiente.gov.ar/geoinformacion/images/ecoregiones.jpg

Map 2: Latin American Eco-regions



Source: A Conservation Assessment of the Terrestrial Ecoregions of Latin America and the Caribbean, World Wildlife Fund, The World Bank Washington D. C., 1995.

Map 3: Biomes



Source: Big Atlas of Argentina and the World, La Nación, 2003.

According to Canevari, et al (1999), the Iberá system has biological value because of the presence of:

- Significant populations that depend on the wetlands: big submerged prairies of *Cabomba australis, Egeria naias* and *Utricularia foliosa*, and vast marginal strips of bulrushes *Schoenoplectus californicus*. Amphibious plants such as *Panicum grumosum, Thypha spp., Thalia multiflora* and *Zizaniopsis spp*. Sedentary fish such as *Acestrorhynchus jenynsis, Astyanax bimaculatus, A. fasciatus* and *Apistograma corumbae*. Great abundance of piranhas (*Serrasalmus spp*.), which together with *Hoplias malabaricus* are the most prominent carnivores. *Ardeidee, Ciconiidae* and *Rallidae*. Relatively considerable populations of *Blastocerus dichtomus*, *Lontra longicaudis*, *Hydrochaeris hydrochaeris* and *Myocastor coypus*, among mammals, and of *Caima spp*., among reptiles.
- Endemic, rare and endangered species: *Caima latirostris* among reptiles, and *B. Dichotomus* and *L. Longicaudis* among other mammals.
- Species of economic importance: Birds and mammals (tourism). The main economic activities are furtive hunting (Broad-nosed Cayman, *Caiman latirostris*), extensive cattle raising and marginal rice agriculture.
- Charismatic species: *B.dichotomus*, *L. Longicaudis* (neotropical river otter*), H. Hydrochaeris* (capybara), *Felis pardalis* (ocelot), *Panthera onca* (jaguar),

Myrmecophaga tridactyla (anteater), *Jabiru mycteria* (Jabiru), *Ardeidae (*herons) and other species.

In total, 80 fish species were recorded, grouped into 59 genera, 19 families and 8 orders (Bonetto et al., 1981). An important bird fauna is observed as well, with typical species of the Chaco / Pantanal region and great abundance of *Ardeidae, Ciconiidae* and *Rallidae*. Prominent species are *Dendrocygna spp. Chauna torquata* and *Jacana jacana*.

The following species are protected by CITES :

- Neotropical River Otter (*Lutra longicaudis*)
- Aguará-Guazú or Maned Wolf (*Chrysocyon brachyurus*)
- Black Cayman (*Caimán Crocodylus Yacaré*)
- Broad-nosed Cayman (*Caimán Latirostris*)
- Marsh Deer (*Blastocerus dichotomus*)

3- Life quality indicators of the population surrounding the wetlands.

Many indicators with environmental implications were developed in the study performed for the INCO project regarding life quality in the Departments close to Esteros del Iberá. These indicators could also be used for the study of Ñeembucú area, because there are available statistics (see Annex) and the UNDP has recently developed a Human Development Atlas 2003 (www.undp.org.py).

The base for its application is to see which are the environmental implications of the main indicators, and in which way they can be combined in order to identify the most affected places.

That is why, in the next part of this report, we develop the following subjects:

1- The environmental implications of the life quality indicators that were used in the INCO project.

2- A comparative analysis of some life quality indicators of the Departments close to Esteros del Iberá, and the application of GIS tool for a spatial visualization, as a quick method for the detection of areas with different levels of vulnerability.

1- Environmental implications of the life quality indicators

a- Demographic dynamics

The size, growth rate, distribution, characteristics, and fluxes of the population are important elements for the understanding of the relationship between man and the environment. As population grows, more resources such as water and land are needed for the development of human activities, and there is more pollution due to the increases in solid, liquid, and gaseous waste (United Nations, 2001). Population density (inhabitants per square kilometre) is one of the indicators that measures the relationship between the number of the population and the environment. The annual average growth rate of the population expresses the rhythm of the growth, what is to say how much the population increases or decreases annually in average per a thousand inhabitants, during a stated period of time (INDEC, 1997).

The growth of the population makes it necessary to build new infrastructure, such as roads, sewer and water supply services, and electric equipments, among other services. The building of this infrastructure can generate environmental problems if it is not done properly. Moreover, if the growth of the population does not happen in an ordered and planned way it can result in other impacts related with, for example, the location of settlements in inadequate areas (frequently flooded or unstable areas).

Indicators used for the analysis of the Esteros del Iberá

- Population, area and density (1991-2001)
- Urban population and rural population (1991-2001)
- Urban and rural population growth rate (2001)
- Migration condition of the population (1991)
- General mortality rate and general birth rate (1991-2001)

- Population by gender and male ratio (1991-2001)

b- Family and Households

The conditions in which a group of people cohabit, including not only the quality of the housing unit but also the infrastructure and services provided, can threaten health, life and environment. The Unsatisfied Basic Needs (UBN) is a tool that offers a way of measuring the deficiencies in the life quality of the population. UBN provides an integral observation of some elements of the human habitat such as employment, housing, health, education, and environmental quality. Households with unsatisfied basic needs (UBN) are those with at least one of the following characteristics: critical overcrowding (households with more than three people to a room), households living in inadequate dwellings (rooms in tenement houses, shanty houses or other type), housing unit having no toilet or no flushing toilet, households having a child in school age not attending school, households with 4 or more people per employed family member, with an undereducated head of household (a person with 2 years or less of primary school education).

Overcrowding, one of the indicators of UBN, can lead to an increase in health problems, for example because of domestic accidents, infections transmitted by air, acute respiratory illnesses, pneumonia and tuberculosis. Health risks increase when there is a situation of low income, because the population has not got the economic resources needed to improve the housing units, and for that reason they can not achieve the necessary space, security and services.

Social differences result in differences in the access to basic services (sewer and drinking water supply services), as well as in the access to the type of lands required to build housing units adequately. These differences sometimes generate stronger pressure upon the local environment, causing pollution of the water and soil, and affecting flora and fauna resources (United Nations, 2003).

Indicators used for the analysis of the Esteros del Iberá

- Number of households and collective dwellings (1991-2001)
- Population in households and collective dwellings (1991-2001)
- Population and households with unsatisfied basic needs (UBN) (1991-2001)

c- Housing and Sanitary services

Housing is an element of human habitat, where man lives and develops; nevertheless, worthy housing must not be considered just as a "roof", instead of this it has to be observed in an integrated way together with other variables such as employment, infrastructure, equipment, income, environment and physical characteristics of the surroundings. Housing is a human basic need, is the shelter or protection that provides privacy and security, and that enables social mobility as well.

The types and deficient conditions of housing affect the health and life quality of the inhabitants. Because of this, it is important for the population to have adequately ventilated and illuminated houses, with basic services, durable structures, dry and comfortable places, protecting the inhabitants against vectors, extreme temperatures and dangers of nature. The places chosen for the construction of houses should minimize the

exposure to noises, industrial emissions, waste, and the possibility of floods. The inside of the housing unit should minimize the risk of accidents, and should also provide a place for privacy and comfort (Barceló, 1999).

Matters related with the availability and quality of fresh water have become a serious problem in some regions, due to the growth of the population, the consequent increase in the demand for water (personal use, agriculture, industry, hydroelectric energy, and mining), and the increase of pollution.

An inadequate supply of *drinking water* as well as *deficient services* are generally linked with diseases transmitted by water and/or related to water such as gastroenteritis, diarrheic diseases, typhoid fever, paratyphoid fever, hepatitis, parasitosis, amoebiasis, cholera, schistosomiasis, malaria filariosis, yellow fever, and others. This situation deteriorates the health of the population as a whole, and results in an increase of infant mortality (Mazzafero, 1999). The importance of the drinking water is shown by the fact that almost half of the world population suffers from diseases related to the lack or to the pollution of water (Chelala, 2003).

Besides a supply of drinking water, it is also very important to have adequate sanitation systems. The insufficiency or lack of sewer systems makes the population pour the sewage in nearby rivers, lakes or cesspools. This generates an increase of the pollution and environmental degradation of the underground and superficial water bodies, from where water for human use is generally extracted. Some of the impacts of the discharge of sewage in aquatic environments are: loss of habitats and loss of biological diversity due to the deterioration of water quality, with the consequent impact on the landscape and the decrease in fishing, tourism, and recreational activities (Gómez, et al, 2002).

Indicators used for the analysis of the Esteros del Iberá

- Population in houselholds classified by type of housing (2001)
- Deficient housing units : with no water pipes within the housing unit, no flushing toilet, without electricity, with packed-earth flooring (1991)
- Population with basic sanitary services: with sewer and water supply services (2001)

d- Health

The interaction between man and the environment is of such a degree that we could say that many diseases are environmental diseases. The amount to which human beings are affected by environmental agents or environmental situations depends on many factors, such as the duration, ways, and levels of exposure to the pollutant, and the characteristics of the people considered (age, nutritional state, immunologic defences, among others). In many cases, the people that because of their socio-economic characteristics are more vulnerable to environmental problems, are also the ones in worst conditions to avoid such problems.

Children are specially susceptible to diseases when they are born and they develop in an inadequate environment, with overcrowding, lack of hygiene, lack of space, and excessive noise. That is why infant mortality could be seen as a measure of the impact of the environmental conditions on life quality (Chelala, 2002).

Health care is a human right and, in order to achieve it, it is necessary to count with the necessary infrastructure for the prevention, cure and rehabilitation in case of disease.

Health services facilities must be well organized, have adequate personnel, and be located in accessible places.

Indicators used for the analysis of the Esteros del Iberá

- Sanitary facilities (1999)
- Beds in medical care institutions, Beds/population relation (1999)
- Percentage of population without health insurance coverage (2001)
- Infant mortality rate (1991-2001)
- Infant mortality according to causes of death (1991-2001)

e- Education

The full development of a human being, in personal and social terms, is linked to the resources of freedom, identity, self-assurance and education that an adequate social and ecological environment provides. Education favours a greater development of human capacities; and education makes it easier to improve life quality, to know and appreciate the environment, and to gain access to more and better information.

Schools are the most suitable places to promote the care for the environment, the knowledge about it and the appreciation of it.

Environmental education should be an integral part of the study programs, and should be connected to other disciplines such as History, Sciences, Geography, Biology, and Arts, in order to integrate the concepts referred to environmental care (Chelala, 2002).

Indicators used for the analysis of the Esteros del Iberá

- Illiteracy rate (1991-2001)
- Population attending some educational establishment, by educational level (1991-2001)
- Educational units by educational level (1995-2001)
- Educational buildings classified by maintenance status (1994)
- Educational buildings connected to public water supply services (1994)

2 – A comparative analysis of some life quality indicators of the Departments close to Esteros del Iberá, and the application of GIS tool for a spatial visualization

a- A comparative analysis of some life quality indicators of the Departments close to Esteros del Iberá

Life quality indicators used for the analysis of the departments close to the Esteros del Iberá: comparartive view

Departments	Population density (inhab/sq km)		Intercensal annual average growth rate 1991-2001 (per thousand)	Annual average growth rate of the urban population 1991-20001 (per thousand)	Percentage of population with UBN		Percentage of population living in huts	Percentage of population living in hovels
	1991	2001			1991	2001	2001	2001
Total Provincial	9,0	10,5	15,0	22,0	31,4	28,5	15,5	4,1
Concepción	2,9	3,7	20,5	60,4	57,9	58,8	25,4	22,9
San Roque	6,6	8.0	10,7	76,8	46,7	41,8	17,4	3,1
San Miguel	3,0	3,6	10,6	31,0	53,9	50,2	37,1	4,8
Santo Tomé	6,1	7,3	21,1	36,5	27,8	28,4	4,1	0,01
Ituzaingó	3,0	3.5	6,0	44,2	31,2	30,0	7,3	4,7
San Martín	1,7	1,9	10,0	19,7	34,0	34,9	11,2	6,3
Mercedes	3,4	4,1	13,7	23,9	33,2	31,1	7,0	1,3

Source: own elaboration based on National Population and Housing Census 1991 and National Population, Households, and Housing Census, 2001. Health Statistics Sub-Directorate. Vital Statistics Department. Provincial Ministry of Public Health. Educational Statistics Department. Ministry of Education of the Province of Corrientes.

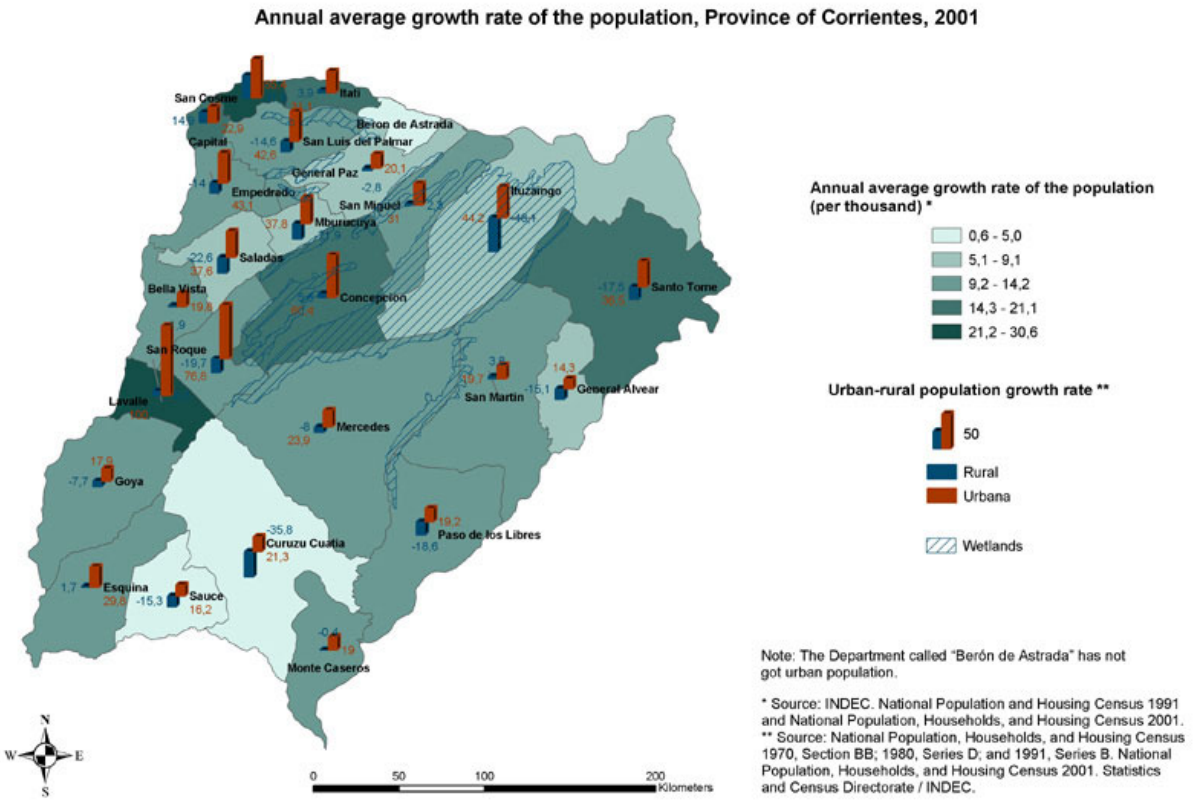
Departments	Percentage of households without public water supply services	Percentage of households not connected to public sewer system	Public health care establishments (units)	Percentage of population without health insurance coverage		Infant mortality rate		Illiteracy rate		Educational units	
	2001	2001	2001	1991	2001	1991	2001	1991	2001	1995	2001
Total Provincial	29,1	75,7	215	48,4	62,1	27,6	23,5	9,3	6,5	1.664	1.946
Concepción	32,5	98,1	4	64,1	76,9	29,9	37,0	23,1	15,4	57	68
San Roque	26,3	96,7	6	62,8	73,5	20,9	21,7	18,0	12,5	55	76
San Miguel	41,8	99,8	3	63,1	76,2	16,1	21,8	17,4	12,7	32	42
Santo Tomé	22,5	55,8	15	42,5	51,7	30,6	24,2	10,1	6,9	99	103
Ituzaingó	22,1	75,9	13	41,2	59,7	19,3	20,5	9,3	6,3	64	83
San Martín	26	85,9	8	57,9	66,6	11,6	9,8	14,1	9,9	38	54
Mercedes	15,7	64,1	5	55,1	62,1	22,8	17,0	11,1	8,0	74	74

Source: own elaboration based on National Population and Housing Census 1991 and National Population, Households, and Housing Census, 2001. Health Statistics Sub-Directorate. Vital Statistics Department. Provincial Ministry of Public Health. Educational Statistics Department. Ministry of Education of the Province of Corrientes.

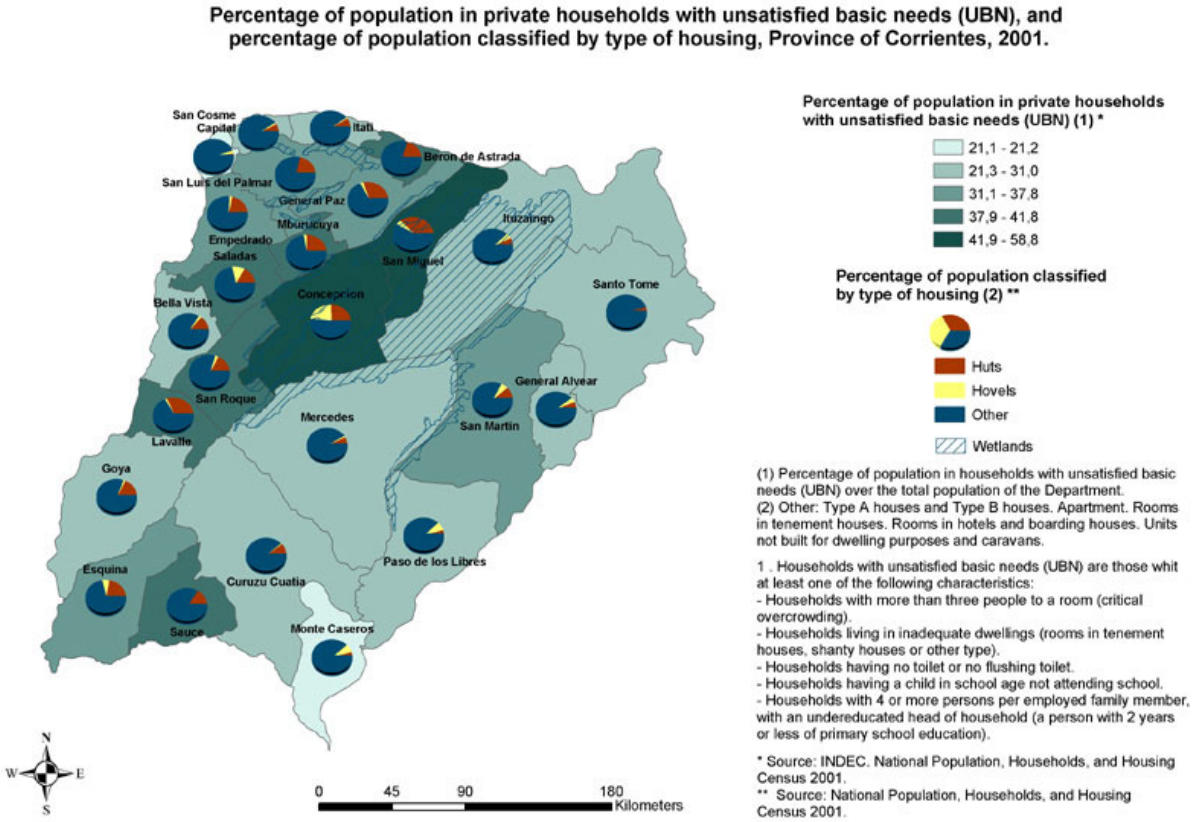
b- The application of GIS tool for a spatial visualization of some life quality indicators

For the studies of life quality in the Esteros del Iberá different tools were used, such as: geographical information system (GIS) and official statistics. Many times, the analysis of the information was done through GIS, allowing a better visualization of the problems and potentialities. Final results were displayed on thematic cartography of our own elaboration, based on provincial and departmental digital cartography. The studies were performed taking as a basis the facts stated in Provincial and National Census, and other bibliography was also used to compare the provincial situation to the national one.

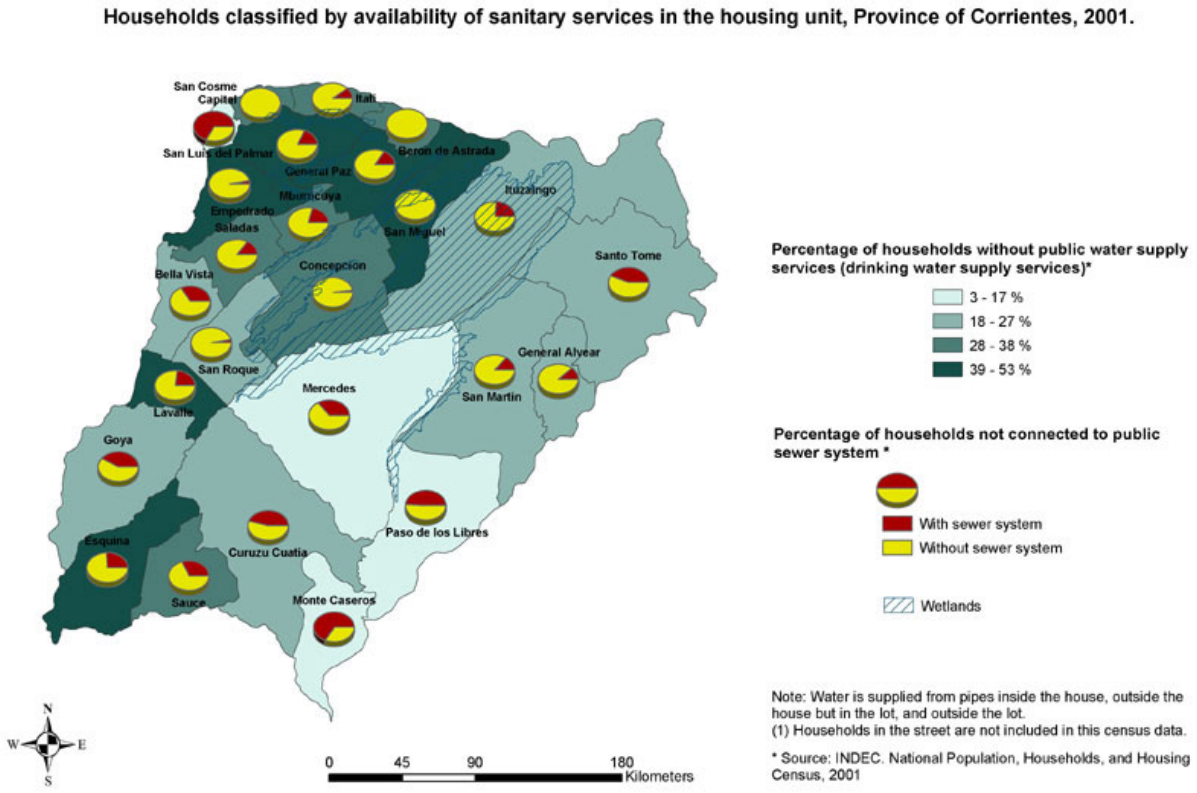
Map 1: Annual average growth rate of the population, Province of Corrientes, 2001



Map 2: Percentage of population in private households with unsatisfied basic needs (UBN), and percentage of population classified by type of housing, Province of Corrientes, 2001.



Map 3: Households classified by availability of sanitary services in the housing unit, Province of Corrientes, 2001.



4- Economic indicators.

The way in which economic activities are evaluated depends on the development model that is assumed. The statistics showed in this chapter reflect a certain model. Both in the case of the Esteros del Iberá and in the case of the Esteros de Ñeembucú, National Accounts provide economic data without taking into account neither the degradation of the habitat and of the energy sources due to the use of resources because of economic activities, nor the waste of natural capital. The effects of economic activities on the population are not estimated either.

In the statistics of the primary sector (the one that uses the natural capital to generate products or inputs for the secondary sector) it is not taken into account that economic activities do not pay for the costs of regeneration of ecosystems, and that the land revenue is not oriented towards that objective. In agro-ecosystems, the agricultural costs do not include the cost of the capital lost because of the substitution of the natural capital.

In the secondary sector, that is based on the primary sector, the carrying capacity of water and air is used, and it is generally exceeded, without paying any cost for the control, management and restitution of what is consequently damaged. Such costs are not included in production costs, and there appears an "negative externality" because some agent's action harms others and does not paid for that damage.

Public services, such as transport, use the spatial aspects of the environment as well as the carrying capacity of air to dilute their gas emissions. In the construction of streets, roads, and infrastructure works, the characteristics of the basins and sub-basins where the constructions are made are not generally taken into account, generating negative externalities.

The omission of these types of environmental costs due to evaluations based on a traditional criterion, makes it necessary to read national statistics with an additional view. It is necessary to include, in each case, the real costs from the point of view of sustainable development, generating a Patrimonial Accounts system that includes the value of the Natural Heritage (UNEP Bariloche Fundation, 1996). The valuation of the Natural Heritage in order to design and implement policies for the sustainable use of nature implies a conception of the value of natural resources that differs from the traditional one, and that involves the use of environmental economic indicators. According to Perrings and Cattáneo (2001):

There are some aspects to consider when thinking of and choosing environmental economics indicators. The indicators should be:

Relevant to the study site and surrounding areas of the wetlands

Smaller sets of well-chosen indicators

More beneficial than costing to society

Helpful in determining the causes of an effects

Highly reliable and of good quality

Fitting the spatial and temporal scale requirements of the site

Regarding this issue, it is important to highlight what Perrings and Cattáneo (Op. cit) propose: the range of potential indicators for the wetlands of Ibera may be many, and it is rather important to have all of them in mind. However, the fact of having too many to track the social ecological system might be expensive,

tedious, and at the end, the picture of the working of the system may be lost. On the other hand, if the indicators are only a few, there is a risk of missing essential information, which provides to the agents with details of the change occurred over time. In addition, the lack of data may also lead to a "weak" social response of the agents involved in the wetlands of Ibera.

Some of the available economic indicators used for the study performed in the Province of Corrientes are showed bellow (Item 4.a). These could be used for the analysis of the Department of Neembucú in order to visualize which production activities may have impacts on the wetlands, regarding environmental sustainability:

- Gross Geographical Product (GGP)
- Direct an indirect jobs in the main branches of activity
- Gross Value Added of the main economic products, relative importance over the total production
- Total area under crops
- Significance of each type of crop as a percentage of the departmental gross value
- Area forested with pine trees
- Soil use
- Growth of the number of hotels and other type of lodgings
- Growth of the number of beds in hotels ad other type of lodgings

In the following item (4.b), we will examine environmental perturbations caused by some of the production developments.

4-a- Economic indicators used for analysis of the Esteros del Iberá

1- Indicators:

Gross Geographical Product (GGP) in 1995: 2.795 million U$S, which is divided among the Big Sectors of Production in the following way :

- Primary production: agriculture, livestock, horticulture, forestry and mining 17%
- Secondary production: construction, textile and leather manufacturing industry, food and beverages manufacturing industry, tobacco industry, and timber industry 28%
- Tertiary production: transport, trade, communications, and financial services 55%

There were no significant variations in the way in which the Gross Provincial Value Added was distributed among the different departments in the period 1995-1999.

Table 1: Direct and indirect jobs in the main branches of activity of the Province of Corrientes. 1999.

Branch of activity	Direct jobs	Indirect jobs	Multiplier *
Cattle, meat and leather	23.528	11.917	0.5
Wool	940	9	0
Citrus fruits	4.327	1.368	0.3
Horticulture	5.505	877	0.2
Rice	2.462	1.596	0.6
Beer	230	668	2.9
Forestry	14.399	386	0
Tobacco industry	2.652	2.195	0.8
Yerba Maté (Paraguay tea)	3.115	931	0.3
Cotton textile industry	4.852	3.693	0.8
Yaciretá	304	2.614	8.6
Electricity and gas	1.168	470	0.4
Construction	3.985	3.392	0.9
Services	12.231	6.380	0.5

* The multiplier of a branch (X) is in direct relation to the amount of inputs (Y) directly or indirectly used by the branch (X) and the coefficient of direct jobs requirements of the branches that provide inputs. It is in inverse relation to the direct and indirect imports of inputs and the coefficient of direct jobs requirements of the branch (X).

Source: own elaboration based on Ministry of Economy and Public Services and Works, Corrientes Economic Report, National Regional Programming Directorate, 1999.

Table 2: Gross Value Added of the main economic products - Relative importance (in percentage) over the total production of the selected Departments, and its situation in relation to the provincial total production – 1998

Products	Ituzaingó	Santo Tomé	Mercedes	San Martín	Concepción	San Roque	San Miguel
Electricity	91%	0	0	0	0	0	0
Tobacco	0	0	0	0	0	5%	0
Yerba Maté (Paraguay tea) and tea	2%	43%	0	0	0	0	0
Livestock	2%	18%	58%	50%	40%	48%	38%
Forestry	5%	33%	1%	16%	24%	7%	42%
Rice	0	6%	32%	30%	2%	8%	4%
Wool	0	0	7%	1%	1%	2%	1%

Horticulture	0	0	2%	1%	5%	12%	10%
Citrus fruits	0	0	0	1%	25%	6%	2%
Watermelon	0	0	0	1%	1%	12%	3%
Cotton textile	0	0	0	0	2%	0	0
Situation in relation to the provincial total production	32.02%	7.43%	3.92%	1.85%	1.64%	1.21%	0.10%

Source: own elaboration based on Ministry of Economy and Public Services and Works, Corrientes Economic Report, National Regional Programming Directorate, 1999.

Table 3: Total area under crops in the selected Departments, and Significance of each type of crop as a percentage of the departmental gross value -1998

Department	Cultivated Area	Cereals	Fruits	Horticulture	Industrial crops and oilseeds
Concepción	7.393 ha	0.39%	27.87%	36.97%	34.76%
Ituzaingó	12.509 ha	23.91%	4.84%	2.51%	68.74%
Mercedes	11.587 ha	96.96%	0	2.51%	0.53%
San Martín	10.425 ha	96.21%	0.70%	2.39%	0.70%
San Miguel	2.608 ha	15.42%	2.42%	60.17%	21.98%
San Roque	8.018 ha	41.08%	3.89%	38.29%	16.74%
Santo Tomé	24.465 ha	37.44%	0.17%	0.85%	61.54%

Source: Ministry of Production and Development. Agro-economic Information Service, Agriculture and Livestock Prediction and Appraisal Department – 1998.

The tree species most frequently grown in Corrientes include *Pinus taeda*, *Pinus elliotti* an *Eucalyptus grandis*, *Pinus caribea*, *Areucaria angustifolia* and *Melia azederach* var. Gigantea (S.R.N. y M.A. 1994 and C.U.E.A. 1993). From 1998 to 2002 timber products of the Province of Corrientes grew 142 %, reaching in 2002 and amount of 15.653.781 dolars (Gobierno de la Provincia de Corrientes, 2004)

Possible impact of the growth of forest production [1]:
The expansion process of forest exploitation has resulted in a series of impacts on the moisty soil:

a) The alteration of the landscape and the natural habitat resulting in the move of different species: the alteration of the natural habitat would not only bring about a radical change in the landscape but also the possible loss of the species and genetic biodiversity and an impact on the soils. As to the latter, some ecologists are afraid that the growth of eucalyptus may affect the ecosystem where it is planted. Among the

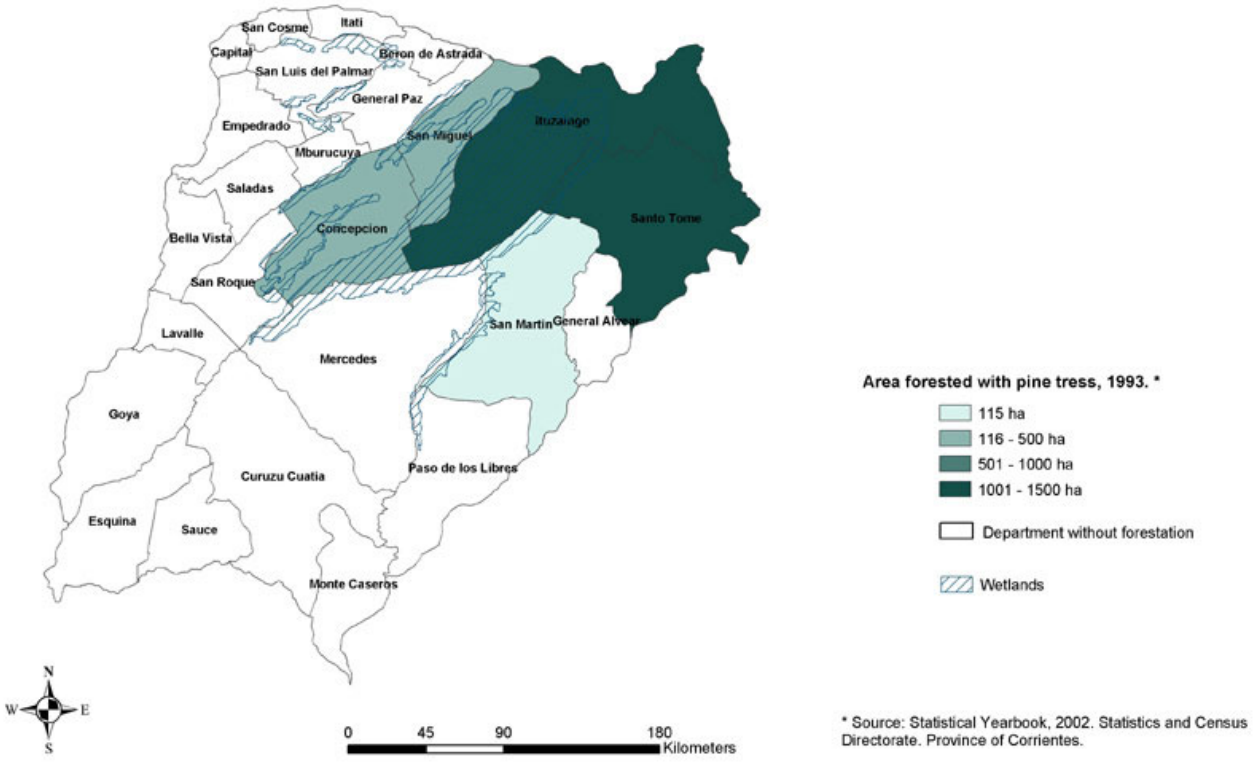
[1] Based on Lucano, María Martha; Gernaert Wilmar, Silvina; Echazú Agüero, María Andrea (2002): "Marco normativo aplicable a los esteros del Iberá con especial énfasis en el correspondiente al sector privado" (unpublished)

arguments supporting this opinion we may find the excessive consumption of water by the eucalyptus, soil empoverishment and its chemical intoxication (alelopathy) which hinders the growth of other kinds of vegetable species [2].

b) The introduction of different exotic species: Lack of proper planning and preliminary study may lead to the loss of the vital richness of the moisty soils and its operation.

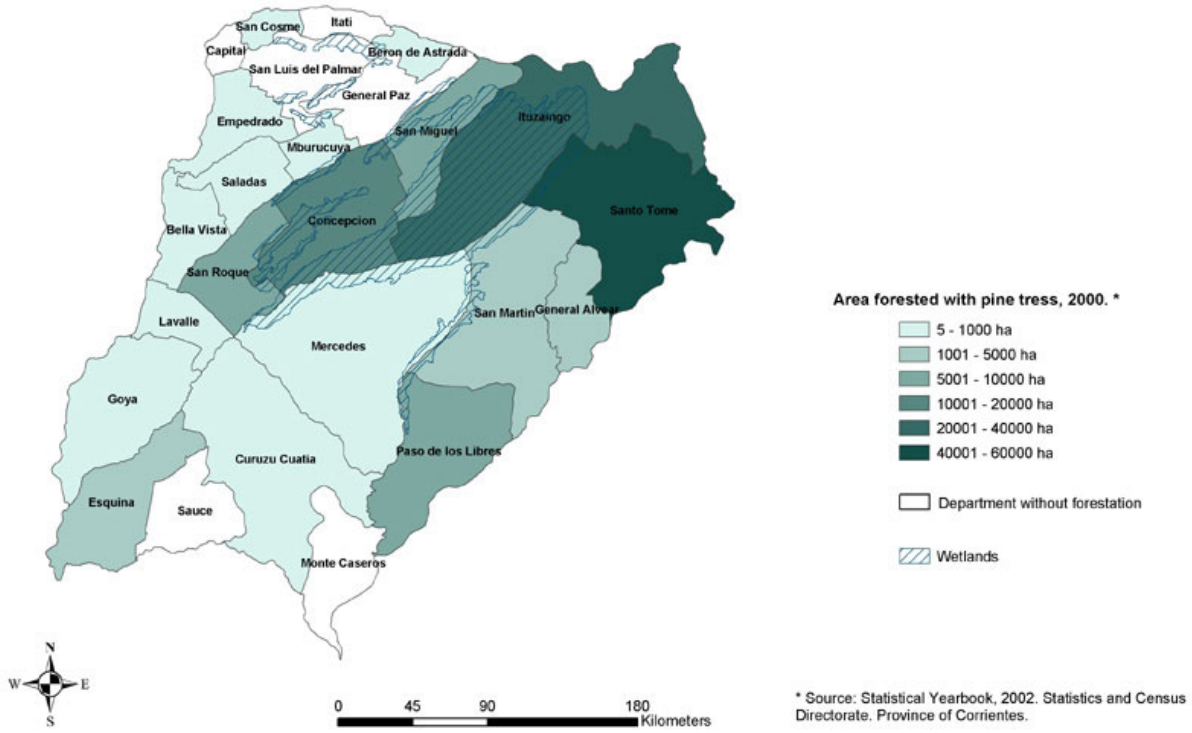
c) Loss of the biodiversity is a consequence of the impacts mentioned above.

Map 1: Area forested with pine trees. Province of Corrientes, year 1993.

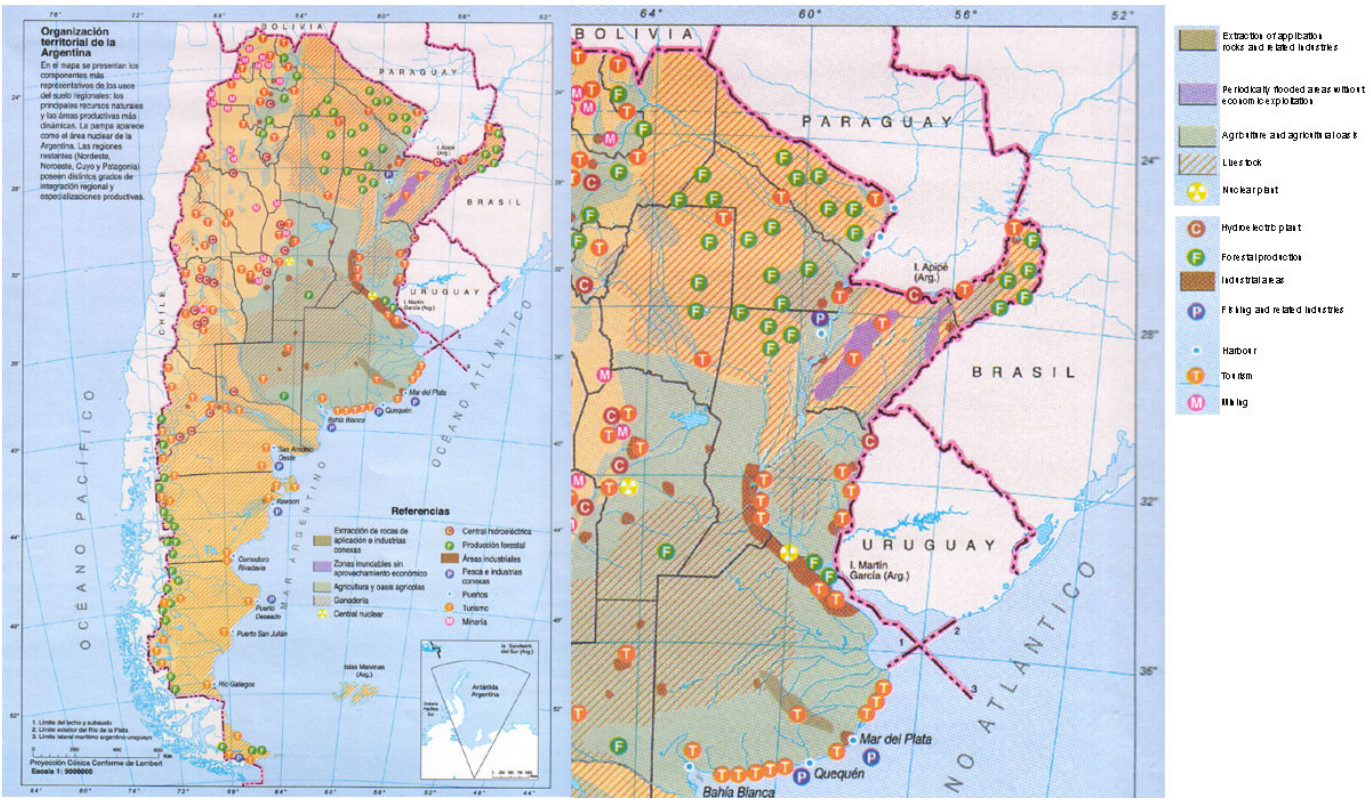


[2] Barrett y Tressens, 1996.

Map 2: Area forested with pine trees. Province of Corrientes, year 2000.



Map 3: Soil use



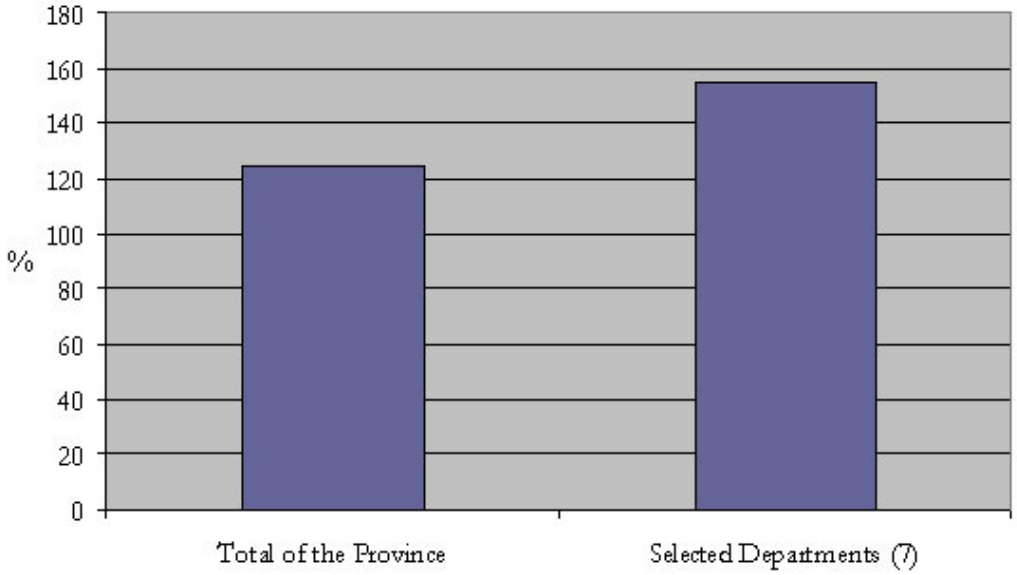
Note: Territorial organization of Argentina:_The map shows the most representative components of the regional soil uses: the main natural resources and the most dynamic production areas. The Pampas appears as the nuclear area of Argentina. The other regions (North-East, North-West, Cuyo and Patagonia) have different degrees of integration and different production specializations.

Source: Big Atlas of Argentina and the World, La Nación, 2003.

Evolution of tourism

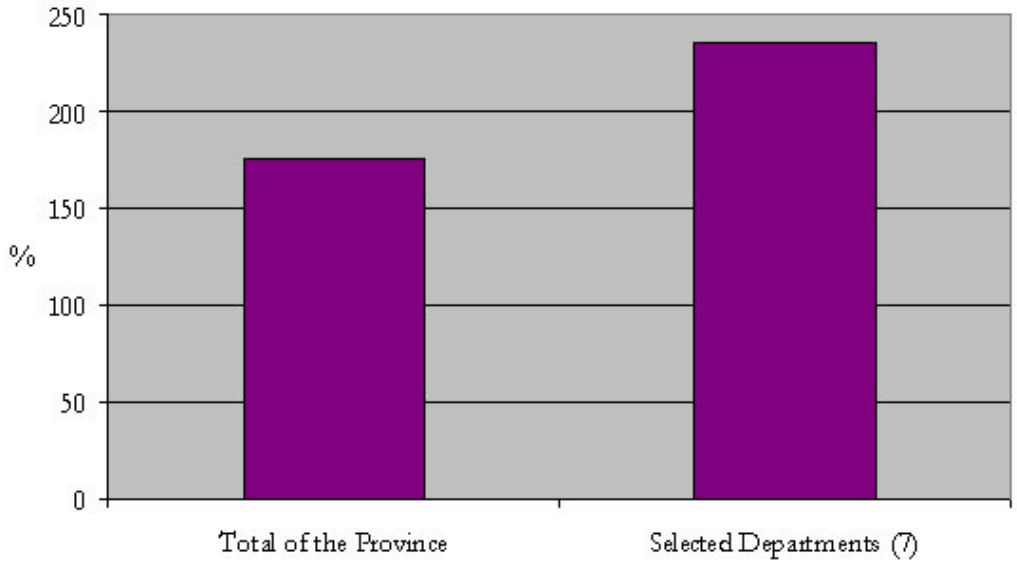
In order to measure the evolution of tourism we can use indirect indicators to evaluate the pressure that the number of tourists puts on the Esteros del Iberá. The proposed indicators are: the Number of hotels and other type of lodgings and the Number of beds in of hotels and other type of lodgings.

Graphic 1: Growth of the number of hotels and other type of lodgings in the period 1997-2001 - (expressed as a percentage)



Source: Statistical Yearbook 1998, and Statistical Yearbook 2002. Statistics and Census Directorate. Province of Corrientes.

Graphic 2: Growth of the number of beds in hotels and other type of lodgings in the period 1997-2001 - (expressed as a percentage)



Source: Statistical Yearbook 1998, and Statistical Yearbook 2002. Statistics and Census Directorate. Province of Corrientes.

4.b- Socio-economic pressures that affect the sustainability of the wetlands.

1- Problems regarding the development of adequate infrastructure:

Main impacts of the municipal sewage on the aquatic ecosystem

POTENTIAL IMPACTS	
ECOLOGIC	**ECONOMIC**
Asphyxia of fish	Changes in the biomass, resulting in loss of food for commercial fish
Temporary increase of plankton	
Reduction of the net primary productivity	
Reduction of the zooplankton and benthos production	
Decrease in the quantity and quality of the fish food	Estimation of changes in the availability of organisms with market value or substitution value
Proliferation of parasites in fish	
Damage in fish organs	Loss of income in the fishing activities
Reduction of the growth rate and size of fish	
Suspension of the development of fish eggs and larvas	Loss of income in business activities related to fishing activities
Reduction of fertility and reproduction of fish	
Loss of natural stock	

Reduction of organisms of commercial size	
Pollution of sediments	Rehabilitation or cleaning costs
Modification of the swimming, natural movements and migration patterns of fish	Loss of commercial species and income related to their capture
Loss of habitats of different species	
Loss of niches and functions of organisms	Loss of jobs
Migration of fish populations to less polluted areas	
Increase in the vulnerability because of competition for space and food in clean areas	Loss of recreational activities
Modification of the trophic chain	Loss of income because of the acquisition of substitute goods for subsistence fishing
Shortening of the trophic chain	
Modification of the biological communities	
Local loss of sensitive species	
Proliferation of tolerant species	
Loss of local biological diversity	
Loss of commercial organisms	
Increase in the vulnerability of the endangered or endemic species	
Impacts on migratory birds	Costs of recuperation of the quality conditions required by the species
Deterioration of riparian areas because of the accumulation of waste and sediments	Decrease in the value of properties
Increase of the available organic matter in the riparian areas	Differences in the productivity of lands under crops or deterioration
Excessive production of algas and aquatic plants	Freeing of resources not used in the cleaning of dams
Loss of water because of evapotransmission of aquatic weeds	Estimation of the value of the amounts lost, according to their potential use
Production of phytotoxins	Increase of costs because of greater water disinfection
Export of nutrients to:	Saving because of the use of nutrients
Soils (short term)	Product quality not accepted by the consumer and the market
Aquifers (in the long term, but with potential effects at the present time)	Potential effects on health, requirements of treatment and confirmation of the aquifer
Oceans (in the long term, but with potential effects at the present time)	Potential effects on the fishing productivity and the related income
Bio-accumulation of metals, zooplankton and macro-invertebrates (short term)	Potential effects on health, resulting in medical care costs

Bio-accumulation in the mollusks (short term)	Rejection of the products in the market, loss of the value of capture Loss of jobs and income of the fishermen
Bio-accumulation in the fish (medium term)	
Deformations in different groups Genetic changes Effects such as dwarfism or commercial short size Spreading of diseases	
Decrease of the resilience of the ecosystem or capacity to recover its initial conditions, due to the accumulative and residual impacts (pollutants without treatment)	Long term investments for the rehabilitation of rivers, lakes, and dams, as well as for the protection or decontamination of underground water

Source: Gómez B., Saldaña F., Martínez, G., Gaitán N., Athala M., Lerdo de Tejada B., Gutiérrez L., Sandoval V., Ruiz L., Salcedo S. (2002) "Economic valuation of the environmental impact of the municipal sewage discharge" Mexican Water Technology Institute, Environment and Natural Resources Secretariat .

2- Development of rice production

Rice cultivation [3]

The rice production is important because of the size of the area under this crop, the number of jobs connected with this activity, and the value added that generates for the Province of Corrientes. The soils found in the province are suitable for rice production, and there are very good chances for the development of this crop also because of other facts, such as the natural conditions of the region, the incorporation of technology, and the creation of additional irrigation systems with the construction of dams.

The Correntinian production represented about 45% of the production of rice in the whole Argentina in 2000/01 season, reaching 394.583 tons[4] . Rice production in the province increased more than 245% between 1991/92 and 1998/99 seasons, the latter reaching 554.110 tons, marking a new provincial record. This increase in the production was mainly due to the increase in the rice sowed land area, which rose 120% during the period 1991-1998 (eight years). This growth was connected with the introduction of new tropical rice varieties and the higher use of agrochemicals, specially fertilizers. Because of the potential growth conditions in the region, it was foreseeable that an increase in the rice sowed land area together with the incorporation of technology and the introduction of big Brazilian capital companies, would result in increases in the production output and in the crop yields[5].

The 87% of the rice exports of the Province in 1998 was addressed to the Brazilian market[6]. But in the last years the effects of the devaluation of the real and the contraction of the Brazilian demand for this crop have been remarkable, and the

[3] Based on Lucano, María Martha; Gernaert Wilmar, Silvina; Echazú Agüero, María Andrea (2002): "Marco normativo aplicable a los esteros del Iberá con especial énfasis en el correspondiente al sector privado" (unpublished)

[4] **1998 Yearbook**, Cereals Exchange, Buenos Aires, 1998.

[5] Demography, employment, infrastructure of production activities, Regional socio-economic diagnosis I Integral Energy Study Programs of the Argentine North-east Region. Document N. 6, Buenos Aires, 1990.

[6] *Corrientes ¿ end or beginning ?,* **Monthly economic report,** Research for Development Foundation editions _FIDE, Buenos Aires, November 1999.

production has faced a high risk as a consequence. The rice exports of the Province of Corrientes have fallen 37% between 1998 and 2001.[7]

This crop needs to remain flooded for about 100 days, and thus the management of large amounts of water is required. In Corrientes, the production system is based on the use of superficial water (from rivers, streams or lagoons) as a source of irrigation. The type of soils under this crops are hydromorfic, plain, and with big difficulties of drainage, including periodically flooded areas.

The production method based on the periodic rotation of crops makes it usual for the producers to rent part of the cultivated land. Although there´s no complete information available yet, we can say that there´s a strong trend towards renting, agricultural partnership and sharecropping agreements. Almost all the tenant producers, as well as the partner and sharecropper producers, cultivate rice exclusively (productive monoculture), whereas the rice producers that cultivate lands of their own generally make rotations between rice and cattle breeding. [8]

The characteristics of this crop impose a specific organizational form of the business unit, because the implementation of an adequate irrigation system requires the installation of equipment able to manage large amounts of water, as well as a source of water able to fulfil such requirements. In the Esteros del Iberá it is possible to extract 10.000 m^3 of water per hectare, during three months of the year.

Most of the big rice production units are placed by the big rivers, such as Paraná, Uruguay, Corrientes and Santa Lucia, while the small an medium ones use lagoons and/or streams (smaller courses of water) as a source of water. The crops are mainly located in the Departments of Santo Tomé, Monte Caseros, Mercedes, Paso de los Libres, Curuzú Cuatiá, San Martín, Ituzaingó, and Bella Vista[9].

The intensity of the cultivation in the area of the Iberá wetland is slow or medium in comparison with other areas of the Province of Corrientes. Nevertheless the rest of the area surrounding this ecosystem suffers a greater intensity, and the resulting impacts, although being indirect, affect its functioning.

Potential impacts of an increase in the production of rice:

The functioning of the Iberá wetlands is affected by a series of impacts that would be greater if there happened an increase in the production of rice, in the following ways:

a) Demand for wetland water: A greater demand due to an increase in rice production will result in greater requirements of water, that will possibly exceed the capacity of the ecosystem.

b) Use of pesticides and fertilizers: Pesticides and fertilizers used nowadays in rice production have a direct impact on superficial and underground water quality.

c) Modification of the natural habitat: The spreading of rice production in the Iberá wetlands is modifying the local landscape of the area and it will keep on affecting the functioning of the ecosystem in the future. The replacement of natural ecosystems with agricultural ecosystems generates a loss of biodiversity.

[7] Statistical Yearbook 2002, Statistics and Census Directorate, Province of Corrientes.
[8] Agriculture, Livestock, Fishing and Food Secretariat, 1994
[9] Estimations indicate that there are 218 rice producers.

Table showing the list of herbicides, insecticides and fertilizers used in rice production

Herbicides	**Commercial name**	**Doses**
GLYPHOSATE	ROUND UP AND OTHERS	4-6 L/HA
BENTHIOCARB + PROPANIL	SATANIL	5-8 KG/HA
MOLINATE	ORDRAM	5-8 KG/HA
PIRAZOSSULFUN-ETHYL	SIRIUS 70 E	0,8 –1 L/HA
BENTAZON	BASAGRAN	1,5 – 2,5 L/HA
BENTAZON + DICAMBA	DIAMANT	1,7 – 2,5 L/HA
BENTAZON + MCPA	AROMO	5 L/HA
Insecticides		
CIPERMETRIN + CLORPIRIFOS	LORBAN PLUS	700 CC/HA
ALFAMETRIN + ENDOSULPHAN	BALA	100+500 CC/HA
ESFENVALERATE + FENITOTRION	SUMITION	400 – 500 CC/HA
METAMIDOPHOS	VARIOUS	800 CC/HA
MONOCROTOPHOS	VARIOUS	700 CC/HA

FERTILIZERS [10]

Producers generally use compound fertilizers or mixtures made up of the following substances:

UREA – as a source of nitrogen

TRI-CALCIUM-PHOSFATE – as a source of phosphorus

POTASIUM CHLORIDE – as a source of potassium

The usual doses vary between 200 and 300 Kg/ha in the sowing time and 50 to 80 Kg/ha of urea at the beginning of the sprout of the crop.

3- Development of tourism

Set of regulations applicable to the Esteros del Ibera with a special emphasis on what refers to the private sector. (Report produced within the project INCO DC)

Towards the end of the 80s and the beginning of the 90s an alternative form of the traditional massive tourism begins to spread throughout the world, which is the ecotourism or ecological tourism, based mainly on a tourism of nature intended to study, admire and enjoy the natural attractions where man appears as little as possible.

[10] Ing. Agr. Gustavo Sabio – Director Delegación Pcia. de Corrientes Universidad del Salvador (comunicación personal) 11 de junio de 1998

Together with this new world tendency, this new form of tourism comes up in different spots of our country. There is a special region in the Province of Corrientes, with a place like the Esteros del Iberá still in their natural state, isolated and mainly unexplored, surrounded by a halo of mystery because of the difficulty to get into them, that offers a great richness of species and a variety of setting beauties, which has become a natural attraction, thus playing an increasing role in the development of the ecotourism of the zone.

Iberá turns to be the ideal place to go so as to admire, enjoy, understand and study the natural environment offering a number of attractions to the visitor: photographic safaris and watching of wild fauna through tourist circuits that make it possible to move through the reserve guided by local guides in any of the three possible ways: on foot, on horseback or sailing.

But for several years the Iberá wildlife had to undergo severe poaching on species like alligators, deer, capybaras, otters an curiyus, the furs of which were sold to clandestine buyers. In order to put an end to this situation, the Government of the Province of Corrientes decided to create in 1983 the Reserve of Ibera, setting up a corps of forest rangers to protect it and establishing an Interpretation Center with the objective of transmitting and spreading substantial knowledge and awareness on the importance of the place. This Center is nowadays provided with a maquette of the whole region, embalmed specimens of the local fauna, plans of the zone, a natural park for the breeding and reproduction of animals in their habitat, a botanical garden and a scientific museum 1[11].

The way to get to the Iberá region is through routes or unpaved roads, what makes the access difficult especially after the rains on one side, but they bestow on the region a unique wild and unexplored feature on the other.

The recreative tourist area has centered mainly around the Ibera Lagoon (in Guarani language: bright waters) and Colonia Pellegrini, although there are many offers of lodging facilities on the edge of the wetlands themselves. The different options are[12]:

- Camping by the Iberá Lagoon and Interpretation Center, and in Colonia Pellegrini.

- 3 inns and 1 hostelry, situated in Colonia Pellegrini: Aguape, of Ñandoreta Lagoon, El Aguara and Ypa Sapukai[13].

- 3 Ranches or cabins: San Juan Poriahu, near Loreto; El Dorado in Mercedes (at present there are activities of sporting fishing and diving) and Rincon del Diablo; Pira Lodge and Sanchez Lodge in Laguna Itati. These ranches and cabins use the ecotourist activity as a complement of their income, as they are mainly devoted to agriculture and cattle raising.

- In the case, for instance, of the ranch San Juan de Poriahu, a protected area has been created in parts of these lands in collaboration with the Wildlife Foundation (Argentina) with the purpose of developing projects of protection and repopulation. In this way "the Foundation uses ranches as a way to set up its own reserves; since buying land is very difficult, they have designed a system of private shelters among private individuals, ranch owners or firms owning zones within their own lands, which are in coincidence with

[11] T. E "Esteros del Ibera: la naturaleza en plenitud", Clarin, Suplemento de Viajes y Turismo, Buenos Aires, 25-10-92, p 12.
[12] Information obtained from the area of Tourism, House of the Province of Corrientes in Buenos Aires.
[13] Data supplied by Pedro Noailles, owner of the Ypa Sapukai Inn, Colonia Carlos Pellegrini. This information refers to the establishments that have the official permission to work given by the Town Hall.

habitats of interesting species or which might have special characteristics of ecological interest"[14].

- Establishing private reserves devoted to the development of ecotourism is one of the institutional options that arises to deal with protected areas , and it provides an alternative to the expansion of the participation of the different sectors which have not traditionally taken part in the management and conservation of the ecosystems. As a world tendency, the role of the private owners, such as that of other groups: Non Governmental Organizations, Universities, native groups, etc, in the management of protected areas is increasing[15]. Those who some time ago allowed damages to the ecosystem, consider nowadays the offer of ecotourism services a stimulus for their economies, what makes them become strong protectors of the environment[16].

- As to the touristic inflow, there are for the time being no official records that give information of the number of visitors that the region receives in a year. There are informal data, obtained through the records produced by every owner of the inns or ranches, that show that in 1997 the number of visitors was yearly around 60 people for one of the inns, while in 1998 that number grew up to 250 people.

Impact of tourism on protected natural areas, with special emphasis on wetlands.

The Convention on Wetlands (Ramsar, Iran, 1971) considers the ecotourism as a possible activity which is included in its concept of rational use of the wetlands, and specially of those mentioned en the List of Wetlands of International Importance, the so called Ramsar Places. Many of these places are fit for the ecotourism, and many local and native communities could get a profit from well thought initiatives moving in this direction.

Although the Convention has not produced its own outlines about this particular subject yet, the recreation of wetlands is nowadays a reality that represents an important challenge for the planners and managers of the territory who are trying to achieve the conservation of ecological and cultural values in public use, in areas of a remarkable ecosystemic fragility.

The increase of these tourist and recreative habits has to do with the interest that the environment awakens in our society, the anxiety to enjoy an atmosphere different from that of the cities and the exhaustion of the model of the conventional tourism.

However, one has to bear in mind that in this way fragile resources are at stake, which experience has shown are very easily degraded, that is why it is essential to have, in the first place, a planning of the activities according to the characteristics of the resources. That is the reason why it is important to know the tourist and recreative potentials of a wetland, so as to be able to prepare a suitable way to handle them, to diminish the impacts that they might cause on the resources and their area of influence.

"By environmental impact we mean the modifications, alterations or changes in the environment or in some of the components of the environmental system, brought about

[14] Interview to Marcos Garcia Rams, owner of the ranch San Juan Poriahu in Entre la preservacion y el ecoturismo., P. 12, Suplemento Verde, Buenos Aires, 26-10-94, p.3.
[15] Barborak, James. Institutional Options for Managing Protected Areas, p.30, in Expanding Partnerships in Conservation, Jeffrey A. Mc Neely, Ed, Washington DC , IUCN- The World Conservation Union, Island Press, 1995.
[16] Toselli, Claudia. Turismo ecologico: aspectos generales sobre esta nueva tendencia, Signos Universitarios – Turismo, Buenos Aires, Ed. Universidad del Salvador, Año XII, N° 24, July/December 1993, p101.

by an activity or action. These alterations can be positive or negative, they can produce direct or indirect , mediate or immediate effects, they can affect a reduced space or a region, they can have a punctual or accumulative incidence"[17].

This concept can be used in environmental, cultural, social, economic or aesthetic terms. (See Chart 1).

A long list of impacts caused by tourism can be set up, the responsibility for which is not only the tourist's, but also of those who plan and organize the typical activities of the sector .

Taking into consideration the most usual problems, and above all those that appear in the tourist centres, it can be pointed out that some of the most important modifiers of such spaces are the real estate speculation and the building factors, which generally have much more accelerated dynamics than those of the communities themselves where they settle, and on some occasions they bring about substantial changes in the physical aspect of the place, problems in the provision of services and space segregation of the resident population.

In Chart ll, in general terms, one can observe the negative impacts that tourism can perform on a protected natural area and their corresponding consequences.

Bearing in mind the factors mentioned in Chart ll, the evaluation of the tourist-loading capacity of the natural tourist or recreative areas is very important.

"The capacity of tourist loading is a specific form of the capacity of environmental loading (in this context, the term environmental refers both to the biophysical and to the socio-cultural aspects).The capacity of environmental loading of an ecosystem to support healthy organisms and keep their productivity, adaptability and capacity of renovation at the same time. In other words, the loading capacity is the borderline level of human activity above which the environmental deterioration of the basis of the resources will follow"[18].

The supporting capacity will determine the level of occupation that an area can bear, without altering its ecological equilibrium or receiving negative impacts on its resources.

Likewise," the tourist loading capacity is the loading capacity of the biophysical and social environment only related to the activity and the tourist development. It refers to the highest level of visitors and substructure that an area can bear without suffering any harmful effects on the resources and diminishing the standard of satisfaction of the visitor or provoking a negative impact on the society, the economy or the culture of an area"[19].

Therefore, the loading capacity can be measured in ecological, as well as in psychological, sociocultural and administrative terms. That is to say, in an area, there will be, in the first place, a physical limit (square meters per person). Next, the environmental impact the development of the activity may cause on animals, trees, soil, and water must be considered. The psycho-social element determines in what way the development of the activity can affect the local community and the tourists themselves, that is to say, one has to take into account the number of simultaneous visitors that a natural area can receive, where everybody can live a satisfactory experience, without affecting the image of the place.

Finally, the administrative component recognizes that there is a level of tourist activity beyond which the suitable management of a protected natural area is not possible. This is

[17] BOO, E., Ecoturismo: Potenciales y Escollos, World Wildlife Found & The Conservation Foundation. USA, Wickersham Printing Company Inc., 1990, p 26.
[18] Ceballos Lasccurain, H. Estrategia nacional de ecoturismo para Mexico, Secretaria de Turismo, Mexico D. F. 1994, pag. 125.
[19] Idem, p 125

connected with the kind of physical substructure and facilities available for tourists, such as staff for the attention of the visitors, capacity of the interpretation centers, parking areas, opening and closing times, etc.

When the supporting capacity has been exceeded, especially in ecological terms, this is highly harmful for the ecosystem affected. As a consequence of this situation an inevitable and quick degradation will come about. Obtaining and evaluating data referring to the number of simultaneous tourists, the number of daily rotations, the frequency of visits a year, the length of time of stay in the place, performed activities, normal animal conduct, etc, must be incorporated to the management plans of the natural areas. With this information, the standards of the supporting capacity of the place will be set and the close season can be determined, or else some regulations that may restrain the visit of tourists in order to protect the species that inhabit the area.

In the case of natural areas, where the tourist activity has already been developed, the process must begin by determining the supporting capacity in the most saturated natural attractions, so as to avoid that the activity keeps increasing and exceeds the proper limits. Those spots of the area which have the lowest supporting capacity will be the first to set up the highest number of tourists.

There are proceedings which enable an area to increase its loading capacity, such as for instance:

- To promote visits during the low season.
- To supply information and interpretative services, with the purpose of making visitors aware of the situation.
- To draw different paths in the same area, in order to shift the routes, when it is thought that stepping on the same place may cause any damage, and thus make its recovery easier.
- To propose alternative means of access to the area (boats, animals of burden, on foot, means of locomotion except contaminating ones, like motorbikes, motorboats, etc)
- To build "balconies" in the sectors of greatest vulnerability so that tourists may watch without getting too close.
- To limit temporarily the access to the ecologically most fragile zones.
- To set up or shorten the hunting or fishing season.
- To establish the best number of visitors within the area.

The studies on environmental impact and supporting capacity are two fundamental concepts to work with in the planning of tourist-recreative natural areas. On the other hand, education and information on the environment will also help to minimize the negative effects that tourism may bring about in protected natural areas.

Undoubtedly these areas are a very important means for education and to generate changes of attitude towards the conservation of the environment in the surrounding inhabited spots. The interpretation and knowledge of the natural area of recreative use, on the side of the local population, will bring about a greater respect and responsibility for its protection.

The placement of signs, distribution of leaflets, scheduled visits for schools, organization of campings, diagramation of centers and paths interpretation and the previous training of specialized guides, prove to be efficient tools to enlarge the knowledge of the tourist and improve the behaviour in the natural area.

It is important to make it clear that every means devoted to this purpose must try to transmit messages of easy comprehension in order to achieve the intended objective. Of

course, these elements are not only for the environmental education of the inhabitants, but they will also be used as a motivating means of environmental ethics for the tourists. They must basically focus on knowing how to transmit to the tourist the "capacity to see" and live in contact with the natural environment.

In this job, the collaboration given by the inhabitants of the area will be essential, that is why the previous education of the local population is very important. To sum up, what is intended to achieve through environmental education is to get the visitor to know the most important features of the natural area, enjoy the contact with nature and, mainly, understand that the preservation of the natural resources depends on his participation.

TOURIST ACTIVITIES IN WETLANDS

Based on the report "Tools for the management of tourism suitable for wetlands"[20], in Chart lll, there is a list of the most frequent tourist-recreative activities in wetlands, grouped in three kinds: game-centered, sporting-adventurous and interpretative-educational, taking into consideration that the place where they can be carried out are natural spaces and also inhabited wetlands in rural areas. They may likewise be classified according to the degree of specialization demanded to the participants. We thus have: general, specialized and highly specialized.

On the other hand, Chart lV shows the activities coming from recreation and tourism, the effects on the wetlands and the possible actions to reverse the impacts caused.

[20] Ministry of The Environment, General Secretary of the Environment, General Department of Environmental Quality and Evaluation. Tools for the management of the tourism suitable for wetlands. Guide for the recreative management of the natural resources, Series Technical Booklets, Spain 2002. http:/www.medwet.org/online/herra/herra2.pdf (Consulting date 04.02.2004).

Chart I – Impacts of tourism

IMPACTS	**ENVIRONMENTAL**	**SOCIO / CULTURAL**	**ECONOMIC**	**AESTHETIC**
Positive	-Makes the tourist and the local population become conscious of the importance of environmental protection. -Contributes to preserve a great number of natural areas. -Helps to increase the conscience and education related to the protection of the environment.	-Improves equipment and substructures. -Avoids or stabilizes the emigration of the local population. -Improves the sociocultural level of the local population. -Allows the interchange of ideas, habits and lifestyles.	-Generates income in the local population. -Encourages the production of local products, such as gastronomy and handicraft. -Recovers and strengthens regions of lower economic development.	-Improves equipment and substructure. -Contributes to take better care of certain zones due to the visit of tourists.
Negative	-Erodes the beaches as a consequence of the destruction of the sandbanks and the coast vegetation. -Increases the contamination of the water. -Alters the natural ecosystems. -Affects the flora and the fauna. -Increases the use of resources, such as the water and the soil.	-Produces the loss of traditional values. -Produces the homogenization of cultures.	-Raises the prices, and consequently, damages the local population.	-Increases the visual polution (signs, excessive signalling, publicity). -Increases the production of waste and the accumulation of garbage. -Destroys the landscape when creating new substructures and buildings.

Source: Elaborated based on González Bernáldez, F. 1994.

Chart II. Impacts of tourism on natural areas

FACTOR	IMPACT ON ENVIRONMENT	CONSEQUENCE
Noise	Disturbance in natural sounds.	Irritation of wildlife and visitors of the area.
Motorboats, touristic boats	Disturbance of wildlife_ acoustic contamination; water contamination (oil spills).	Vulnerability during the nesting / reproduction / breeding season; loss of quality of water.
Garbage	Harm to the natural landscape; change in the condition of nourishers generating alterations in the vegetation.	Sanitary danger and aesthetic damage.
Careless use of fire	Fires.	Damage of landscape; erosion; death of animals.
Wood collection	Death of wild animals; destruction of the habitat; deforestation.	Ecological changes; erosion; extinction of species.
Feeding of animals	Change in the conduct of the fauna.	Dependence on a constant source of feeding; damage due to ingestion of inappropriate food.
Collection of natural resources	Removal of natural and/or cultural elements.	Exhaustion of the resource (fossil or archeological deposits); disturbance of the natural processes; impossibility to cary out deep scientific investigations.
Outflow of untreated water	Changes in the quality of the water, contamination of the water in the surface and underground; increase of nourishers in the water.	Eutrofication, smell, increase of the level of oxygen, loss of drinkable water, extinction of species; less fishing.
People	Changes in animal conduct; saturation of the loading capacity, erosion for stepping.	Erosion of the paths; compacting of the soil.

Source: Elaborated based on Boo, E. (1990) and Bertonatti, C. (2003)

Chart III. Recreative activities in wetlands

		NATURAL WETLANDS	**AGROECOSYSTEMS**
Game centered kinds	Terrestrial (On land)	Recreation and relaxation Camping Vacation colonies Collection of mushrooms, minerals, shells, etc. Stay in shelters, ecolodges, etc. Country meals Sunbathing Trekking Horse riding, etc. Bike rides Car or bus drives	Recreation and relaxation Stay in rural houses Gastronomy Visits to craftsmen Sunbathing Walks Visits to fairs and markets Attendance to cultural events
	On water	Bathing Fishing Boat sailing Hidrotherapy	Bathing Fishing Boat sailing
	In the air	Light aircraft flying	Light aircraft flying
Interpretative-educational kinds	On land	Photographic safari Scientific expedition Ecological routes Classrooms in nature Interpretation centers Work fields Nature watching (birds –birdwatching-, snakes, butterflies, plants,etc)	Agrotourism School-farms Visits to craftsmen Workshops Workfields Visits to ecomuseums Visits to Etnological museums Visits to local museums Attendance to cultural events Guided cultural visits Free cultural visits Cultural routes
	In the air	Itineraries in light aircraft	Itineraries in light aircraft
Sporting-adventurous kinds	On land	Trekking Hunting	Trekking Hunting

	On water	Swimming Sailing Windsurfing Canoeing Rowing Fishing	Swimming Sailing Windsurfing Canoeing Rowing Fishing
	In the air	Aeromodelling Gliding Ultralight aircrafts	Aeromodelling Gliding Ultralight aircrafts.

Chart IV. Some of the main impacts of recreation and tourism which affect the wetlands

	ACTIVITY	EFFECTS ON THE WETLAND	CORRECTIVE MEASURES
Water	-Bombing of the aqueducts and of the superficial flows to supply water to the recreative and/or tourist facilities.	-Desiccation of the wetland. -Alteration of the hydroperiod. -Salinization of the coast ducts due to the sea intrusion in the littoral wetlands. -Compacting of the soil and induced subsidence. -Alterations in the bioceno sis.	-Prohibition of any work. intended to drain the wetland. -Proper use of underground water. -Measures of restoration. -Conversion of the traditional. watering systems to techniques of fertirrigation.
	-Artificial reservoir of water	-Alteration of the morphology and hydrology of the wetland	Measures of restoration
	-Outflows of sewage coming from the recreative and/or tourist facilities	-Eutrofization. -Salinization. -Microbiological contamination.	-Instrumentation of plans to clean up sewage. -Canalization of the sewage (draining nets).
	-Building of hydraulic substructures for the development of recreative and/or tourist activities	-Decrease of the wet surface. -Decrease of the rate of infiltration in the aqueduct. -Increase of the draining speed of the wetland. -Increase of the superficial drain and of the erosion.	-Maintenance and rehabilitation of traditional channels with natural banks and bottoms. -Projecting of substructures of communication that avoid the wetlands.
Fauna	-Hydraulic substructures, substructures of communications, etc in the wetland.	-Isolation of the biocenesis. -Loss of genetic biodiversity.	-Projecting of substructures avoiding the wetlands.
	-Introduction of exotic species.	-Damage to local species and loss of biodiversity. -Extinction of sensitive species. -Loss of habitats for native species. -Introduction of associated illnesses.	-Loss of habitats for the native species.
Vegetation	-Hydraulic substructures, substructures of communications, etc.	-Punctual loss of vegetal mass.	-Projecting of substructures avoiding the wetlands.
	-Introduction of exotic species.	-Damage to the native species and loss of biodiversity.	-Reintroduction of native species.

	-Uncontrolled fires (accidental and intentional) in the wetland.	-Undiscriminated loss of vegetal mass, habitats and biocenesis. -Decrease of rains. -Increase of erosion.	-Promotion of natural regeneration. -Vegetal restoration.
Landscape	-Earth coverings.	-The landscape becomes banal.	-Measures of restoration
	-Urbanization.	-Loss of the quality of the landscape.	-In existing urbanizations; restoration measures where it is possible.
	-Presence of garbage.	-Loss in the quality of the landscape. -Bad smells. -Increase of the sanitary risk.	-Collection of garbage and cleaning.

5- Comparison between Argentine and Paraguayan legal aspects

International law

Argentina:

- Decree 89.180/41. It ratifies the Convention on Nature Protection and Wild Life Preservation in the Western Hemisphere – Washington, 1940.
- Law 22.344. It approves the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- Law 23.918. It approves the Convention on the Conservation of Migratory Species of Wild Animals.
- Law 23.919. It approves the Convention on Wetlands of International Importance especially as Waterfowl Habitat, signed in Ramsar on 2-2-71, later modified by a Protocol signed in Paris on 8-12-82.
- Law 24.375. It approves the Convention on Biological Diversity.
- Law 25.337. It approves the Amendment to the Convention on International Trade in Endangered Species of Wild Fauna and Flora.
- Law 21.836. It approves the Convention concerning the Protection of the World Cultural and Natural Heritage, adopted by the General Conference of the United Nations Educational, Scientific and Cultural Organization.
- Law 23.922. It approves the Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, signed in Basilea (Switzerland).

Paraguay:

- Law 758/79. it approves and ratifies the Convention on Nature Protection and Wild Life Preservation in the Western Hemisphere – Washington, 1940.
- Law 583/76. It approves and ratifies Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- Law 253/93. It approves the Convention on Biological Diversity.
- Law 350/94. It approves Convention on Wetlands of International Importance especially as Waterfowl Habitat.
- Law 253/93. It approves the Convention on Biological Diversity.
- Law 21/90. It approves and ratifies the Convention on the constitution of the Regional Committee for Plant Health (COSAVE) among Argentina, Brasil, Chile, Paraguay and Uruguay.
- Law 567/95. It approves Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, signed in Basilea.

National law

Argentina:

Biological Diversity:

- Law 23.919. Incorporation of 24.550 ha of the Iberá Macrosystem as a Ramsar site.
- Law 22.421 and Decree 691/81 regarding the Protection of Wild Fauna.
- Law 22.421 regarding the protection of wild fauna, as well as its conservation, exploitation, hunting, and breeding.

Water:

- Law 340. Civil Code reformed by Law 17.711. It defines the bank line, and it recognizes the juridical value of the modifications from natural origin in water courses. It establishes the "towpath" (35 meters), it regulates and prohibits dams and derivations, it regulates easements. It indicates that administrative law is applicable to the construction of weirs in rivers and streams.

Soil:

- Law 23.879. It prescribes the assessment of the environmental consequences that the existing dams, or the ones in process of construction or being planned, either national or foreign, produce or may produce in the Argentine territory. Decree 1317/90.
- Law 22.428 regarding support and conservation of the soil. It promotes the recovery of the productive capacity of the soil. Regulatory decree 681/81.
- Law 13.273. regarding the protection of forestry resources.
- Law 22.421 regarding the conservation of soil.
- Law 13.273 regarding the exploitation of woods.
- Art. 1560 of the Civil Code: abusive use of rural properties.
- Law 13.246. It establishes the rules concerning rural renting, and rural partnership and sharecropping.
- Law 13.273 (and its modifications) regarding protection and rational use of the woods and forestal resources.
- Law 20.531. New modification and creation of the "National Forestry Institute" (IFONA). Promotion of forestry industry.
- Law 21.695. It establishes fiscal incentives for forestation.
- Law 22.351. It creates the National Administration of Natural Parks (APN). As the federal law implementation authority, it has jurisdictional power over the areas declared National Parks, Natural monuments and National Reserves. It also creates the Park Rangers Corps. Regulatory decree 637.

Air:

- Law 20.284 regarding the preservation of air resources. It establishes the rules concerning air resources: it states parameters of air quality. (still not regulated by decree).

Paraguay:

Biological Diversity:

- Law 799/96. It refers to fishing. Its rules are applicable to the capture of fish.
- Law 123/91. Adoption of new phyto-sanitary measures.
- Law 96/92 regarding Wild Life.
- Law-Decree 13.782/92. It declares that the species of the ichthyic fauna living in the adjacencies of the sinks of Yaciretá dam are under the protection of public authorities. 1992.

Water:

- Paraguayan Civil Code: article 2011. "The banks of the navigable rivers and lakes, even the ones existing in privately owned areas, will be subject to a restriction on the domain in the public interest of navigation, throughout an extension of ten meters, according to the rules stated in special laws".

Soil:

- Law 422/63 regarding forestry issues and Law 536/95 regarding "Promotion of the Forestation and Reforestation". This law is regulated by decree 9.425/95.
- Decree 14.047/92. It creates a compensatory regime for investments regarding processing and commercialization of forestal products that come from forests without management.
- Law 352/94. It establishes the national system of protected wild areas.

- Law 294/93. It establishes that the environmental impact assessment is mandatory in all projects and activities, either public or private.
- Law 515/94 prohibits the export and traffic of wooden roll logs, wooden pieces and wooden beams, of any kind, quantity, weight and volume.
- Law 854/63. It establishes the Agrarian statute.

Natural Resources:

- Law 716/95. It establishes punishments for crimes against the environment, such as fines or imprisonment, depending on the type of crime committed.
- Law 816/96. It establishes measures to protect natural resources.
- Law 42/90. It prohibits the import, deposit, and use of products classified as dangerous industrial waste or toxic waste. Decree-law 18.831/86 establishes rules concerning the protection of the environment as a whole.
- Law 40/90. It creates the National Commission for the Protection of Natural Resources.

Provincial law

Argentina:

Biological diversity:

- Decree 2.248/55 establishes rules concerning sport hunting in the Esteros del Iberá. Notwithstanding the hunting seasons, the species and the quota for each one are ruled annually by the Sub-director of Flora and Fauna, dependent of the Provincial Director of Fauna, Flora and Ecology. The latter is the law implementation authority. The decree also establishes which species are considered plagues and thus can be hunted without quota restrictions. To be allowed to practice sport hunting, a person needs a license given by the law implementation authority and a permit given by the owner of the land.
- Article 13 of Law 22.421 regarding Wild Fauna establishes that the national and provincial authorities on Fauna should be consulted in cases of feasibility studies and building projects, clear-felling, drying and drainage of flooding plains, construction of dams and weirs that may change the environment of the wild fauna.
- Extractive fishing is forbidden. But "catch and release" fishing is allowed, if the release is done at the place of capture, and the capture is performed with equipments with fly or spinning with fishhook without rough edges. A tourist-type license for "catch and release" fishing is required, according to resolution 102 of the Sub-director of Flora, Fauna and Ecology. The close seasons for fishing and the type of species involved are determined annually, as in the case of hunting.
- Provincial decree 2249/55 regarding sport hunting. Law 1863 regarding protection of flora and fauna.
- Law 22.344 and Law 22.421 prohibit and punish the traffic of autochthonous species.
- Decree 1555 declares that some species of wild life considered more vulnerable are national monument.

Water:

- Provincial Water Code, Law 3066.

Soil:

- Law 3.771 regarding the creation of the provincial reserve. Law 4.736 and Decree 18/00.
- Law 3.623, Law 1.181, Law 1.771, and Rural Code.
- Law 5.350, that adheres to National Law 25.080 regarding investments in cultivated forests.

- Law 4.438 regarding use of soil.
- Law 4.547. It creates a Fund for forestry promotion and comptrollership, as well as for the promotion of protection and preservation of species.
- Law 4.361 regarding soil management. It creates soil conservation consortiums in different parts of the Province.
- Law 5.067 regarding Environmental Impact Assessment.

Natural Resources:

- Natural Resources Code.
- Law 4.495 and Law 5.300 regulate and control the use of pesticides and agrochemical products: they state general rules regarding the use of these substances, as well as fines, and they establish that the handling of these substances by people under 18 years old is forbidden.

6- The cultural components of the wetlands

The shared cultural features derive from the resemblance in the landscapes of both ecosystems together with man's responses to such a peculiar condition of his environment.
The natural environment together with the cultural expressions constitute a "heritage resource" unfortunately not fostered in a comprehensive manner for both moisty soils. This is the reason why the proposal to launch a net of ecomuseums presupposes the integration between the ecosystem and the anthropic activity as a reflexion of the regional cultural development.
The guaranitic ethnics, the pathway of the expeditions and travels of the Jesuit missionaries (Furlong,1984) leaving behind proof of their stay in both regions (archeologic fields and ruins), and the Spanish colonization and the contribution of the immigration represent common grounds.
Several are the development starting points for a net of ecomuseums, based on the recovery of local productions such as the regional craftmanship (several times in danger of extinction) and as a way of fostering new cultural-touristic resourcesl in the benefit of the local communities.
Based on the above, we believe that the proposals for the Ibera can be transferred; a fact which has been confirmed by Margarita Ibars in her book and by José María Gómez in his research work on the Ñeembucú marshes. Here follows a brief description of the development project to foster the recovery of its cultural heritage.

A summary of the history of Corrientes

The savanna areas situated in southern Brazil, in eastern Paraguay and in the Argentine Mesopotamia were originally inhabited by the "Guayanás". Meanwhile, other groups such as "Makás", "Guaycurúes" and "Charrúas" lived in the areas of Chaco, Argentine Pampas and part of the Brazilian Matto Grosso. The lands situated south of the Corriente river were inhabited by "Caingang" tribes, which were ethnically related to the "Charrúas" and spoke the same language, the Arawak. They had come form the Pampas area, probably pushed off from there by more aggressive tribes.

Around 500 b. C. the first groups of "Tupí-Guaraníes" arrived in these lands. They came from the Amazonian region, probably because of suffering long lasting droughts and subsequent fires in that former place.

In 1588 Juan Torres de Vera y Aragón founded the town named San Juan de Vera y Aragón de las Siete Corrientes, and at that time attacks from "Guaraníes" were rare.

Vestigial traces of the colonization period remain throughout the Province of Corrientes, such as the missions of San Carlos, Santo Tomé y Yapeyú. The latter, founded in 1626 by the Jesuits, had once a population of more than 8.000 indigenous people, a shipyard, a school of music and another one for basic education.

The Argentine national heroes: Yapeyú is the birth place of the Libertador General José de San Martín, one of the most important heroes of the South-American indepence wars.

The inhabitant of Corrientes: As a consequence of both the cultural exchange and the racial mixture of the indigenous population and the Spanish conquerors, and a slightly significant African element introduced during the War of the Triple Alliance, in Corrientes emerged an autochthonous culture, creole, with particular characteristics resulting from the adaptation of different communities to the environment in which they settled.

Eco-types that can be found in Corrientes: from a wide perspective, it is possible to divide the landscape in which the inhabitants of Corrientes live into three categories:

- **The plains and rolling grasslands** that slope down to the big wetlands and streams. It is a kind of environment suitable for agriculture and livestock. There are two peculiar lifestyles related to this category : the cattle labourer or **mecho**, skifull at breaking in wild horses and all related matters, and the producer of traditional crops (corn, manioc, sweet potato, cotton) with whom is associated the **boyero (ox driver),** who manages and takes care of the animals used for pulling vehicles or carrying things.
- **The large areas covered by water of the lacustrine ecosystem**. The inhabitant of the low-lying lands – "bañados", wetlands and lagoons – lives in sparsely settled communities, made up of **mariscadores**, or furtive hunters, fishermen, and horticulturalists of low-lying grounds, for whom their survival depends greatly on the rich and still diverse wild fauna. Many species of this fauna are rapidly decreasing in number or are in danger of extinction.
- **The islands and riversides**. The islander lives in a place surrounded by water and thus depends naturally on fishing for his survival. But he also carries on other activities allowed by this environment, such as the cultivation of a vegetable garden for family use and animal husbandry. In some times of the year he also makes use of the wood resources of the islands, becoming a **jangadero**. On the other side of the Paraná river we can find the riverside dweller, who is a fisherman that uses trotline, by antonomasia.

Popular traditions

In the province we can find a mixture of religious beliefs, and there´s worship given to virgins and saints of the Catholic Church as well as to local personages that come from old pagan customs.

There´s worship given to many people that wouldn´t have deserved such veneration during their lives. They are generally gauchos that committed various crimes. They suffered considerably during their lives and died in a violent way. These latter facts would have given them a supernatural status. The places where they were killed as well as their graves have been turned into sanctuaries, and are visited by faithful devotees.

With respect to profane devotions, it`s particularly important to mention the faith in "San La Muerte". This old local belief may have its roots in the existence of a strange personage among the "Tupí-Guaraníes" called "Payé".

Source: Statistics and Census Directorate, Province of Corrientes, 2000.

The cultural components of the "Esteros del Iberá"

Iberá is not just an almost untouched natural area, but also an endless source of different cultural expressions, such as the imagery, the handicrafts, the popular calendar of saints` days, the myths and legends, the language, the songs, the buildings, and the food. This group of cultural expressions, together with moral and ethical values such as respect for the environment and the family continuity, make up an own identity which is clearly identifiable.

The cultural heritage of Iberá

1- The Guaraní roots – The Guaraní conception of the world.

2- The evangelization – The Jesuits.

3- Legends, myth and popular religious beliefs.

4- The mariscador, a cultural eco-type

5- Architecture

6- Art, handicrafts and gastronomy.

Eco-museum "Agua brillante, Yberá" project

Eco-museums, a new museology

The new museology "eco-museology", community museology, and other types of active museology, focus on the development of the population and the main forces that produced its evolution, working in association with that population in mutually beneficial projects. This movement aims at a global approach to the matter, and in thus it involves scientific, cultural, social and economic concerns about the mentioned issues.

Declaration of Quebec, Basic Principles of a new museology. 13th October 1984.

Objectives

To promote the knowledge, understanding and spreading of the Cultural Heritage of Iberá, aiming at its best appraisal and preservation. The heritage, the land, and the community are inseparable elements of a project in which the latter should be an active and dynamic protagonist of the project, which should be able to perform on its own.

Main objectives:

1- To preserve the "integral heritage", cultural and natural, of Iberá.

2- To use the natural reserve as a living museum, or "site museum"

3- To show the development of the cultural and economic life, in relation to the environmental context of the region

4- To preserve "in situ" the local heritage

5- To connect the different towns by a network of community museums

6- To promote the development of tourism, with an integral offer that can complement the existing one, and that should recognize the value of the natural, social and cultural goods, for the benefit of the local community

7- To protect Nature, show up the local identities, and support the economic development, taking into account two main elements: territory and population.

Complementary objectives:

1- To promote new sites of interest.

2- To promote associations between people working on agricultural production and livestock breeding, craftsmen, and tourism companies, in relation to network activities

3- To inform, to sensitize and to train the population about the values, resources and peculiar products that may be incorporated to the tourist activities.

4- To encourage the development of local cultural industries.

5- To integrate the Mesopotamia into the "Mercosur cultural", by creating thematic tours that can connect different areas.

Points of aim of the Eco-museum:

8- Interpretation Centre of the provincial reserve of Yberá (already working)

9- Natural reserve

10- Main point of aim: Regional Historical Museum of the Esteros del Iberá, "Y Yará"

11- Community museums

12- Tour of the Vernacular Architecture

13- House-museums, taken out from their natural environment and prepared to be visited as museums

14- Cascos de estancias, mud houses, arbours

15- Tour of Archeological Sites

16- Tour of production activities

17- Capybara tanneries, arts and crafts workshops

18- Regional plantations, curative and aromatic plants

19- Tour of religious and mythical places

20- Jesuits´ heritage, popular prayer rooms

21- Tour of gastronomic facilities

Main point of aim

Regional Historical Museum of the Esteros del Iberá, "Y Yará"

Museum of the area, located in the wetland (in planning and building stage, at the present time)

Colonia Carlos pellegrini

Academic management: USAL; IMAE

The foundation stone was laid on 20-9-02

The museum collection is made up of voluntary donations made by members of the local community and scientific findings as a result of in situ research in the wetland.

At the present, the museum is a small initiative of the local community. It has a house located in the center of the town, donated by the local government. This initiative has been declared "of local interest", "of cultural and tourist interest", and "of provincial interest".

Thematic organization

1- Iberá ecosystem. Flora and fauna.

2- The first inhabitants

3- The settlers - History of "Colonia Carlos Pellegrini"

4- Guaranitic myths and legends – Popular beliefs

5- Local folklore, handicrafts and gastronomy

7- Conclusions

The tools used for the socio-economic assessment of the "Esteros del Iberá" can be perfectly used in the case of the "Esteros de Neembucú", which would allow for the latter the potential estimation of the effects caused by the use of its resources assuming different scenarios of natural heritage management.

Even if the indicators available for both wetlands derive from the national accounts, it is important to bear in mind that some kind of systematization of the statistical information available is needed. The necessary information for determining the indicators will depend on the specific features of the "Esteros de Neembucú" and on their productive development; as a consequence of the impact of the latter, an estimate of the environmental costs involving research and development study should be included in order to:

- Protect the air and the weather
- Protect the water
- Prevent, collect, transport and dispose of waste
- Protect the soil and the phreatic waters
- Provide sanitation and similar services

As shown by the studies done in the "Esteros del Iberá", it is important to take into account that much of the productive development in the wetlands alter the quality of the water and of the air and affect the natural working of the ecosystems.

Forest activity bears landscape alteration and loss of the biodiversity and soil impact as possible effects.

Even if tourism is an important development factor, this main source of local income can be lost in the short term if it does not take place together with research and studies on the possible impacts produced on the natural resources.

The natural environment shared in terms of landscape similarities together with the cultural expressions constitute a heritage resource not fostered in a comprehensive manner for both moisty soils.The guaranitic ethnics, the pathway of the expeditions and travels of the Jesuit missionaries, leaving behind proof of their stay in both regions (archeologic fields and ruins), and the Spanish colonization and the contribution of the immigration represent common grounds.

From the review of this study on environmental legislation applied to the moisty soils in both sites and according to the review of the Southamerican legislation for moisty soils compiled by Solano (1997), it is concluded that:

- There is a trend to institutionalize environmental management.
- The environmental institutions of both countries have different levels of autonomy as well as political and economic decision.
- The outlining of national policies concerning the moisty soils almost always correspond to the environmental institutions of both countries. Either the same institution or any another sector of the government may be in charge of laying down such policies.
- Argentina and Paraguay have subscribed the Relative Convention to the Moisty Soils as of International Relevance. Specially as Habitat of Water Birds ("Ramsar").
- Neither country has yet domestic legislation which rules the ecosystems of the moisty soils in a global manner.

- The legal mechanism mostly used in order to protect certain moisty soils very important for the country and region has been through its declaration as protected natural area. The category assigned to each case varies according to the system of protected areas of each country and the permitted uses as from the declaration.
- The assessment processes of the environmental impact are mechanisms incorporated in the two countries of the region for environment-risk projects or that are developed in fragile ecosystems. Any project or activity that may affect a moisty soil should bear a study of environmental impact prior to carrying it out.

Annex 1 – Statistical facts of the Department of Ñeembucú

Total Population, 1992

District	Total population		
	Total	Men	Women
Pilar	22.103	11.410	10.693
Alberdi	5.618	2.818	2.800
Cerrito	4.682	2.356	2.326
Desmochado	1.817	907	910
General Jose Eduvigis Diaz	3.520	1.783	1.737
Guazucua	2.291	1.206	1.085
Humaita	2.884	1.464	1.420
Isla Umbu	3.349	1.772	1.577
Laureles	3.367	1.761	1.606
Mayor Jose D Martinez	3.585	1.837	1.748
Paso de Patria	1.577	801	776
San Juan Bautista de Neembucu	5.982	3.026	2.956
Tacuaras	3.256	1.724	1.532
Villa Franca	772	400	372
Villa Oliva	2.788	1.514	1.272
Villalbin	2.181	1.089	1.092

Source: Organización Paraguaya de Cooperación Intermunicipal (OPACI), 2003 (based on National Population and Housing Census, 1992)

Housing indicators: housing units and electricity, urban and rural area, 1992

District	Housing unit			Electricity		
	Total served	Urban area (%)	Rural area (%)	Total served	Urban area (%)	Rural area (%)
Pilar	5.574	25,57	22,90	7.299	21,31	4,09
Alberdi	1.250	21,79	23,78	1.606	16,77	0,00
Cerrito	1.118	27,83	22,87	0	0,00	0,00
Desmochado	461	31,46	24,47	45	19,39	1,32
General Jose Eduvigis Diaz	988	28,55	27,87	311	17,75	0,59
Guazucua	556	27,72	23,90	0	0,00	0,00
Humaita	753	27,96	24,94	376	14,47	2,03
Isla Umbu	846	27,85	25,00	57	19,12	0,85
Laureles	824	27,56	23,80	0	0,00	0,00
Mayor Jose D Martinez	883	25,53	2.439,00	107	14,38	2,88
Paso de Patria	383	26,10	22,91	128	18,87	2,11
San Juan Bautista de Neembucu	1.347	27,91	21,67	269	17,24	1,77
Tacuaras	725	23,94	22,06	0	0,00	0,00

Villa Franca	198	24,11	26,68	0	0,00	0,00
Villa Oliva	698	26,48	24,88	0	0,00	0,00
Villalbin	484	24,79	21,67	57	15,87	0,43

Source: Organización Paraguaya de Cooperación Intermunicipal (OPACI), 2003 (based on National Population and Housing Census, 1992)

Housing indicators: public drinking water supply services and refuse collection and disposal service, 1992

District	Public drinking water supply services			Refuse collection & disposal service		
	Total served	Urban area (%)	Rural area (%)	Total served	Urban area (%)	Rural area (%)
Pilar	3.233	16,85	0,33	410	2,14	0,00
Alberdi	890	20,33	0,77	79	1,82	0,00
Cerrito	0	0,00	0,00	0	0,00	0,00
Desmochado	0	0,00	0,00	0	0,00	0,00
General Jose Eduvigis Diaz	136	13,62	0,03	0	0,00	0,00
Guazucua	0	0,00	0,00	0	0,00	0,00
Humaita	219	19,33	0,22	0	0,00	0,00
Isla Umbu	0	0,00	0,00	0	0,00	0,00
Laureles	0	0,00	0,00	0	0,00	0,00
Mayor Jose D Martinez	0	0,00	0,00	0	0,00	0,00
Paso de Patria	0	0,00	0,00	0	0,00	0,00
San Juan Bautista de Neembucu	131	16,12	0,01	0	0,00	0,00
Tacuaras	0	0,00	0,00	0	0,00	0,00
Villa Franca	0	0,00	0,00	0	0,00	0,00
Villa Oliva	0	0,00	0,00	0	0,00	0,00
Villalbin						

Source: Organización Paraguaya de Cooperación Intermunicipal (OPACI), 2003 (based on National Population and Housing Census, 1992)

Housing indicators: telephone, 1992

District	Telephone		
	Total served	Urban area (%)	Rural area (%)
Pilar	557	2,89	0,13
Alberdi	141	3,25	0,00
Cerrito	1	0,00	0,02
Desmochado	1	0,43	0,00
General Jose Eduvigis Diaz	8	0,80	0,00
Guazucua	0	0,00	0,00

Humaita	4	0,35	0,00
Isla Umbu	1	0,00	0,03
Laureles	4	0,67	0,00
Mayor Jose D Martinez	14	0,94	0,24
Paso de Patria	2	0,29	0,00
San Juan Bautista de Neembucu	21	0,24	0,36
Tacuaras	4	0,00	0,13
Villa Franca	5	0,32	0,86
Villa Oliva	10	1,39	0,24
Villalbin	1	0,27	0,00

Source: Organización Paraguaya de Cooperación Intermunicipal (OPACI), 2003 (based on National Population and Housing Census, 1992)

Socio-demographic diagnosis of the Department of Ñeembucú[1]

Ñeembucú has got characteristics that make it different form other Departments. It has an strategic location between the two main rivers of the region, the Paraná and the Paraguay, and due to this characteristic it can play an important role in the context of a regional integration process, becoming the first port of entry (for imports) and the last of departure (for exports). It is important to mention that in 1983 it was impossible to operate in the port of Asunción because of a flood that affected it; whereas in the south of Ñeembucú there are areas which are not threatened by floods and thus can be suitable for a deepwater port that would enable the establishment of a free zone, or that can be an alternative for the consolidation of the regional integration. With respect to this, it is important to take into account that in front of the port of Itapirú and/or Humaitá it is located the port of Las Palmas Argentina, with a railway station in the route of the bi-oceanic corridor. We consider that this combination of alternatives could promote the social and economic development of the region, which would also benefit the rest of the country.

Ñeembucú has been a neglected Department, it was for a long time the only Department of Paraguay lacking paved routes, but that situation is changing nowadays.

This Department has big wetlands, and its area has a big number of wetlands, lagoons and small watering places that in some parts of the year hinder the agricultural development. Besides this, there are recurring floods in the southern zone of Yaciretá dam, that continuously damage the low-lying regions.

The capital city of Ñeembucú, Pilar, was totally flooded in 1983, and its surrounding neighborhoods suffer recurring floods because they don not have definite defense walls.

Demographic characteristics

Ñeembucú has an area of 12.147 sq km. It has been the only Department that showed a negative growth rate in the Census of 1992. It is divided into 16 districts, as follows: Pilar (capital), Isla Umbú, Mayor Martínez, Desmochados, Gral. Díaz, Paso de Patria, Humaitá, Laureles, Villalbin, Villa Oliva, San Juan del Ñeembucú, Cerrito, Tacuaras, Alberdi, Villa Franca and Guazu Cuá.

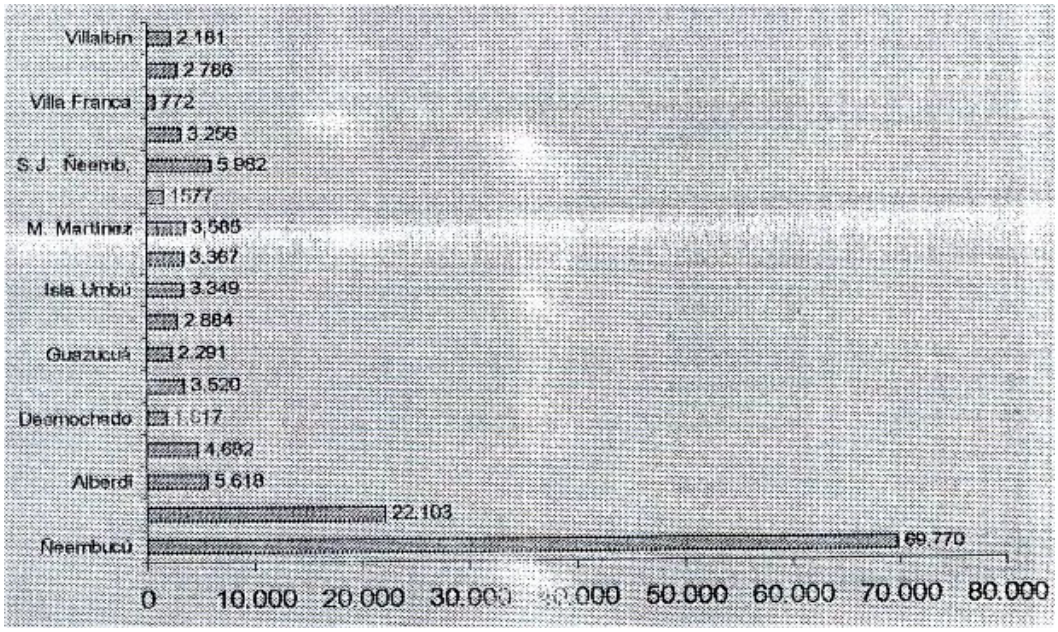
The Department has a population of 87.873 inhabitants, and it is estimated to reach 88.285 inhabitants in year 2000, with a growth of 0,4%. In the following table we show, for each district, the growth rate of 1995/2000, the percentage of the population in year 2000, and the estimation for year 2005.

District	Total population '92	Population density 1995/2000	Growth rate 1995/2000	% of the population 2000	Population in 2005
Ñeembucu	69.770	7.27	0.54	1.61	88.285
Pilar	22.103	84.64	1.38	33.97	31.717
Alberdi	5.618	41.70	0.60	8.22	7.440

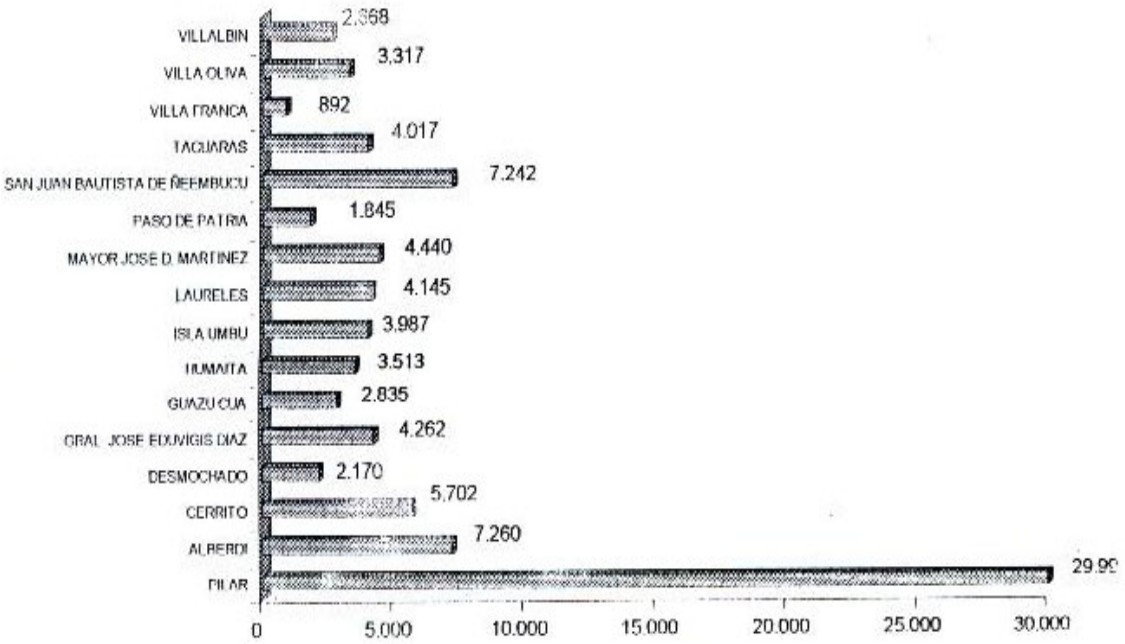
[1] GOBERNACION DE NEEMBUCU: Diagnóstico Socio demográfico del Departamento de Ñeembucú, 2003, www.paraguaygobierno.gov.py/neembucupresentacioninforme.html (consulting date: August 2003).

Cerrito	4.682	8.88	0.03	6.46	5.712
Desmochado	1.817	9.39	-0.01	2.46	2.171
General Diaz	3.520	15.55	0.14	4.83	4.288
Guazucua	2.291	1.89	0.23	3.21	2.863
Humaita	2.884	8.28	0.01	3.98	3.517
Isla Umbu	3.349	6.12	-0.03	4.52	3.985
Laureles	3.367	4.04	0.27	4.70	4.193
M. Martinez	3.585	14.14	0.23	5.03	4.483
Paso de Patria	1.577	10.22	-0.31	2.09	1.823
S. J. Ñeembucu	5.982	6.99	-0.01	8.20	7.242
Tacuaras	3.256	4.88	0.01	4.55	4.021
Villa Franca	772	0.53	-0.46	1.01	876
Villa Oliva	2.786	2.30	-0.10	3.76	3.306
Villalbin	2.181	4.91	0.15	3.02	2.686

Population distribution by district. Year 1992.



Ñeembucú: Population by district. Year 2000.



With respect to what is showed in the tables, it is important to mention that the districts of Desmochados, Isla Umbú, Paso de Patria, San Juan del Ñeembucú, Villa Franca and Villa Oliiva show a negative growth, while the districts of Tacuarás and Villalbín have an slight growth as a consequence of the emigration of a big part of their population.

Regarding the population structure, in terms o sex and age, the facts provided by the Estimation and Projection of the National Population of 1996, by the DGEEC, are the following:

Groups of Age	**Year 2000**
Total	88.285
0-14 years old	31.992
15-64 years old	51.101
65 and over	5.192

- Participation of the population in Economic Activities

District	**Men**	**Women**	**% Men**	**% Women**
Pilar	5.361	1.938	70.0	23.8
Alberdi	1.624	741	79.6	39.3
Cerrito	1.296	58	83.0	3.9
Desmochado	503	44	79.0	6.9
General Diaz	977	98	80.1	7.9

Guazucua	676	110	82.1	15.1
Humaita	780	100	81.0	10.3
Isla Umbu	970	61	79.2	5.4
Laureles	969	123	80.4	10.1
M. Martinez	996	189	83.3	15.2
Paso de Patria	402	46	77.6	9.1
S. J. Ñeembucu	1.320	192	68.8	9.8
Tacuaras	886	118	82.0	12.2
Villa Franca	218	24	78.4	11.4
Villa Oliva	743	108	71.9	12.4
Villalbin	566	73	84.2	9.8

In the Department there are more men than women in the Economically Active Population, and a bigger number of men work in the rural area than in the urban area. This can be shown as follows:

Urban area 70%

Rural area 80,4%

The participation rate of women is greatly slower than the one correspondent to men.

The relation between the population out of the age adequate to work and the population that is in the age adequate to work, known as ratio of dependence, was 81,03 in 1990. In year 2000 it had a slight fall , reaching 72,76%.

Ñeembucú is a Department whose main economic activities are agriculture and livestock breeding. It is significant then to note that only the 0,24% of the total area of the Department is under crops that can be greatly sold in the national market, such as: garlic, rice, pea, sugar cane, strawberry, manioc, peanut, tomato, potato, soybeans, tobacco, carrot.

According to the Census and Agricultural and Livestock Statistic Directorate of the MAG, the distribution of livestock is the following:

	´95	**´96**	**´97** (in thousands)
Cattle	436	424	424
Pigs	17	23	24
Sheep	36	37	40
Horses	32	32	32
Goats	9	8	8

This facts show that cattle has decreased, probably because of floods in the areas where it was located, mainly in the riverside of the Paraná river due to the increase in the water flow of Yaciretá dam.

Ñeembucú only has 22 industrial companies with more than seven workers per zone, with its main office in the Department. They are exclusively located in the urban area, none of them are in surrounding or rural areas.

In the city of Pilar it is located one of the most important textile companies of Paraguay, with approximately a thousand workers.

Health

According to the information about hospital services of public institutions provided by the Statistical Yearbook of Paraguay 1997, in Ñeembucú there are only 86 available beds.

This means that there are only 9,7 beds per 10.000 inhabitants.

In Ñeembucú, 27,3% of the population has drinking water supply services, either supplied by CORPOSANA, by SENASA, or by private system, 51,4% of the population has safe water (wells with and without pump), and 21,3% has not got drinking water. This means that 17.500 inhabitants obtain water from springs, rivers, streams, etc.

Housing

A total of 16.259 housing units were taken into account in the census, and the results indicate that 37,7% of them have electricity supply services, and 28,3% have water supply services. But this situation varies considerably between urban and rural areas.

Only 5,4% of the units have electricity supply services in the rural area, whereas in the urban area 74,9% of the units have them.

Only 0,3% have water supply services in the rural area, whereas in the urban area the correspondent percentage is 60,5%.

Unsatisfied Basic Needs (UBN)

In Ñeembucú 75,93% of the households have at least one UBN, which is a percentage that exceeds in 11,75 points the national average. There is a big difference between the poorest and the richest districts in terms of UBN: Gauzucuá has 95,39% of the households with at least one UBN whereas Alberdi has 63,69% of the households with at least one UBN. The difference is 31,7 points.

The rural areas have 4 out of 5 households with deficiencies (79,94%), whereas urban areas have a lower percentage (71,37%).

Tacuaras, Villa Franca y Guazucuá are the districts at the end of the scale according to the high percentage of households with unsatisfied basic needs, and they are the ones with the worst results in terms of socio-demographic indicators related to deficiencies.

The percentage of illiterate population in Tacuaras (24,8%) and Guazucuá (23%) is higher than the departmental average, while the percentage in Villa Franca (14,9%) is closer to it.

Regarding indicators related to housing issues, only Tacuaras has part of its housing units (6,2%) with electricity supply services.

In Ñeenmbucú 48,49% of the housing units lack sanitary infrastructure, 29,3% of its households have deficiencies related to the access to education, and 18,57% of its households with deficiencies are in a situation of subsistence capacity, what means that in this UBN the district is in the third level of the departmental scale.

Regarding the variables analysed, there are some special points to mention:

Guazucuá has got only 251 households according to the census of 1992, it appears in the 216º position in the whole of the country, and if we take into account the four UBN it is below other districts such as Tacuaras or San Juan de Ñeembucú.

With respect to education, there is a big desertion form school, basically because of the rural culture which makes the help that a child can bring in rural or domestic activities more appreciable for their parents than the school education that he/she can get, in important production areas. Besides this, there is also a big distance between educational centers and family houses. We should also mention the continuous emigration of families that live in riverside areas affected by floods, that many times make it necessary to close the educational center and to move people towards higher areas where there are no educational centers.

Regarding this point, we have to mention that the department has got 8 neighborhoods and 38 riverside towns threatened by floods, in the areas of Pilar, Villa Oliva, Alberdi, Villa Franca, Humaitá, Paso de Patria, Gral. Díaz, Mayor Martínez, Villalbin, and Cerrito, in whose housing units the deficiencies become more evident.

Paraguay: Distribution of the Population by Area of Residence

Paraguay: Distribution of the Population by Area of Residence			
	Total	**Urban**	**Rural**
Country Total	**5.206.101**	**2953168**	**2252933**
Asunción	513.399	513399	
Concepción	180.277	70534	109743
San Pedro	318.787	56354	262433
Cordillera	234.805	78958	155847
Guairá	176.933	60855	116078
Caaguazú	448.983	141975	307008
Caazapá	139.241	25479	113762
Itapúa	463.410	142702	320708
Misiones	103.633	51463	52170
Paraguarí	226.514	52958	173556
Alto Paraná	563.042	373152	189890
Central	1.363.399	1174751	188648
Ñeembucú	76.738	39238	37500
Amambay	113.888	77478	36410
Canindeyú	140.551	35639	104912
Pdte Hayes	81.876	30775	51101
Boquerón	45.617	19908	25709
Alto Paraguay	15.008	7550	7458

Source: Dirección General de Estadísticas, Encuestas y Censos (DGEEC), 2003ª.

Paraguay: Distribution of the Population by Area of Residence

Paraguay: Distribution of the Population by Area of Residence			
	Total	**Urban**	**Rural**
Country Total	**5.206.101**	**56,7**	**43,3**
Asunción	513.399	100,0	
Concepción	180.277	39,1	60,9
San Pedro	318.787	17,7	82,3
Cordillera	234.805	33,6	66,4
Guairá	176.933	34,4	65,6
Caaguazú	448.983	31,6	68,4
Caazapá	139.241	18,3	81,7
Itapúa	463.410	30,8	69,2
Misiones	103.633	49,7	50,3
Paraguarí	226.514	23,4	76,6
Alto Paraná	563.042	66,3	33,7
Central	1.363.399	86,2	13,8
Ñeembucú	76.738	51,1	48,9
Amambay	113.888	68,0	32,0
Canindeyú	140.551	25,4	74,6
Pdte Hayes	81.876	37,6	62,4

Boquerón	45.617	43,6	56,4
Alto Paraguay	15.008	50,3	49,7

Source: Dirección General de Estadísticas, Encuestas y Censos (DGEEC), 2003ª.

Mean income of the household, 2000-2001

Paraguay: Mean income of the Household, by Department. (thousands of guaranis March 2001*)	
Total	1.843
Asunción	3.727
Concepción	1.616
San Pedro	890
Cordillera	1.160
Guairá	1.016
Caaguazú	1.154
Caazapá	1.317
Itapúa	1.362
Misiones	1.307
Paraguarí	1.118
Alto Paraná	2.267
Central	2.059
Ñeembucú	1.088
Amambay	1.268
Canindeyú	1.226
Pdte Hayes	1.425

* It includes the imputed income from homeownership.
Source: Dirección General de Estadísticas, Encuestas y Censos (DGEEC), 2003ª.

Mean income of the poorest 40% of the population (in guaraníes of Mach 2001): **460.660**
Mean income of the richest 10% of the population (in guaraníes of Mach 2001): **1.944.573**

Coefficient that relates the mean income of the poorest 40% of the population to the mean income of the richest 10% of the population: **4,2**
(the mean income of the richest 10% of the population is 16.5 times higher than the mean income of the poorest 40% of the population)

Paraguay: Total population by gender, male ratio, and other classifications; by department, district and urban-rural area , 1992.

Department, district and area	Total population					
	Both sexes	Men	Women	Male ratio	Born in Paraguay	Born abroad
TOTAL PARAGUAY	4.152.588	2.085.905	2.066.683	100,9	3.961.681	190.907
URBAN AREA	2.089.688	1.007.400	1.082.288	93,1	2.003.334	86.354
RURAL AREA	2.062.900	1.078.505	984.395	109,6	1.958.347	104.553
DEP. ÑEEMBUCU	**69.770**	**35.093**	**34.677**	**101,2**	**68.389**	**1.381**
Districts:						
PILAR	22.103	10.789	11.314	95,4	21.429	674
ALBERDI	5.618	2.895	2.723	106,3	5.457	161
CERRITO	4.682	2.373	2.309	102,8	4.628	54
DESMOCHADO	1.817	891	926	96,2	1.803	14
GRAL. J. EDUVIGIS DIAZ	3.520	1.772	1.748	101,4	3.425	95
GUAZU CUA	2.291	1.202	1.089	110,4	2.276	15
HUMAITA	2.884	1.446	1.438	100,6	2.804	80
ISLA UMBU	3.349	1.742	1.607	108,4	3.335	14
LAURELES	3.367	1.700	1.667	102,0	3.337	30
MAYOR J. D. MARTINEZ	3.585	1.795	1.790	100,3	3.501	84
PASO DE PATRIA	1.577	805	772	104,3	1.526	51
S. JUAN B.DE ÑEEMBUCU	5.982	2.982	3.000	99,4	5.956	26
TACUARAS	3.256	1.727	1.529	112,9	3.228	28
VILLA FRANCA	772	407	365	111,5	760	12
VILLALBIN	2.181	1.056	1.125	93,9	2.166	15
VILLA OLIVA	2.786	1.511	1.275	118,5	2.758	28
URBAN AREA	**31.381**	**15.303**	**16.078**	**95,2**	**30.372**	**1.009**
Districts:						
PILAR	19.121	9.250	9.871	93,7	18.502	619
ALBERDI	4.327	2.202	2.125	103,6	4.173	154
CERRITO	945	481	464	103,7	909	36
DESMOCHADO	232	108	124	87,1	231	1
GRAL. JOSE E. DIAZ	991	490	501	97,8	934	57
GUAZU CUA	220	108	112	96,4	216	4
HUMAITA	1.112	547	565	96,8	1.069	43
ISLA UMBU	298	134	164	81,7	298	-
LAURELES	595	267	328	81,4	585	10
MAYOR J. D. MARTINEZ	744	351	393	89,3	725	19
PASO DE PATRIA	678	341	337	101,2	636	42
S. JUAN B. DE ÑEEMBUCU	806	381	425	89,6	800	6
TACUARAS	355	179	176	101,7	353	2

VILLA FRANCA	311	159	152	104,6	305	6
VILLALBIN	359	163	196	83,2	354	5
VILLA OLIVA	287	142	145	97,9	282	5
RURAL AREA	**38.389**	**19.790**	**18.599**	**106,4**	**38.017**	**372**
Districts:						
PILAR	2.982	1.539	1.443	106,7	2.927	55
ALBERDI	1.291	693	598	115,9	1.284	7
CERRITO	3.737	1.892	1.845	102,5	3.719	18
DESMOCHADO	1.585	783	802	97,6	1.572	13
GRAL. J. EDUVIGIS DIAZ	2.529	1.282	1.247	102,8	2.491	38
GUAZU CUA	2.071	1.094	977	112,0	2.060	11
HUMAITA	1.772	899	873	103,0	1.735	37
ISLA UMBU	3.051	1.608	1.443	111,4	3.037	14
LAURELES	2.772	1.433	1.339	107,0	2.752	20
MAYOR J. D. MARTINEZ	2.841	1.444	1.397	103,4	2.776	65
PASO DE PATRIA	899	464	435	106,7	890	9
S. JUAN B. DE ÑEEMBUCU	5.176	2.601	2.575	101,0	5.156	20
TACUARAS	2.901	1.548	1.353	114,4	2.875	26
VILLA FRANCA	461	248	213	116,4	455	6
VILLALBIN	1.822	893	929	96,1	1.812	10
VILLA OLIVA	2.499	1.369	1.130	121,2	2.476	23

Source: Dirección General de Estadísticas, Encuestas y Censos (DGEEC), 2003b

Education: facts referred to population aged 15 and over , 1992

Department, district and area	Population aged 15 and over					
	Literate	Illiterate	Not informed	Attends some educational establishment	Doesn´t attend any educational establishment	Not informed
TOTAL PARAGUAY	2.183.661	235.323	8.501	757.724	117.396	2.745
URBAN AREA	1.232.316	75.763	6.420	368.587	31.373	1.240
RURAL AREA	951.345	159.560	2.081	389.137	86.023	1.505
DEP. ÑEEMBUCU	**37.055**	**5.810**	**58**	**12.352**	**2.022**	**24**
Districts:						
PILAR	13.118	1.150	39	3.911	274	10
ALBERDI	3.327	224	4	938	124	1
CERRITO	2.050	608	-	840	264	-
DESMOCHADO	1.022	135	-	349	30	-
GRAL. J. EDUVIGIS DIAZ	1.768	423	2	615	133	-
GUAZU CUA	1.076	322	2	358	112	6
HUMAITA	1.400	331	-	445	154	1
ISLA UMBU	1.849	244	1	620	105	-

LAURELES	1.856	322	1	553	11	-
MAYOR J. D. MARTINEZ	1.856	326	2	635	84	3
PASO DE PATRIA	754	165	-	265	80	-
S. JUAN B.DE ÑEEMBUCU	2.664	658	1	1.237	243	-
TACUARAS	1.373	454	2	541	144	-
VILLA FRANCA	376	66	1	114	43	-
VILLALBIN	1.024	216	1	425	70	-
VILLA OLIVA	1.542	166	2	506	51	3
URBAN AREA	**18.139**	**1.815**	**28**	**5.686**	**446**	**8**
Districts:						
PILAR	11.485	948	23	3.385	192	6
ALBERDI	2.625	160	4	698	79	1
CERRITO	437	117	-	170	47	-
DESMOCHADO	159	10	-	43	1	-
GRAL. JOSE E. DIAZ	514	115	-	180	19	-
GUAZU CUA	101	17	-	63	2	-
HUMAITA	550	107	-	211	43	-
ISLA UMBU	160	16	-	77	5	-
LAURELES	332	45	-	133	4	-
MAYOR J. D. MARTINEZ	353	84	-	146	14	1
PASO DE PATRIA	346	62	-	127	13	-
S. JUAN B. DE ÑEEMBUCU	405	50	-	182	7	-
TACUARAS	170	30	-	78	3	-
VILLA FRANCA	147	15	1	59	13	-
VILLALBIN	198	26	-	65	1	-
VILLA OLIVA	157	13	-	69	3	-
RURAL AREA	**18.916**	**3.995**	**30**	**6.666**	**1.576**	**16**
Districts:						
PILAR	1.633	202	16	526	82	4
ALBERDI	702	64	-	240	45	-
CERRITO	1.613	491	-	670	217	-
DESMOCHADO	863	125	-	306	29	-
GRAL. J. EDUVIGIS DIAZ	1.254	308	2	435	114	-
GUAZU CUA	975	305	2	295	110	6
HUMAITA	850	224	-	234	111	1
ISLA UMBU	1.689	228	1	543	100	-
LAURELES	1.524	277	1	420	107	-
MAYOR J. D. MARTINEZ	1.503	242	2	489	70	2
PASO DE PATRIA	408	103	-	138	67	-
S. JUAN B. DE ÑEEMBUCU	2.259	608	1	1.055	236	-
TACUARAS	1.203	424	2	463	141	-
VILLA FRANCA	229	51	-	55	30	-

VILLALBIN	826	190	1	360	69	-
VILLA OLIVA	1.385	153	2	437	48	3

Source: Dirección General de Estadísticas, Encuestas y Censos (DGEEC), 2003 b

Economically or not economically active population: facts referred to people aged 12 and over, 1992

Department, district and area	Population aged 12 and over					
	Economically active		Not Economically active		Not informed	
	Men	Women	Men	Women	Men	Women
TOTAL PARAGUAY	1.065.226	325.354	290.398	1.038.773	2.848	1.650
URBAN AREA	511.186	272.292	173.467	493.927	2.016	1.364
RURAL AREA	554.040	53.062	116.931	544.846	832	286
DEP. ÑEEMBUCU	**18.287**	**4.023**	**5.721**	**19.921**	**25**	**15**
Districts:						
PILAR	5.361	1.938	2.280	6.211	22	7
ALBERDI	1.624	741	414	1.141	3	3
CERRITO	1.296	58	266	1.421	-	-
DESMOCHADO	503	44	134	598	-	-
GRAL. J. EDUVIGIS DIAZ	977	98	242	1.148	-	-
GUAZU CUA	676	110	147	620	-	-
HUMAITA	780	100	183	872	-	-
ISLA UMBU	970	61	255	1.062	-	-
LAURELES	969	123	236	1.092	-	2
MAYOR J. D. MARTINEZ	996	189	199	1.056	-	1
PASO DE PATRIA	402	46	116	460	-	-
S. JUAN B.DE ÑEEMBUCU	1.320	192	598	1.766	-	1
TACUARAS	886	118	194	849	-	-
VILLA FRANCA	218	24	60	187	-	-
VILLALBIN	566	73	106	673	-	-
VILLA OLIVA	743	108	291	765	-	1
URBAN AREA	**7.560**	**3.006**	**3.107**	**8.470**	**21**	**8**
Districts:						
PILAR	4.540	1.863	2.024	5.306	18	4
ALBERDI	1.225	670	340	830	3	3
CERRITO	227	32	93	273	-	-
DESMOCHADO	62	20	23	80	-	-
GRAL. JOSE E. DIAZ	239	60	101	306	-	-
GUAZU CUA	42	21	25	51	-	-
HUMAITA	257	58	93	325	-	-
ISLA UMBU	67	16	31	95	-	-
LAURELES	119	51	61	190	-	-

MAYOR J. D. MARTINEZ	171	47	49	234	-	1
PASO DE PATRIA	159	38	63	189	-	-
S. JUAN B. DE ÑEEMBUCU	166	49	78	234	-	-
TACUARAS	88	24	25	88	-	-
VILLA FRANCA	64	18	31	71	-	-
VILLALBIN	81	20	28	119	-	-
VILLA OLIVA	53	19	42	79	-	-
RURAL AREA	**10.727**	**1.017**	**2.614**	**11.451**	**4**	**7**
Districts:						
PILAR	821	75	256	905	4	3
ALBERDI	399	71	74	311	-	-
CERRITO	1.069	26	173	1.148	-	-
DESMOCHADO	441	24	111	518	-	-
GRAL. J. EDUVIGIS DIAZ	738	38	141	842	-	-
GUAZU CUA	634	89	122	569	-	-
HUMAITA	523	42	90	547	-	-
ISLA UMBU	903	45	224	967	-	-
LAURELES	850	72	175	902	-	2
MAYOR J. D. MARTINEZ	825	142	150	822	-	-
PASO DE PATRIA	243	8	53	271	-	-
S. JUAN B. DE ÑEEMBUCU	1.154	143	520	1.532	-	1
TACUARAS	798	94	169	761	-	-
VILLA FRANCA	154	6	29	116	-	-
VILLALBIN	485	53	78	554	-	-
VILLA OLIVA	690	89	249	686	-	1

Source: Dirección General de Estadísticas, Encuestas y Censos (DGEEC), 2003 b

Paraguay: Some indicators about housing and households, by rural-urban area and district, 1992.

Department, district and area	Private housing units			Total number of collective dwellings	Population in housing units		Average people per private housing unit with person present
	Total	With person present	With absent person		Private	Colective	
TOTAL PARAGUAY	913.079	855.547	57.532	2.176	4.111.991	40.597	4,8
URBAN AREA	473.608	443.691	29.917	1.384	2.061.536	28.152	4,6
RURAL AREA	439.471	411.856	27.615	792	2.050.455	12.445	5,0
DEP. ÑEEMBUCU	**17.088**	**16.259**	**829**	**50**	**69.326**	**444**	**4,3**
Districts:							
PILAR	5.574	5.351	223	14	21.870	233	4,1
ALBERDI	1.250	1.192	58	6	5.539	79	4,6

CERRITO	1.118	1.002	116	3	4.673	9	4,7
DESMOCHADO	461	456	5	1	1.815	2	4,0
GRAL. JOSE EDUVIGIS DIAZ	988	877	111	3	3.509	11	4,0
GUAZU CUA	556	521	35	1	2.288	3	4,4
HUMAITA	753	695	58	4	2.868	16	4,1
ISLA UMBU	846	845	1	2	3.345	4	4,0
LAURELES	824	784	40	2	3.362	5	4,3
MAYOR JOSE D. MARTINEZ	883	875	8	4	3.558	27	4,1
PASO DE PATRIA	383	369	14	1	1.568	9	4,2
SAN JUAN BAUTISTA DE ÑEEMBUCU	1.347	1.271	76	4	5.969	13	4,7
TACUARAS	725	712	13	-	3.256	-	4,6
VILLA FRANCA	198	173	25	2	753	19	4,4
VILLALBIN	484	479	5	1	2.178	3	4,5
VILLA OLIVA	698	657	41	2	2.775	11	4,2
URBAN AREA	**7.989**	**7.572**	**417**	**34**	**31.061**	**320**	**4,1**
Districts:							
PILAR	4.891	4.677	214	12	18.945	176	4,1
ALBERDI	943	915	28	6	4.248	79	4,6
CERRITO	263	211	52	2	938	7	4,4
DESMOCHADO	73	73	-	1	230	2	3,2
GRAL. JOSE EDUVIGIS DIAZ	283	263	20	2	982	9	3,7
GUAZU CUA	61	57	4	1	217	3	3,8
HUMAITA	311	284	27	3	1.096	16	3,9
ISLA UMBU	83	83	-	1	296	2	3,6
LAURELES	164	156	8	1	592	3	3,8
MAYOR JOSE D. MARTINEZ	190	188	2	2	733	11	3,9
PASO DE PATRIA	177	166	11	-	678	-	4,1
SAN JUAN BAUTISTA DE ÑEEMBUCU	225	189	36	-	806	-	4,3
TACUARAS	85	81	4	-	355	-	4,4
VILLA FRANCA	75	65	10	1	307	4	4,7
VILLALBIN	89	88	1	1	356	3	4,0
VILLA OLIVA	76	76	-	1	282	5	3,7
RURAL AREA	**9.099**	**8.687**	**412**	**16**	**38.265**	**124**	**4,4**
Districts:							
PILAR	683	674	9	2	2.925	57	4,3
ALBERDI	307	277	30	-	1.291	-	4,7
CERRITO	855	791	64	1	3.735	2	4,7
DESMOCHADO	388	383	5	-	1.585	-	4,1
GRAL. JOSE EDUVIGIS DIAZ	705	614	91	1	2.527	2	4,1
GUAZU CUA	495	464	31	-	2.071	-	4,5
HUMAITA	442	411	31	1	1.772	-	4,3
ISLA UMBU	763	762	1	1	3.049	2	4,0
LAURELES	660	628	32	1	2.770	2	4,4
MAYOR JOSE D.	693	687	6	2	2.825	16	4,1

MARTINEZ							
PASO DE PATRIA	206	203	3	1	890	9	4,4
SAN JUAN BAUTISTA DE ÑEEMBUCU	1.122	1.082	40	4	5.163	13	4,8
TACUARAS	640	631	9	-	2.901	-	4,6
VILLA FRANCA	123	108	15	1	446	15	4,1
VILLALBIN	395	391	4	-	1.822	-	4,7
VILLA OLIVA	622	581	41	1	2.493	6	4,3

Source: Dirección General de Estadísticas, Encuestas y Censos (DGEEC), 2003b

Paraguay: Some indicators about housing and households, by rural-urban area and district, 1992.

Department, district and area	Electric light (ANDE)	Public water supply services	Public refuse collection & disposal service	Telephone	Modern bathroom connected to public sewer system	Moderm bathroom connected to cesspool
TOTAL PARAGUAY	493.898	232.263	181.726	85.666	65.817	231.047
URBAN AREA	407.927	225.242	181.453	81.922	65.802	198.878
RURAL AREA	85.971	7.021	273	3.744	15	32.169
DEP. ÑEEMBUCU	**6.137**	**4.609**	**489**	**774**	**-**	**2.611**
Districts:						
PILAR	4.198	3.233	410	557	-	1.685
ALBERDI	726	890	79	141	-	540
CERRITO	-	-	-	1	-	24
DESMOCHADO	66	-	-	1	-	2
GRAL. JOSE EDUVIGIS DIAZ	191	136	-	8	-	57
GUAZU CUA	-	-	-	-	-	1
HUMAITA	197	219	-	4	-	66
ISLA UMBU	83	-	-	1	-	24
LAURELES	-	-	-	4	-	4
MAYOR JOSE D. MARTINEZ	189	-	-	14	-	35
PASO DE PATRIA	147	-	-	2	-	16
SAN JUAN BAUTISTA DE ÑEEMBUCU	231	131	-	21	-	69
TACUARAS	44	-	-	4	-	13
VILLA FRANCA	-	-	-	5	-	11
VILLALBIN	65	-	-	1	-	5
VILLA OLIVA	-	-	-	10	-	59
URBAN AREA	**5.672**	**4.583**	**489**	**728**	**-**	**2.427**
Districts:						
PILAR	4.076	3.223	410	553	-	1.656
ALBERDI	726	880	79	141	-	533
CERRITO	-	-	-	-	-	23
DESMOCHADO	45	-	-	1	-	2
GRAL. JOSE EDUVIGIS	176	135	-	8	-	51

DIAZ						
GUAZU CUA	-	-	-	-	-	-
HUMAITA	161	215	-	4	-	55
ISLA UMBU	57	-	-	-	-	5
LAURELES	-	-	-	4	-	4
MAYOR JOSE D. MARTINEZ	107	-	-	7	-	12
PASO DE PATRIA	128	-	-	2	-	15
SAN JUAN BAUTISTA DE ÑEEMBUCU	139	130	-	2	-	35
TACUARAS	-	-	-	-	-	-
VILLA FRANCA	-	-	-	1	-	4
VILLALBIN	57	-	-	1	-	2
VILLA OLIVA	-	-	-	4	-	30
RURAL AREA	**465**	**26**	**-**	**46**	**-**	**184**
Districts:						
PILAR	122	10	-	4	-	29
ALBERDI	-	10	-	-	-	7
CERRITO	-	-	-	1	-	1
DESMOCHADO	21	-	-	-	-	-
GRAL. JOSE EDUVIGIS DIAZ	15	1	-	-	-	6
GUAZU CUA	-	-	-	-	-	1
HUMAITA	36	4	-	-	-	11
ISLA UMBU	26	-	-	1	-	19
LAURELES	-	-	-	-	-	-
MAYOR JOSE D. MARTINEZ	82	-	-	7	-	23
PASO DE PATRIA	19	-	-	-	-	1
SAN JUAN BAUTISTA DE ÑEEMBUCU	92	1	-	19	-	34
TACUARAS	44	-	-	4	-	13
VILLA FRANCA	-	-	-	4	-	7
VILLALBIN	8	-	-	-	-	3
VILLA OLIVA	-	-	-	6	-	29

Source: Dirección General de Estadísticas, Encuestas y Censos (DGEEC), 2003 b

Housing units with air conditioning and car o light lorry, 1992

Department, district and area	Housing unit with air-conditioning	Housing unit with car or light lorry
TOTAL PARAGUAY	45.721	130.305
URBAN AREA	43.617	106.950
RURAL AREA	2.104	23.355
DEP. ÑEEMBUCU	**205**	**905**

Districts:		
PILAR	138	603
ALBERDI	41	67
CERRITO	1	13
DESMOCHADO	1	9
GRAL. JOSE EDUVIGIS DIAZ	1	23
GUAZU CUA	-	7
HUMAITA	1	24
ISLA UMBU	2	17
LAURELES	-	14
MAYOR JOSE D. MARTINEZ	10	29
PASO DE PATRIA	1	9
SAN JUAN BAUTISTA DE ÑEEMBUCU	7	42
TACUARAS	-	23
VILLA FRANCA	-	1
VILLALBIN	-	6
VILLA OLIVA	2	18
URBAN AREA	**196**	**757**
Districts:		
PILAR	138	583
ALBERDI	41	65
CERRITO	1	11
DESMOCHADO	-	6
GRAL. JOSE EDUVIGIS DIAZ	1	12
GUAZU CUA	-	3
HUMAITA	1	16
ISLA UMBU	2	4
LAURELES	-	11
MAYOR JOSE D. MARTINEZ	9	14
PASO DE PATRIA	1	8
SAN JUAN BAUTISTA DE ÑEEMBUCU	2	10
TACUARAS	-	6
VILLA FRANCA	-	-
VILLALBIN	-	2
VILLA OLIVA	-	6
RURAL AREA	**9**	**148**
Districts:		
PILAR	-	20
ALBERDI	-	2
CERRITO	-	2
DESMOCHADO	1	3
GRAL. JOSE EDUVIGIS DIAZ	-	11
GUAZU CUA	-	4
HUMAITA	-	8

ISLA UMBU	-	13
LAURELES	-	3
MAYOR JOSE D. MARTINEZ	1	15
PASO DE PATRIA	-	1
SAN JUAN BAUTISTA DE ÑEEMBUCU	5	32
TACUARAS	-	17
VILLA FRANCA	-	1
VILLALBIN	-	4
VILLA OLIVA	2	12

Source: Dirección General de Estadísticas, Encuestas y Censos (DGEEC), 2003 b

Private households by language spoken, 1992

Department, district and area	Private households by language spoken					
	Total	Guarani	Spanish and guarani	Spanish	Another language	Not informed
TOTAL PARAGUAY	863.990	321.363	429.390	60.447	50.402	2.388
URBAN AREA	451.948	60.700	326.236	53.782	9.458	1.772
RURAL AREA	412.042	260.663	103.154	6.665	40.944	616
DEP. ÑEEMBUCU	**16.308**	**6.651**	**9.104**	**533**	**6**	**14**
Districts:						
PILAR	5.392	1.089	3.896	402	3	2
ALBERDI	1.198	254	853	91	-	-
CERRITO	1.003	640	361	2	-	-
DESMOCHADO	456	194	261	-	-	1
GRAL. JOSE EDUVIGIS DIAZ	877	617	257	-	-	3
GUAZU CUA	521	376	144	-	-	1
HUMAITA	696	461	217	16	1	1
ISLA UMBU	845	526	318	-	1	-
LAURELES	784	374	403	5	-	2
MAYOR JOSE D. MARTINEZ	875	200	670	4	-	1
PASO DE PATRIA	369	101	266	2	-	-
SAN JUAN BAUTISTA DE ÑEEMBUCU	1.271	811	457	2	1	-
TACUARAS	712	431	279	-	-	2
VILLA FRANCA	173	92	80	1	-	-
VILLALBIN	479	257	221	-	-	1
VILLA OLIVA	657	228	421	8	-	-
URBAN AREA	**7.621**	**1.664**	**5.439**	**510**	**3**	**5**
Districts:						
PILAR	4.718	751	3.570	393	3	1
ALBERDI	921	188	642	91	-	-
CERRITO	212	95	115	2	-	-

DESMOCHADO	73	21	52	-	-	-
GRAL. JOSE EDUVIGIS DIAZ	263	80	181	-	-	2
GUAZU CUA	57	18	39	-	-	-
HUMAITA	285	130	139	15	-	1
ISLA UMBU	83	45	38	-	-	-
LAURELES	156	55	99	2	-	-
MAYOR JOSE D. MARTINEZ	188	18	168	2	-	-
PASO DE PATRIA	166	22	142	2	-	-
SAN JUAN BAUTISTA DE ÑEEMBUCU	189	131	57	1	-	-
TACUARAS	81	52	28	-	-	1
VILLA FRANCA	65	26	38	1	-	-
VILLALBIN	88	31	57	-	-	-
VILLA OLIVA	76	1	74	1	-	-
RURAL AREA	**8.687**	**4.987**	**3.665**	**23**	**3**	**9**
Districts:						
PILAR	674	338	326	9	-	1
ALBERDI	277	66	211	-	-	-
CERRITO	791	545	246	-	-	-
DESMOCHADO	383	173	209	-	-	1
GRAL. JOSE EDUVIGIS DIAZ	614	537	76	-	-	1
GUAZU CUA	464	358	105	-	-	1
HUMAITA	411	331	78	1	1	-
ISLA UMBU	762	481	280	-	1	-
LAURELES	628	319	304	3	-	2
MAYOR JOSE D. MARTINEZ	687	182	502	2	-	1
PASO DE PATRIA	203	79	124	-	-	-
SAN JUAN BAUTISTA DE ÑEEMBUCU	1.082	680	400	1	1	-
TACUARAS	631	379	251	-	-	1
VILLA FRANCA	108	66	42	-	-	-
VILLALBIN	391	226	164	-	-	1
VILLA OLIVA	581	227	347	7	-	-

Source: Dirección General de Estadísticas, Encuestas y Censos (DGEEC), 2003 b

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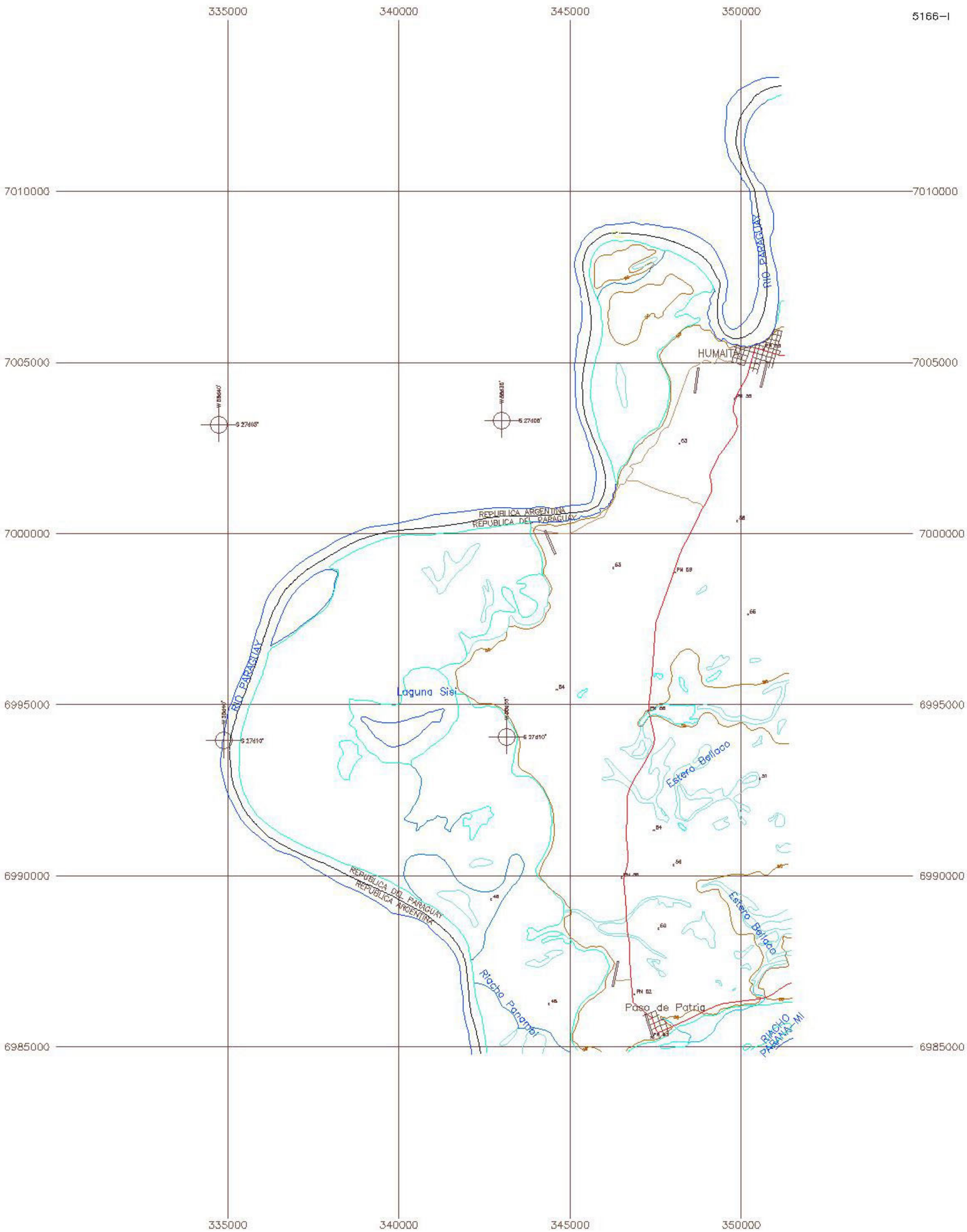
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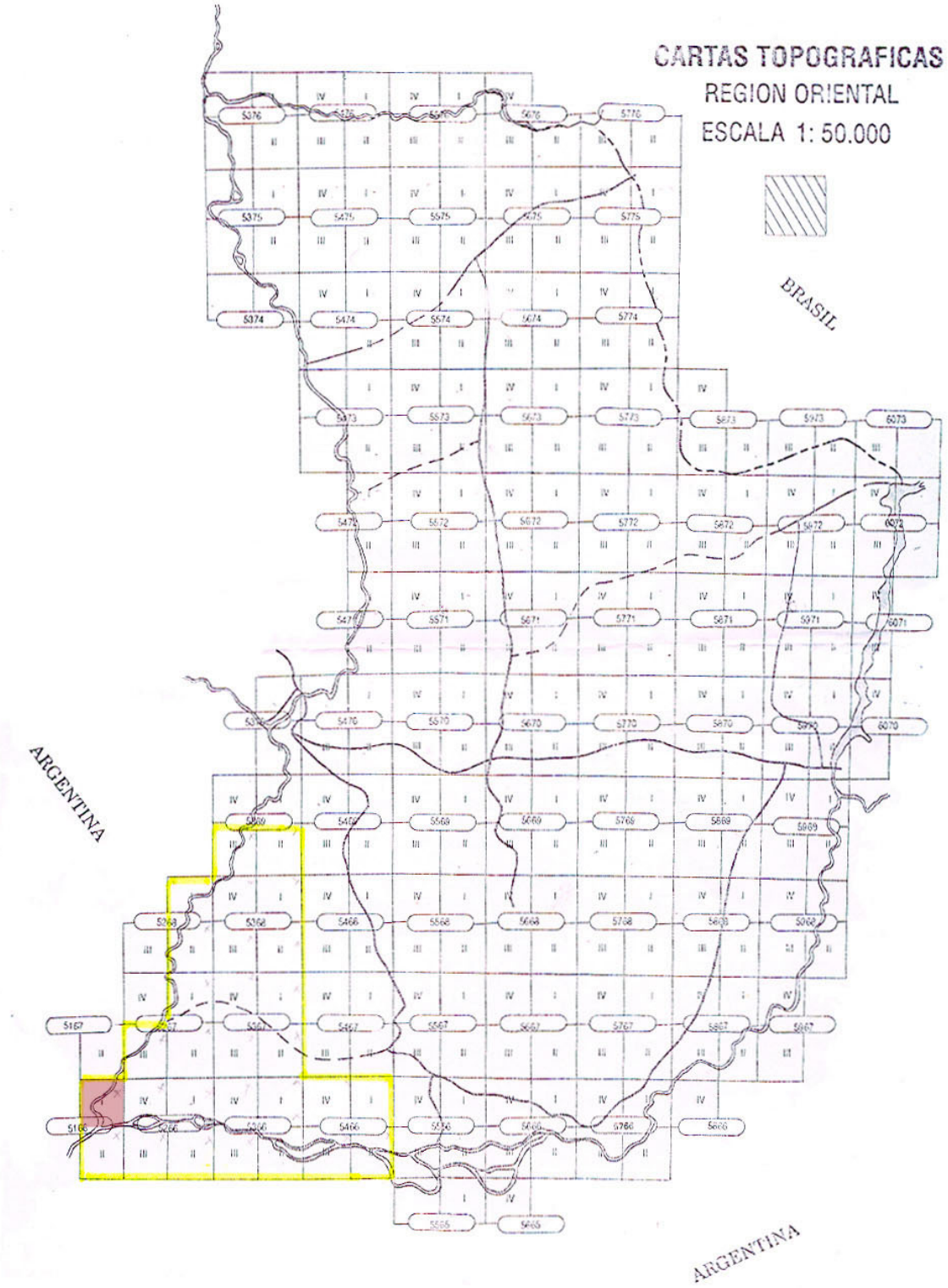
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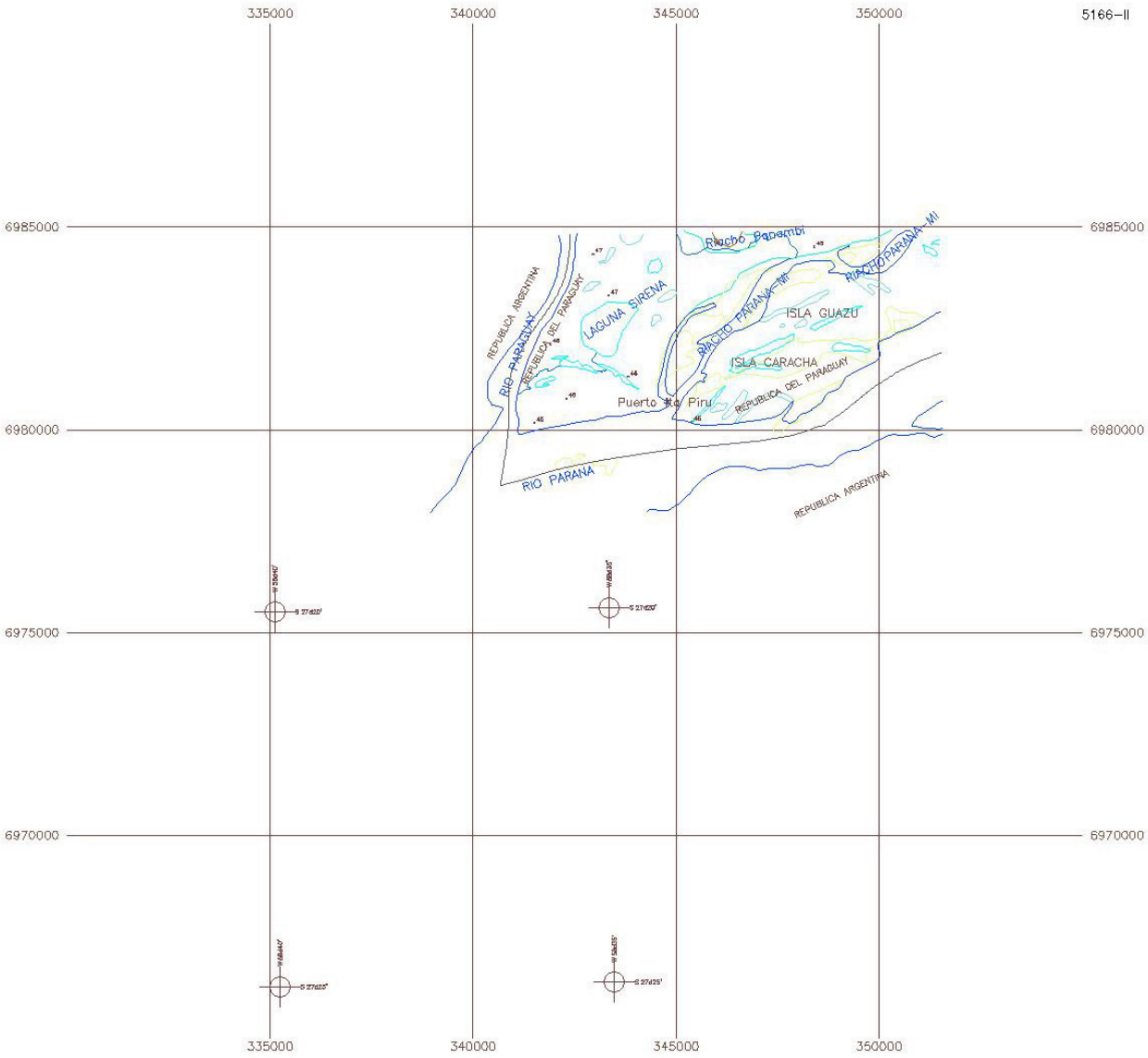
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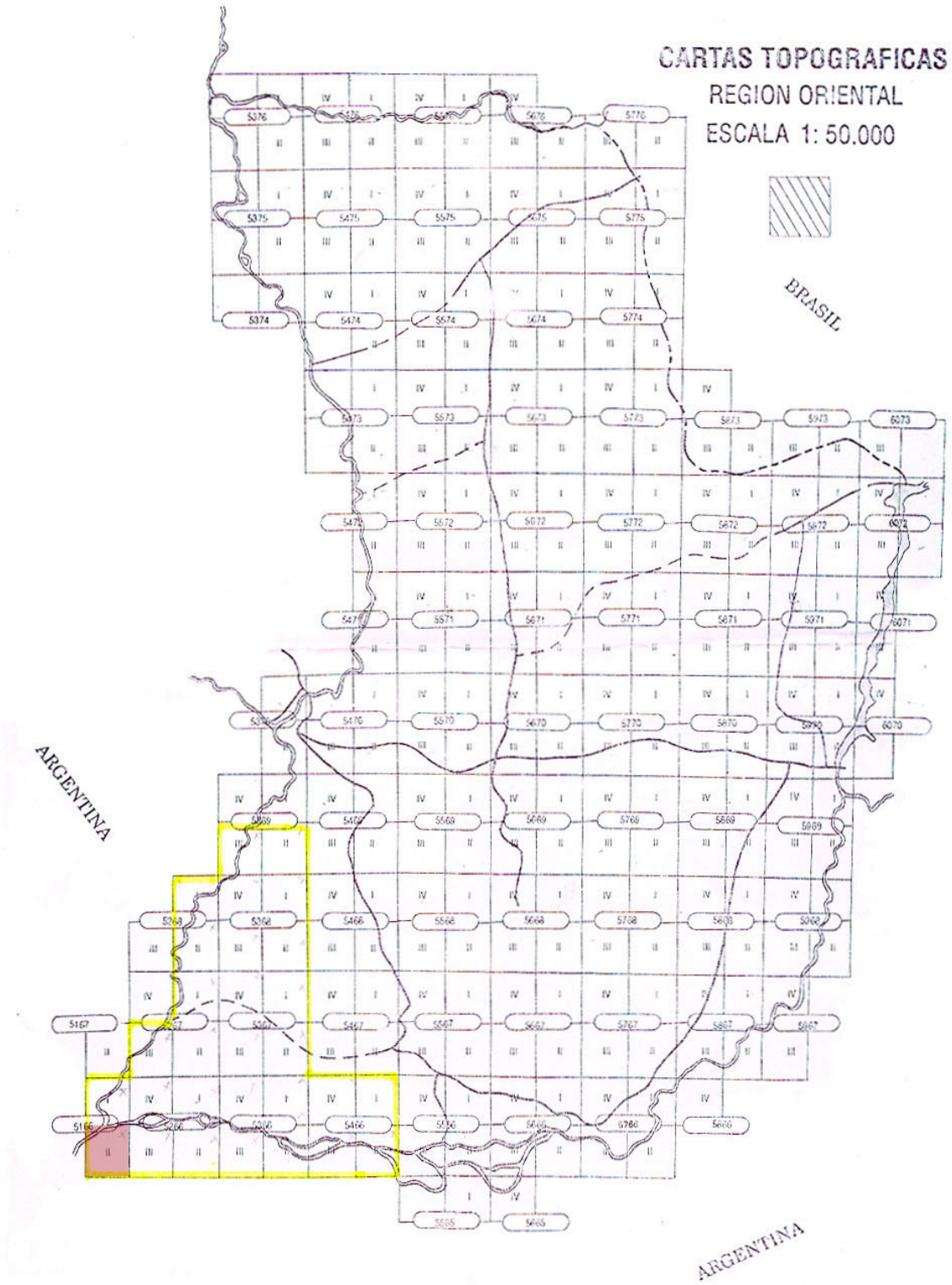
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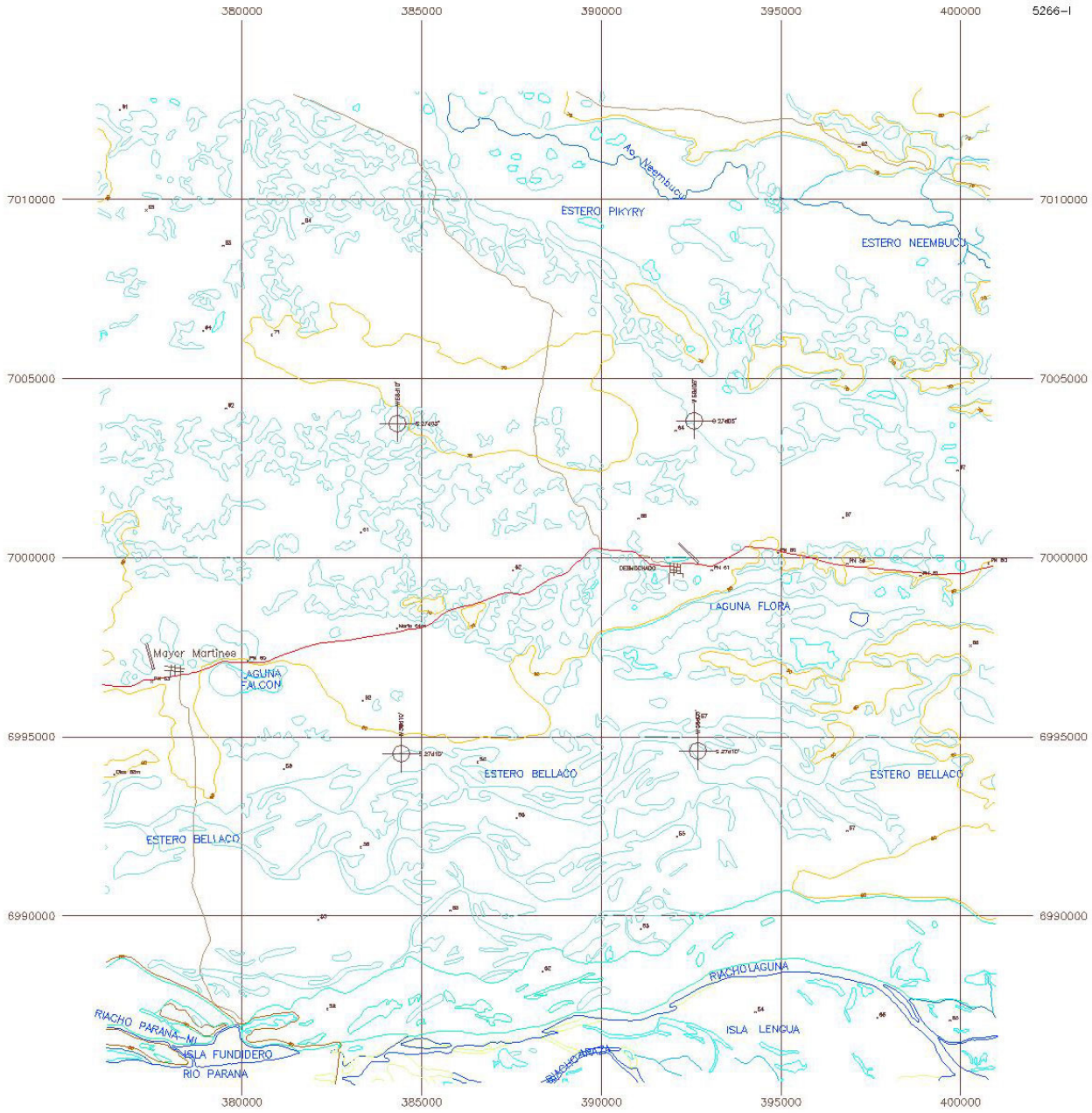
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RIACHO LAGUNA
ISLA LENGUA
RIACHO PARANA-MI
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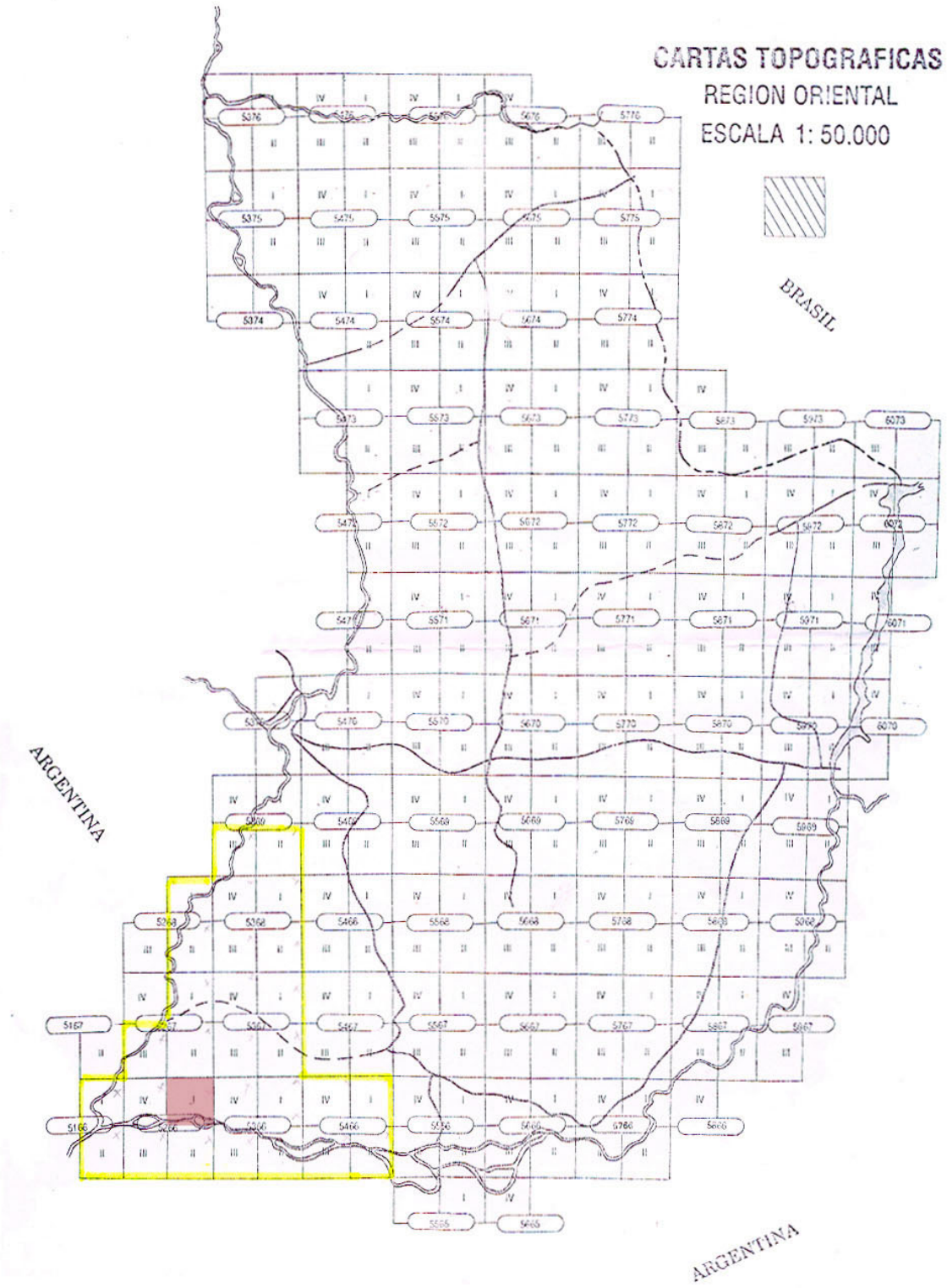
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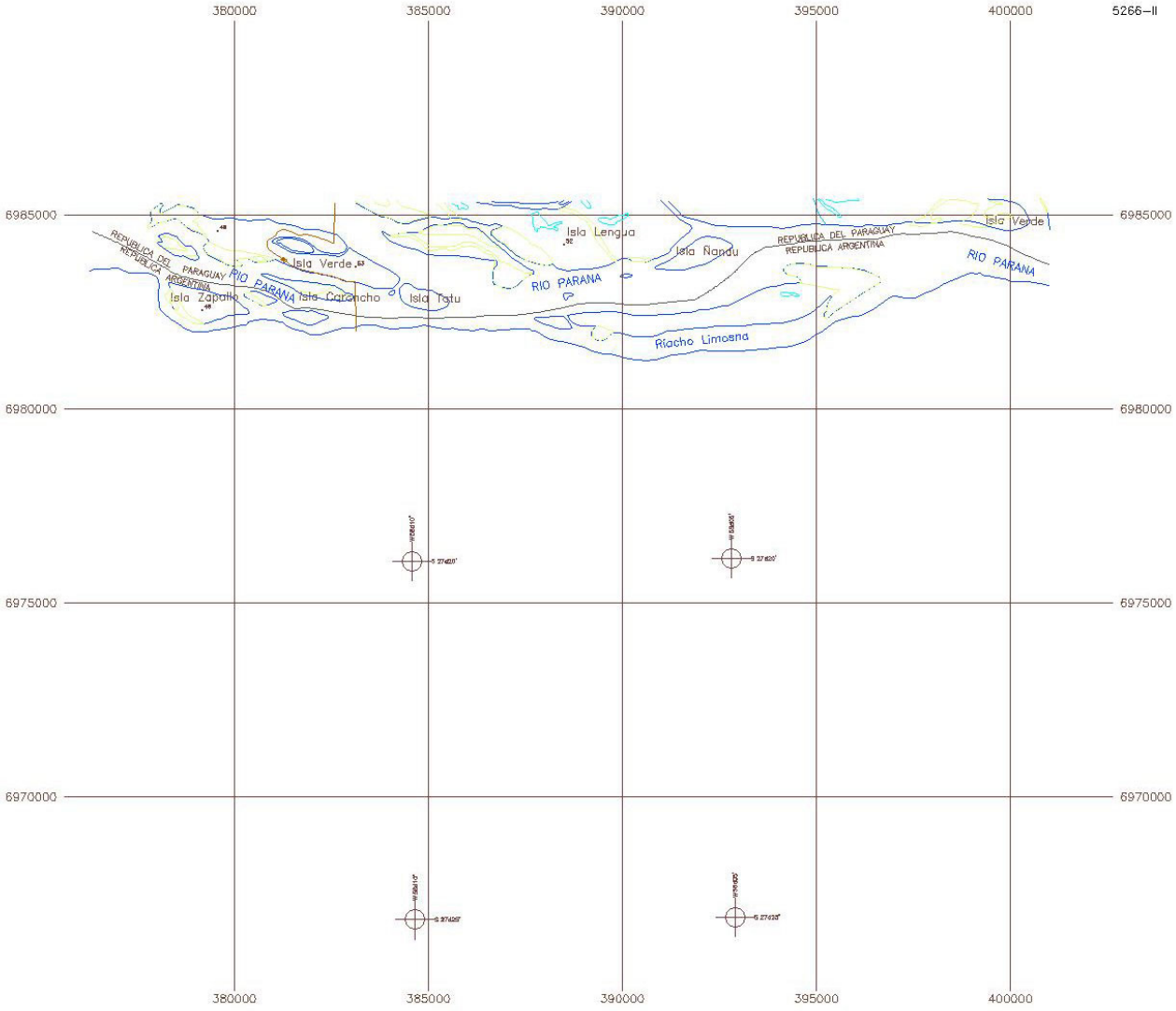
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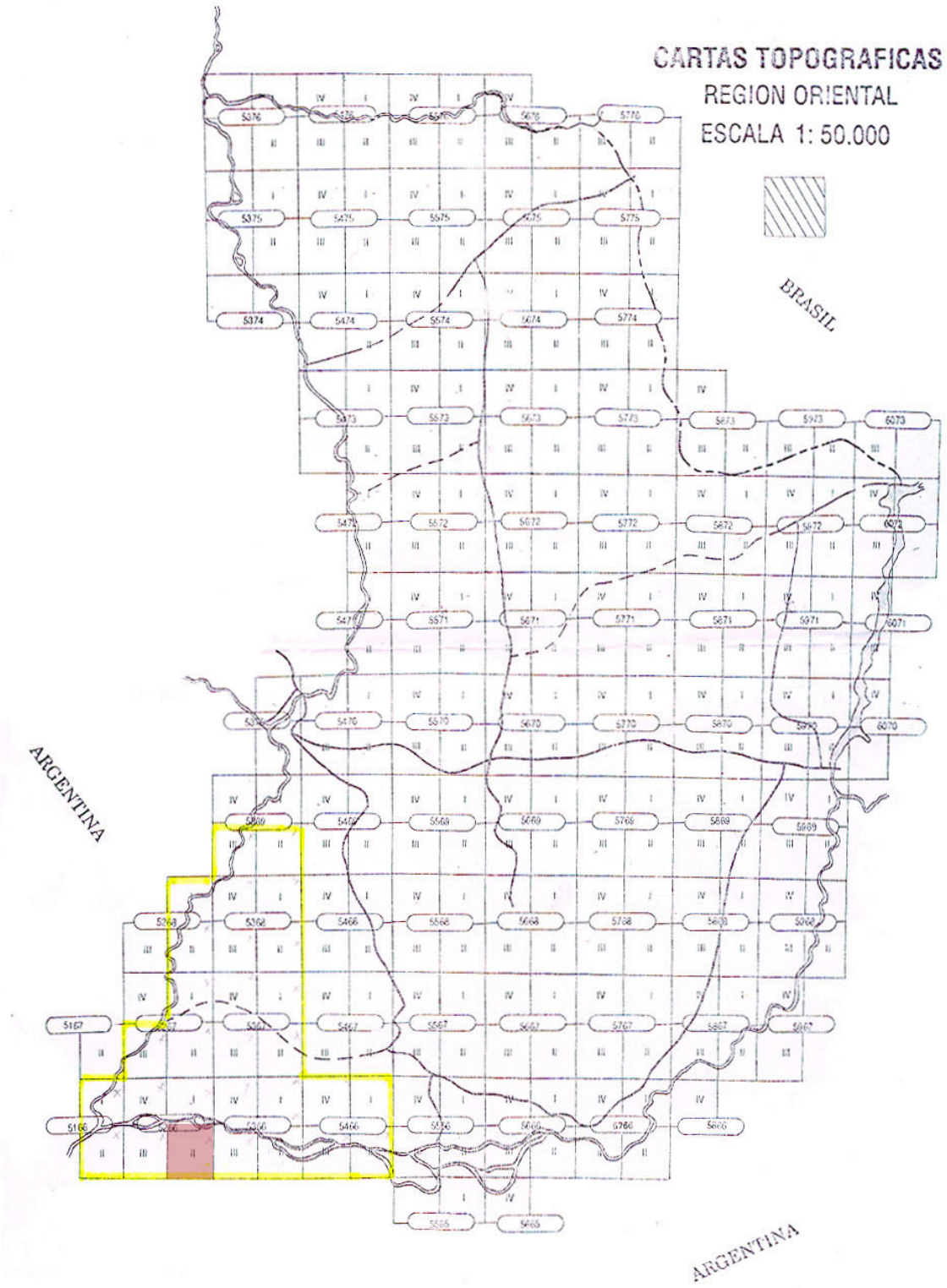
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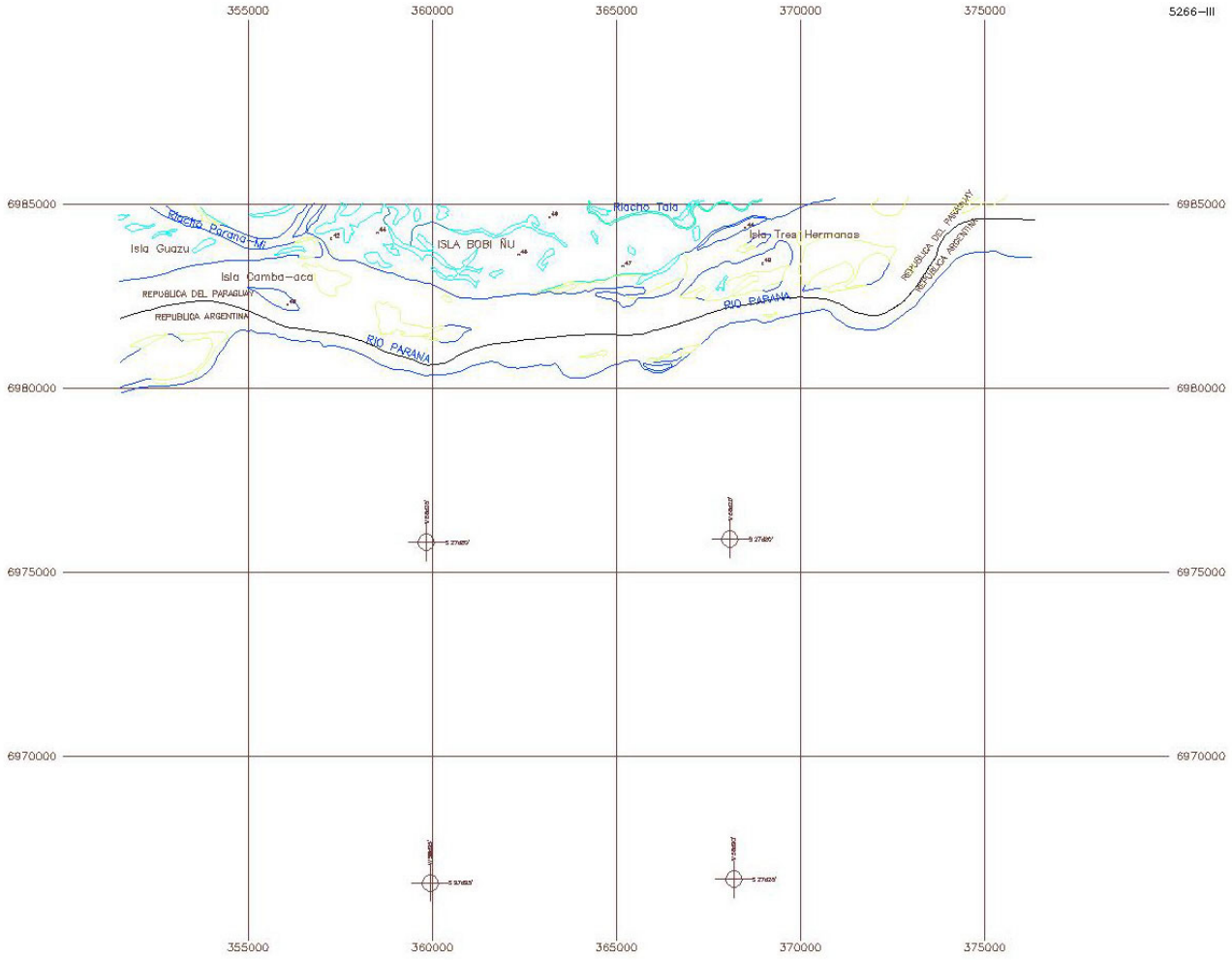
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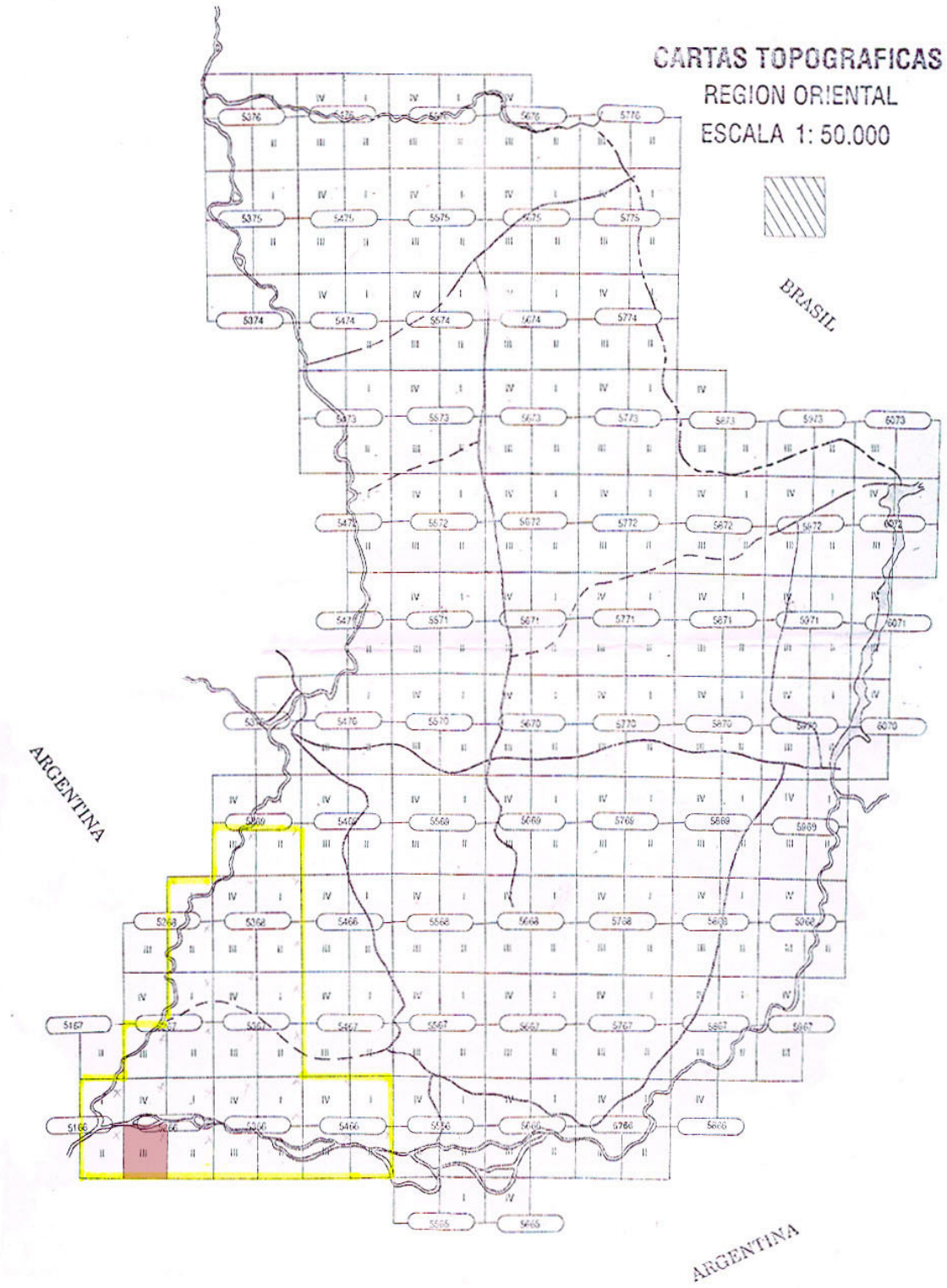
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