

**RAPID ECOLOGICAL EVALUATION FOR THE PROJECT ON  
THE USE OF REMOTE SENSING TECHNOLOGIES FOR  
ECOSYSTEM MANAGEMENT TREATIES**

**DATES: 17-23 October 2004**

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This rapid ecological evaluation of 17-23 October 2004 was developed in the context of the project on Remote Sensing Technologies for Ecosystem Management Treaties, funded by the State Department of the United States of America. This project assesses the use of data from satellite remote sensing instruments in order to improve the efficacy of multilateral treaties for the protection of the environment. The creation of agreements and the designation of sites for the preservation of biodiversity and natural resources of international importance require data for their proper implementation. Therefore, this project intends to prove the use of the data provided by the remote sensing in the management of a specific site which is part of the sites recognized by the Ramsar Treaty and by UNESCO as a Biosphere Reserve in the northeast of the Uruguayan territory and in the Laguna Merín, a freshwater lake located in the cross-border area of Brazil and Uruguay. This area is being affected by pollution from agro-chemicals and over-exploitation of fishery resources. For further information and other reports go to: <http://sedac.ciesin.columbia.edu/rs-treaties/laguna.html>.

## 1. Methodology

Field work was carried out in the plots already surveyed in March and with the transects marked on that occasion in mind.

The survey was undertaken using georeference points, the majority of which were taken as ‘support points’ for each of the transects considering that they no longer coincide exactly with the points marked in last March’s survey. Flora and fauna information was noted (birds, mammals, reptiles, amphibians and fish) on field notes which are attached to this report.

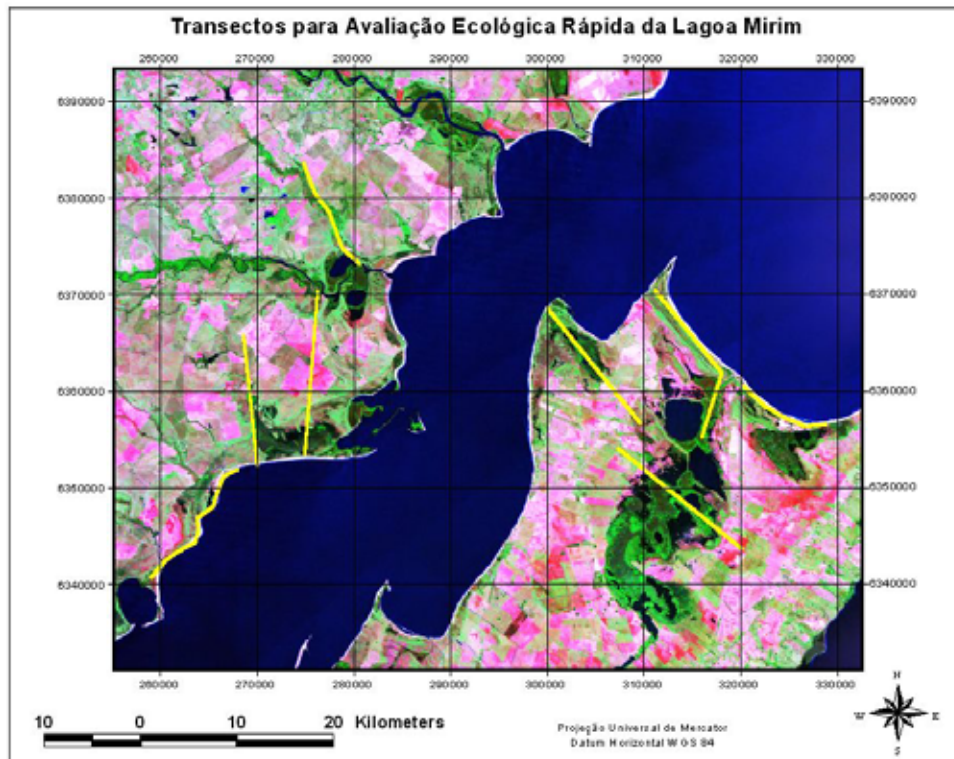
To add to the knowledge of flora and vegetation, samples of plant species were collected which had not previously been surveyed or which had not been fully identified in the March sample due to the lack of flowers and/or fruit. These can be found stored in the plant collection at the Agronomy Faculty in Montevideo, Uruguay (The initials in Spanish are MVFA)

As a result of not taking the same points in the previous survey, there is insufficient data to complete a classification analysis (cluster) which would allow us to find out the similarities between the points with regards to the different features and composition of the vegetation.

## 2. Vegetation Results

The points sampled are regarded as support points for each of the transects considering their different longitudes and latitudes.

### Transects in Brazil



## 2.1 Brazil

### Points for transect 1

**Point 5 (photo below):** It shows bovines grazing in pastureland. On this occasion the soil appears to be very wet implying winter flooding. The pasture is fenced off with electric fencing. The herbaceous cover represents between 60% and 80% and intercepts an equal percentage of light intensity. There is no shrub cover. The height of the vegetation ranges from 5cm to 10cm. The species surveyed were: *Centunculus minimus*, *Cyclopogon diversifolius*, *Cynodon dactylon*, *Eclipta elliptica*, *Eryngium sangisorba*, *Gamochaeta sp.*, *Gamochaeta coarctata*, *Gamochaeta filaginea*, *Glandularia selloi*, *Gratiola peruviana*, *Hypericum brasiliensis*, *Hypoxis decumbens*, *Ischaemum minus*, *Paspalum plicatulum*, *Pterocaulon sp.*, *Richardia stellaris*, *Scoparia montevidensis*, *Spergularia bocconi* y *Sporobolus indicus*.



**Point 26 (photo next page):** This point is located on both sides of a small bridge on a local path to the Laguna del Rey. Three environments are laid out: pastureland at risk from flooding with a plant cover ranging from 60% to 80%, with no shrub cover and with an interception of light equal to the vegetation cover; a marsh with no shrub species and with a scarcity of plant species which barely cover from 20% to 40% of the water's surface; and an open wood which can be seen from the path and where the species standing out due to its stature is *Salix humboldtiana*. The rest of the species surveyed were: *Anagalis arvensis*, *Baccharis pingraea*, *Cyperus sp.*, *Eichhornia crassipes*, *Eryngium pandanifolium*, *Erythrina crista-galli*, *Galium richardianum*, *Hydrocotyle bonariensis*, *Pistia stratiotes*, *Polygonum punctatum*, *Salix humboldtiana*, *Salvinia auriculata*, *Scirpus giganteus*, *Solanum glaucophyllum*, *Thalia multiflora*, *Typha sp.*, y *Verbena bonariensis*.



**Point 39:** It is a pasture currently used for grazing cattle. In the past it was used to plant *Oryza sativa*. The vegetation present intercepts 60-80% of light intensity and the only tree species observed is an example of *Butia Capitata* with a height of approximately 10m, while the majority of other species present have a maximum height of 15cm with a cover of between 40% and 60%. As well as those already mentioned, species present are: *Ambrosia tenuifolia*, *Anagalis arvensis*, *Apium leptophyllum*, *Borreria verticillata*, *Conyza bonariensis*, *Cynodon dactylon*, *Cyperus reflexus*, *Glandularia sp.*, *Guaumberia linarioides* y *Plantago sp.*



## Points for transect 2

**Point 6:** It is a natural pasture grazed by cattle which might flood in the winter. The plant cover is from 60-80% and intercepts the same amount of light intensity. There are no examples of trees and the greatest cover height is provided by examples of *Sesbania punicea*, which have an

average height of 40cm. The remaining species present at this point are: *Acicarpha tribuloides*, *Centella asiatica*, *Centunculus minimus*, *Crassula peduncularis*, *Cynodon dactylon*, *Facelis retusa*, *Hedyotis salzmannii*, *Hydrocotyle bonariensis*, *Ischaemum minimus*, *Luziola peruviana*, *Myriophyllum aquaticum*, *Nymphoides indica*, *Polygala pulchella*, *Pratia hederacea*, *Ranunculus apiifolius*, *Sagina sp.*, *Sisyrinchium sp.*, *Solanum glaucophyllum*, y *Soliva sessilis*.



**Point 7:** It consists of a sandy area already georeferenced in the area around the Laguna Merin coast, moving a little further away from the coast than in the March 2004 sample which might flood in the winter season. The vegetation is scarce, only covering a maximum of 20% of the soil surface and without any shrub cover; The greatest height is represented by *Sesbania punicea* (40 cm). The species surveyed at this point are: *Acmella sp.*, *Bacopa monnieri*, *Cynodon dactylon*, *Eleocharis sp.*, *Enydra sessilifolia*, *Hydrocotyle bonariensis*, y *Xanthium cavanillesii*.



**Point 8:** This point is similar to the previous one but has a higher percentage of plant cover reaching up to 40% despite the fact that the light interception is not that much (20%). It might also flood in winter. The greatest cover height is provided by the presence of *Sesbania punicea* (50cm), the other species are smaller. *Solanum platense* is considered an important find at this point since there's no knowledge of its occurrence in Brazil, although there isn't an updated bibliography of Solanaceae. The remaining species present are: *Acanthospermum australe*, *Acicarpha tribuloides*, *Ambrosia tenuifolia*, *Androtrichium trigynum*, *Azolla sp.*, *Bacopa monnieri*, *Baccharis articulata*, *Cardionema ramosissima*, *Centella asiatica*, *Cephalanthus glabratus*, *Chenopodium retusum*, *Cuphea carthagenensis*, *Cynodon dactylon*, *Cyperus haspan*, *Cyperus virens*, *Enydra sessilis*, *Erechtites hieracifolia*, *Eryngium pandanifolium*, *Hedyotis salzmanii*, *Ischaemum minus*, *Juncus microcephalus*, *Nymphoides indica*, *Panicum racemosum*, *Paspalum nicorae*, *Petunia litoralis*, *Pluchea sagitalis*, *Polygonum punctatum*, *Pterocaulon sp.*, *Ranunculus apiifolius*, *Senecio aff. crassifolius*, *Thelipteris interrupta*, *Xyris jupicai*, y *Zizaniopsis bonariensis*



**Point 9 (photo next page):** It consists of two very different environments. On one side there is sandy pastureland which might flood in winter with a very high percentage of cover (80-100%) and an equal interception of light. There aren't any tree species and the greatest cover height is represented by examples of *Sesbania punicea* which reach 1.30m, while the remaining vegetation scarcely reaches a height of between 5 and 10 cm. On the other side there is a marsh with much less plant cover than that of the pastureland since it doesn't exceed 40% and it's interception of light doesn't exceed 40% either. In the latter environment, the greatest cover height is due to the presence of *Solanum glaucophyllum* which reaches a height of up to 1.50m. As well as the species already mentioned, species surveyed were: *Centella asiatica*, *Cephalanthus glabratus*, *Conyza blackeii*, *Conyza bonariensis*, *Cynodon dactylon*, *Cyperus haspan*, *Cyperus reflexus*, *Cyperus virens*, *Eleocharis bonariensis*, *Erechtites hierasifolia*, *Eryngium pandanifolium*, *Hedyotis salzmanii*, *Hydrocotyle bonariensis*, *Juncus microcephalus*, *Ludwigia caparosa*, *Oxalis paludosa*, *Panicum sabulorum*, *Paspalum nicorae*, *Polygonum punctatum*, *Solanum platense*, *Solanum sisymbriifolium*, *Thelipteris interrupta*, *Vigna luteola*, *Xyris jupicai*, y *Zizaniopsis bonariensis*.



**Point 10:** Two environments were also observed at this point: a) a sandy area which might flood in winter with a high percentage of cover (80-100%) and an equal interception of light. However, unlike point 9 no species of great stature were noted since the greatest cover height is 15 cm, hence no tree species were present. b) a marsh with sparse vegetation (20-40% of plant cover). The species present are: *Acicarpa tribuloides*, *Boehmeria cylindrica*, *Bulbostylis capillaris*, *Centella asiatica*, *Conyza bonariensis*, *Cyperus reflexus*, *Eleocharis viridans*, *Gamochoaeta filaginea*, *Indigofera sabulicola*, *Ischaemun minus*, *Juncus sp.*, *Panicum gouinii*, *Paspalum nicorae*, *Polygonum punctatum*, *Pratia hederacea*, *Pterocaulon lorentzii*, y *Zizaniopsis bonariensis*.

**Point 12 :** It consists of two environments : a) a sandy pastureland along the coast of the lagoon with a plant cover of between 60% and 80% that intercepts an equal percentage of light and which does not have any shrub cover. b) woodland or forest on the Rey stream (do Rei) with a cover of 40-60% in the upper layer and the same interception of light. In the pastureland the greatest cover height is 10cm and in the woodland or forest the height is between 10 and 15 m. The species surveyed at this point are : *Acianthera pubescens*, *Blepharocalyx salicifolia*, *Bromelia antiacantha*, *Celtis iguanea*, *Cephalanthus glabratus*, *Cereus uruguayensis*, *Chenopodium retusum*, *Daphnopsis racemosa*, *Dichondra microcalyx*, *Eugenia uniflora*, *Eugenia uruguayensis*, *Ficus organensis*, *Glandularia tenera*, *Hydrocotyle bonariensis*, *Lantana camara*, *Mecardonia tenella*, *Mikania cordifolia*, *Myrceugenia sp.*, *Myrcine parvifolia*, *Oplismenus hirtellus*, *Petunia litorales*, *Plantago lanceolata*, *Psychotria carthagenensis*, *Sapium glandulosum*, *Scutia buxifolia*, *Schinus longifolius*, *Sesbania punicea*, *Smilax campestris*, *Solanum flagellaris*, *Solanum mauritianum*, *Syagrus romazoffianum*, *Tibouchina sp.*, y *Tradescantia anagallidea*.





**Point 13:** Two environments stand out at this point: a) a sandy pasture with sparse vegetation since up to 20% of the light is intercepted and the cover is the same percentage. There is a maximum height of 30cm. b) a woodland or forest which has a cover of between 60% and 80% intercepting an equal amount of light. In the latter environment's case, the plant cover in the lower layer does not exceed 20% of the cover and height ranges between 6 and 8 m. The following species can be found at this point: *Aciparpha tribuloides*, *Cardionema ramossisima*, *Conyza blackeii*, *Daphnopsis racemosa*, *Eugenia uruguayensis*, *Glandularia selloi*, *Gamochoaeta americana*, *Gomphrena perennis*, *Hydrocotyle bonariensis*, *Litraea brasiliensis*, *Myrciantes cisplatensis*, *Myrcine parvifolia*, *Petunia littoralis*, *Plantago tomentosa*, *Sebastiania commersoniana*, *Senecio plantense*, *Smilax campestris*, *Tillandsia aeranthos*, *Tillandsia geminiflora*, *Thelypteris interrupta*, y *Vitex megapotanica*.



**Point 16:** It consists of pastureland used for grazing where two layers of vegetation can be observed. One is 10m tall and the other consists of a few examples of *Sesbania punicea* which are 60-70 cm tall and which represent up to 20% of the total plant cover. The general plant cover ranges from 80% to 100%. The species present are: *Borreria verticillata*, *Cynodon dactylon*, *Dichondra microcalyx*, *Echinodorus sp.*, *Elatine triandra*, *Eleocharis bonariensis*, *Gratiola peruviana*, *Lithrum sp.*, *Nymphoides indica*, *Paspalum pumilum*, *Salvinia biloba*, *Solanum glaucophyllum*, y *Xanthium cavanillesii*.



### Points for transect 3

**Point 32:** The presence of a pastureland at risk from flooding is seen at this point. It has a plant cover of between 20-40% with a little less interception of light (20%) and there isn't any shrub cover ; The maximum cover height does not exceed 20cm. A marsh was also surveyed with a plant cover of 40-60% and which, like the pastureland, did not have any tree species. The following species were present : *Bacopa monnieri*, *Centella asiatica*, *Cynodon dactylon*, *Echynodorus tenellus*, *Eleocharis bonariensis*, *Eleocharis geniculata*, *Gratiola peruviana*, *Ischaemum minus*, *Leerzia hexandra*, *Ludwigia peploides*, *Nymphoides indica*, *Rhynchospora holochoesnoides*, *Schoenoplectus californicus*, *Sesbania punicea*, *Scirpus aff. pungens*, y *Solanum glaucophyllum*.



**Point 33:** This point should not really be taken as a support to this transect exactly, since only a few species were surveyed here and only GPS data was taken. It consists of the ruins of an old abandoned farm where a short break from work was taken to have lunch. Among other species the presence of examples belonging to the Orchidaceae family were seen, some of which are used by plant breeders to obtain examples for florists and gardens. The following were surveyed at this point: *Cattleya sp.*, *Ficus organensis*, *Laelia sp.*, *Parkinsonia aculeata*, *Scutia buxifolia*.



**Point 37:** It shows a woodland or forest on land prepared at the time for the cultivation of *Oryza sativa*, leaving a small strip of wet pastureland between the forest and the land ready for sowing time; Furthermore, it's observed that from year to year, a little bit more woodland is 'stolen' through tree felling and burning to increase the area for cultivation. Hence the vegetation cover is not very high (20-40%) with species whose stature ranges from 30cm to 1m, there is a greater shrub cover (60-80%) with a cover height of 3-10m. The remains of an old house were also observed. The species present there are: *Acicarpa tribuloides*, *Apium leptophyllum*, *Blepharocalyx salicifolia*, *Bluembachia insignes*, *Berveris laurina*, *Briza minor*, *Bromelia antiacantha*, *Butia capitata*, *Cayaponia sp.*, *Celtis sp.*, *Cereus uruguayensis*, *Cissus verticilata*, *Cyperus sp.*, *Daphnopsis racemosa*, *Dichondra micorcalyx*, *Erechtites varianifolia*, *Eryngium paniculatum*, *Ficus luschnatiana*, *Ficus organensis*, *Heimia myrtifolia*, *Juncus bufonicus*, *Lithraea brasiliensis*, *Microgramma squamulosa*, *Myrrhinium atropurpureum var. octandrum*, *Opuntia arechavaletae*, *Plantago hirtella*, *Polygonum punctatum*, *Rapanea parvifolia*, *Sagittaria montevidesis*, *Sapium glandulosum*, *Scutia buxifolia*, *Schinus longifolium*, *Sesbania punicea*, *Solanum flagellare*, *Solanum mauritanum*, *Solanum sissymbriifolium*, *Sonchus asper*, *Tillandsia aeranthos*, y *Tripodanthus acutifolius*.



## Points for transect 4

**Point 49:** Two environments were observed, one of which is pastureland, probably flooded in winter with a plant cover of 20-40% which intercepts the same percentage of light and which does not have any shrub species ; the general cover height is from 10cm except for the presence of examples such as *Sesbania punicea* (50cm) which make up a very low percentage (3-5% of the total). The other environment is a marsh with a vegetation cover of between 60% and 80%. The species recorded at this point are : *Azolla* sp., *Centella asiatica*, *Centunculus minimus*, *Cuphea carthagenensis*, *Cynodon dactylon*, *Cyperus surinamensis*, *Echinodorus* sp., *Eichhornia azurea*, *Endydra sessiliflora*, *Gymnocoronis spilanthoides*, *Hedyotis salzmanii*, *Hydrocotyle bonariensis*, *Ischaemun minus*, *Ludwigia peploides*, *Oxalis paludosa*, *Phyllanthus sellowianus*, *Polygonum punctatum*, *Pratia heredacea*, *Salvinia auriculata*, *Sapium glandulosum*, *Schoenoplectus aff. pungens*, *Schoenoplectus californicus*, *Sisyrinchium* sp., *Solanum glaucophyllum*, y *Zizaniopsis bonariensis*.



**Point 51:** It is a pastureland at risk from flooding with a high plant cover (80-100%) which also intercepts 80-100% of the light and where no tree species are recorded. The greatest cover height is represented by *Sesbania punicea* and ranges from 30 to 50 cm. The rest of the species present are smaller and are : *Acmella decumbens*, *Borreria verticillata*, *Centella asiatica*, *Gamochaeta coarctata*, *Glandularia selloi*, *Hedyotis salzmanii*, *Ischaemun minus*, *Lathyrus crassipes*, *Mecardonia tenella*, *Medicago polymorpha*, *Nymphoides indica*, *Panicum guinii*, *Polygala australis*, *Sesbania punicea*, y *Sisyrinchium* sp.



**Point 52:** This point consists of pastureland which floods, where cattle are grazing. The plant cover is predominantly herbaceous (60-80%) and the percentage of light intercepted is the same as the cover. The height of the herbaceous layer ranges from 5 to 30 cm, whilst the shrub layer is 5m and consists of *Sapium glandulosum* which does not exceed 0.95% of the total cover. The rest of the species present are: *Calitriche sp.*, *Crassula peduncularis*, *Centella asiatica*, *Centunculus minimus*, *Cynodon dactylon*, *Elatine triandra*, *Echinodorus sp.*, *Eleocharis bonariensis*, *Glandularia selloi*, *Gratiola peruviana*, *Ischaemun minus*, *Juncus microcephalus*, *Ludwigia sp.*, *Nymphoides indica*, *Oxalis paludosa*, *Paspalum pumilum*, *Paspalum modestum*, *Phyllanthus sellowianus*, *Pontederia rotundifolia*, *Ranunculus apiifolius*, *Sapium glandulosum*, *Sesbania punicea*, *Sisyrinchium sp.*, y *Solanum glaucophyllum*.



## 2.2 Uruguay

### Transects in Uruguay



## Points for transect 1

**Point 56:** It is a field sown with *Oryza Sativa* where, on this occasion pre-emerging crop-spraying using an airplane can be observed.



**Point 57:** It consists of wet scrubland located on the edge of the highway. It has a general cover ranging from 80-100%, the lower layer is less, comprising of 40-60%. The only representative of tree growth is *Erythrina crista-galli* which is between 2-3m tall, but 80% of the total cover is provided by *Eryngium pandanifolium*, a classic feature of this type of environment. The rest of the species present are : *Baccharidastrum triplenerivium*, *Centunculum minimus*, *Cyperus sp.*, *Dichondra microcalyx*, *Glandularia selloi*, *Juncus microcephallus*, *Mikania micrantha*, *Oxalis sp.*, *Paspalumsp.*, y *Polygonum punctatum*



**Point 58:** At this point the land is being prepared for the cultivation of *Oriza sativa*.

**Point 65:** It is an upgraded pastureland where the predominant species are imported for their cultivation because they are good fodder species. The plant cover is 60-80%, the same as the

interception of light. Tree species were not surveyed. The species present are: *Cynodon dactylon*, *Lolium multiflorum*, *Lotus corniculatus*, *Trifolium repens*.

**Point 67:** It shows a grazing pasture on the one hand, with a herbaceous cover of 60-80% and the same interception of light; The cover height does not exceed 5cm and does not include tree species. On the other hand there is a woodland or forest which is quite open. Its plant cover is 40-60% in the upper layer and it has a herbaceous cover in the lower layer of 40-60%. The largest species reach a height of 3m. The following species were recorded at this point: *Aniseia argentina*, *Borreria sp.*, *Caperonia hystrix*, *Centaurium pulchellum*, *Centella asiatica*, *Centunculum minus*, *Cissus palmata*, *Crassula sp.*, *Cuphea sp.*, *Cynodon dactylon*, *Echinodorus sp.*, *Gamochaeta sp.*, *Gratiola peruviana*, *Juncus bufonius*, *Ludwigia sp.*, *Mikania micrantha*, *Ornothopus micranthus*, *Phyllanthus sellowianus*, *Polygonum hydropeperoides*, *Ranunculus sp.*, *Sapium glandulosum*, *Sesbania punicea*, *Solanum sp.*, y *Stemodia hyptoides*.



**Point 68 (photo next page):** Three different environments are portrayed at this point: a) a sandy pasture with sparse vegetation which covers between 20-40% and which is from 5 to 20 cm tall. There aren't any tree species; The interception of light is 0-20%; b) a sandy area made up of low sand dunes where the vegetation present has a cover of 40-60% intercepting an equal percentage of light and where the largest species reach 1.50 m. c) Scrubland fundamentally consisting of *Panicum prionitis*. In this environment the plant cover reached is 80-100% with the same interception of light and with a maximum height of 1.80 m. The species surveyed at this point are: *Acantosperrmun australe*, *Acicarpha tribuloides*, *Alternathera philoxeroides*, *Ambrosia tenuifolia*, *Cardionema sp.*, *Cardionema ramossissima*, *Centella asiatica*, *Cynodon dactylon*, *Cyperus surinamensis*, *Chenopodium sp.*, *Echynodorus longiscapus*, *Eleocharis viridans*, *Eragrostis cataclasta*, *Gamochaeta coartata*, *Gamochaeta stachydifolia*, *Gomphrena perennis*, *Hydrocotyle bonariensis*, *Hyptis mutabilis*, *Indigofera sabulicola*, *Jaegeria hirta*, *Juncus microcephalus*, *Leerzia hexandra*, *Ludwigia sp.*, *Manihot clavelifolia*, *Mikania micrantha*, *Mikania cordifolia*, *Oenothera mollissima*, *Panicum sabulorum*, *Panicum prionitis*, *Panicum racemosum*, *Paspalum nicorae*, *Piptochaetium confusum*, *Pluchea sagitalis*, *Polygonum punctatum*, *Psidium luridum*, *Ranunculus apiifolius*, *Richardia brasiliensis*, *Sagittaria montevidensis*, *Senecio sp.*, *Sesbania punicea*, *Sisyrinchium sp.*, *Solanum curtipes*, y *Stemodia hyptoides*.



**Point 69:** It deals with a sandy area which includes an open forest. The herbaceous cover does not exceed 60% and the tree cover reaches 20% at the most, this last calculation also corresponds with the interception of light. In the sandy area the greatest cover height is provided by a few examples of *Sesbania punicea* which reach up to 30cm and the majority of the shrub examples in the forest have a height ranging from 4 to 6 m. The following species were recorded at this point: *Acicarpa tribuloides*, *Baccharis arenaria*, *Cephalanthus glabratus*, *Erythrina crista-galli*, *Frigilanthus acutifolius*, *Hydrocotyle bonariensis*, *Ipomoea cairica*, *Muehlenbeckia sagittifolia*, *Nectandra megapotamica*, *Ocotea acutifolia*, *Passiflora coerulea*, *Phyllanthus sellowianus*, *Poa sp.*, *Richardia brasiliensis*, *Sapium glandulosum*, *Smilax campestris*, y *Tillandsia aeranthos*.



**Point 71 (photo next page):** Two environments are highlighted: a sandy area and a forest or woodland. The sandy area has a plant cover of 20-40%, intercepting up to 20% of the light and the forest or woodland has a cover which ranges from 60% to 80%. Tree species were not surveyed in the sandy area, the largest species is *Sesbania punicea*. In the forest, heights vary between 3 and 5 m. The following species were recorded: *Acanthospermum australe*, *Baccharis arenaria*, *Cynodon dactylon*, *Fragmites communis*, *Hydrocotyle bonariensis*, *Mikania micrantha*, *Myrcianthes cisplatensis*, *Oenothera sp.*, *Passiflora caerulea*, *Polygonum sp.*, *Salix humboldtiana*, *Sapium glandulosum*, *Schoenoplectus californicus*, *Sebastiania schottiana*, *Senecio crassiflorus*, *Sesbania punicea*, *Theliptheris interrupta*, y *Tillandsia aeranthos*.





**Point 72:** This point consists of pastureland which could flood in winter and a forest or woodland. The pastureland has a cover of between 40% and 60% with an equal percentage of light interception and the forest, which is pretty open has a cover ranging from 20% to 40% and an equal interception of light. In the pastureland the greatest height is represented by *Sesbania punicea* (80cm) and the tree species range from 2m to 3m tall. The species recorded are: *Azolla sp.*, *Centella asiatica*, *Cephalanthus glabratus*, *Cuphea racemosa*, *Cynodon dactylon*, *Hydrocotyle bonariensis*, *Ludwigia peploides*, *Miriophyllum aquaticum*, *Nymphoides indica*, *Polygonum punctatum*, *Pontederia coartata*, *Schoenoplectus californicus*, y *Sesbania punicea*.



**Point 101 (photo next page):** It consists of pastureland at risk from flooding that has been ploughed and currently has cattle in it. The plant species here do not exceed a height of 20cm and have a cover of 60-80% with an equal percentage of interception of light. In addition a marsh was observed with a cover of between 40% and 60%. In the latter environment the cover height ranges between 1m and 1.20m. The species surveyed were: *Borreria dasycephala*, *Canna glauca*, *Cyperus giganteum*, *Eryngium pandanifolium*, *Pontederia cordata*, *Rhynchospora corymbosa*, y *Solanum platense*.



### Points for transect 2

**Point 86:** At this point there is pastureland with cattle which is at risk from flooding and which has a plant cover of 60-80% and an equal percentage of interception of light; The cover height ranges from 5 to 10cm, except for *Sesbania punicea* which is taller (30-50cm). There is also a marsh with less plant cover (20-40%) which intercepts between 0 and 20% of the light. The greatest height in this latter environment is provided by the presence of *Panicum prionitis* with examples which range from 2m to 2.5m. Tree species were not recorded in either environment at this point. Species present were: *Centella asiatica*, *Cephalanthus glabratus*, *Cynodon dactylon*, *Gratiola peruviana*, *Hedyotis salzmännii*, *Ischaemum minus*, *Juncus microcephalus*, *Ludwigia peploides*, *Mecardonia tenella*, *Nymphoides indica*, *Polygala australis*, *Potamogetum sp.*, *Sesbania punicea*, *Solanum glaucophyllum*, y *Utricularia sp.*



**Point 87 (photo next page):** The environments present at this point are a pastureland at risk from flooding on the one hand. It has a plant cover of 40-60% which intercepts the same percentage of light. It does not have any shrub cover. The largest species is *Sesbania punicea* which ranges from 50cm to 80cm tall. On the other hand, there is a forest or woodland with a greater plant cover than the pastureland (60-80%) with examples that reach up to 8m tall. The species surveyed are: *Acacia caven*, *Aechmea recurvata*, *Angramma chaerophylla*, *Blepharocalyx salicifolia*, *Boehmeria cylindrica*, *Cissus striata*, *Commelina erecta*, *Daphnopsis racemosa*, *Dicliptera tweediana*, *Drymaria cordata*, *Enydra sessilis*, *Eryngium pandanifolium*,

*Erythrina crista-galli*, *Eugenia uniflora*, *Eupatorium* sp., *Guettarda uruguensis*, *Hydrocotyle bonariensis*, *Hydrocotyle leucocephala*, *Juncus microphallus*, *Lathyrus magellanicus* var. *tucumanensis*, *Lithraea brasiliensis*, *Microgramma squamulosa*, *Myrcianthes gigantea*, *Myrrhimum atropurpureum* var. *octandrum*, *Myriophyllum aquaticum*, *Peperomia tetraphylla*, *Polygonum punctatum*, *Pratia hederacea*, *Psychotria carthagenensis*, *Ranunculus apiifolium*, *Rapanea laetevirens*, *Rhipsalis lumbricoides*, *Sebastiania brasiliensis*, *Sebastiania commersoniana*, *Sebastiania schottiana*, *Sesbania punicea*, *Stachys gilliesii*, *Syderoxylon obtusifolium*, *Tilladsia aeranthos*, *Tillandsia usneoides*, *Tradescantia anagallidea*, *Tropaeolum pentaphyllum*, *Vitex megapotamica*, , y *Xylosma tweediana*.



**Point 107:** At this point there is a marsh with a plant cover of 40-60% and an equal interception of light. The smallest species reach a height of 10cm and the largest a height of 1.20-2m. No tree species were recorded. The species recorded are: *Aspilia montevidensis*, *Baccharis trimera*, *Cyperus giganteus*, *Daphnopsis racemosa*, *Eryngium pandanifolium*, *Funastrum flavum*, *Glandularia selloi*, *Panicum prionitis*, *Polygonum punctatum*, *Pontederia cordata*, *Rhynchospora corymbosa*, *Solanum chenopodioides*, y *Thelypteris* sp.



### Points for transect 3

**Point 82:** Two environments were observed at this point: a) a sandy flood plain or sandy area with abundant plant cover (80-100%) and no shrub species; The interception of light is also 80% to 100% and the largest species is *Sesbania punicea* (80cm), the rest of the vegetation has an average height of 10cm. b) a marsh with less cover than the pastureland (40-60%) which intercepts an equal percentage of light. The only tree species present is *Salix hunbodtiana* with a height of 3-5m. The species present at point 82 are: *Acicarpa tribuloides*, *Bulbostyllis capillaris*, *Cardionema ramossisima*, *Centella asiatica*, *Cephalanthus glabratus*, *Cynodon dactylon*, *Eleocharis maculosa*, *Gamochoeta filaginea*, *Glandularia tenella*, *Gratiola peruviana*, *Hedyotis salzmannii*, *Ischaemun minus*, *Ludwigia peploides*, *Mecardonia tenella*, *Nymphoides indica*, *Panicum prionitis*, *Panicum racemosum*, *Plantago tomentosa*, *Paspalum nicorae*, *Poa sp.*, *Richardia brasiliensis*, *Salix hunbodtiana*, *Scutelaria racemosa*, *Senecio crassiflorus*, *Sesbania punicea*, y *Solanum glaucophyllum*.



**Point 83 (photos next page):** At this point there is a very wet pastureland with 60-80% cover which intercepts the same percentage of light. There isn't any shrub cover. The tallest species is *Sesbania punicea* which reaches 1m whilst the other species are between 5 and 10cm tall. The other environment is a fairly open forest with a plant cover of 20-40% and an equal interception of light. It includes examples with heights of 4-5m. The species surveyed here are: *Adiantopsis chlorophylla*, *Alternanthera paronichioides*, *Caperonia hystrix*, *Centella asiatica*, *Cephalanthus glabratus*, *Cissus palmata*, *Cuphea carthagenensis*, *Hedyotis salzmannii*, *Hydrocotyle bonariensis*, *Hydrocotyle ranunculoides*, *Ludwigia peploides*, *Mikania micrantha*, *Modiola carolineana*, *Muehlenbeckia sagittifolia*, *Myriophyllum aquaticum*, *Nectandra megapotamica*, *Ornithopus micranthus*, *Panicum sabulorum* var. *polycladum*, *Paspalum sp.*, *Phoradendron falcifrons*, *Phyllanthus sellowianus*, *Polygonum sp.*, *Ranunculus flagelliformis*, *Ranunculus apiifolium*, *Sesbania punicea*, *Solanum sp.*, *Solanum glaucophyllum*, y *Vigna luteola*.



**Point 84:** This point consists of two environments: wet pastureland which could flood in winter and which has a herbaceous cover of 60-80%, There is no shrub cover of note (0-20%). The tallest species is *Sesbania punicea* (0.80-1m). The other environment is an open forest or woodland with a 20-40% cover and an equal interception of light. It has examples which reach heights of 4-5m. The following species were recorded: *Alternanthera paronichioides*, *Caperonia hystrix*, *Centella asiatica*, *Cephalanthus glabratus*, *Cissus palmata*, *Cuphea glandulosa*, *Glandularia selloi*, *Hedyotis salzmannii*, *Hydrocotyle bonariensis*, *Hydrocotyle ranunculoides*, *Ludwigia peploides*, *Mikania micrantha*, *Modiola carolineana*, *Muehlenbeckia sagittifolia*, *Myriophyllum aquaticum*, *Ocotea sp.*, *Ornithopus micranthus*, *Panicum sp.*, *Paspalum sp.*, *Phoradendron sp.*, *Phyllanthus sellowianus*, *Polygonum sp.*, *Ranunculus sp.*, *Ranunculus apiifolium*, *Sesbania punicea*, *Solanum sp.*, *Solanum glaucophyllum*, y *Vigna luteola*.

#### Points for transect 4

**Point 92 (photo next page):** Two different environments can be observed at this point. One is a pastureland at risk from flooding where *Oryza sativa* used to be cultivated. It has a herbaceous cover of 60-80% which intercepts 60-80% of the light intensity. It does not have any tree species. There is a marsh connected to the pastureland which has a plant cover ranging from 20% to 40% which intercepts up to 20% of the light intensity. Like the pastureland, it does not have any tree species. The species present in these environments are: *Azolla sp.*, *Centella asiatica*, *Centunculus minimus*, *Crassula sp.*, *Chenopodium sp.*, *Eichhornia crassipes*, *Elatine triandra*, *Glandularia selloi*, *Gratiola peruviana*, *Hedyotis salzmannii*, *Hibiscus striatus*, *Hydrocotyle ranunculoides*, *Ludwigia sp.*, *Mecardonia tenella*, *Myriophyllum aquaticum*, *Nymphoides indica*, *Ornithopus micranthus*, *Oxalis sp.*, *Paspalum sp.*, *Phyllanthus sellowianus*, *Pistia stratiotes*, *Polygonum hidropeperoides*, *Polygonum punctatum*, *Pratia hederacea*,

Ranunculus flagelliformis, Salix humboldtiana, Sesbania punicea, Sisyrinchium sp., Solanum curtipes, y Solanum glaucophyllum.



**Point 95 (photos next page):** This point consists of a very interesting woodland or natural forest due to the variety of species, some of which are very beautiful. In the ecological evaluation carried out last March it was surveyed as the last point in transect 4. This time it was assigned as a support to this because the GPS values do not coincide with the recordings taken on that occasion. It has a shrub cover of 60-80% with species reaching a height of 10m. It has a plant cover in the lower section which ranges from 20% to 40% and which has a height of between 20 and 80cm; The interception of light is 60-80%. The following species were recorded: *Abutilon grandifolium*, *Acacia bonariensis*, *Abutilon umbelliflorum*, *Achmea recurvata*, *Adenostemma brasilianum*, *Allophylus edulis*, *Anogramma chaerophylla*, *Asplenium sellowianus*, *Blechnum australe ssp. auriculatum*, *Bilbergia sp.*, *Blepharocalyx salicifolia*, *Blumenbachia insignis*, *Calliandra tweediei*, *Canavalia bonariensis*, *Celtis iguanea*, *Celtis spinosa*, *Cephalanthus glabratus*, *Cestrum parkii*, *Cerastium glometarum*, *Chaptalia runcinata*, *Citharexylum montevidense*, *Cupania vernalis*, *Cyclopogon elatus*, *Daphnopsis racemosa*, *Eryngium pandanifolium*, *Erythrina crista-galli*, *Eubrachion ambiguun*, *Eugenia uruguayensis*, *Eupatorium hecatanthum*, *Fagara hyemalis*, *Guettarda uruguayensis*, *Heiminia mirtifolia*, *Hervertia lahue ssp. amoena*, *Hydrocotyle bonariensis*, *Hydrocotyle ranunculoides*, *Ipomoea cairica*, *Lithraea brasiliensis*, *Macfadiena unguisati*, *Maytenus ilicifolia*, *Microgramma squamulosa*, *Microgramma vacciniifolia*, *Myrcine laetevirens*, *Myrrhinium atropurpureum var. octandrum*, *Nectandra megapotamica*, *Nicotiana longifolia*, *Oxalis articulata ssp. rubra*, *Peperomonia tetraphylla*, *Pistia stratiotes*, *Polygonum punctatum*, *Psychotria cartaginensis*, *Rhipsalis lumbricoides*, *Samolus valerandi*, *Scutia buxifolia*, *Sesbania punicea*, *Sebastiania brasiliensis*, *Sebastiania commersoniana*, *Senna corymbosa*, *Smilax campestris*, *Solanum mauritianum*, *Syagrus romanzoffianum*, *Thelypteris sp.*, *Tillandsia aeranthos*, *Vitex megapotamica*, *Urvillea uniloba*, *Xyderoxylon obtusifolia*, y *Xylosma tweediana*.



**Point 103:** Like the previous point, there is a natural forest or woodland with a shrub plant cover of 60-80% and a herbaceous cover of 40-60% in which 60-80% of the light is intercepted. The herbaceous cover has a maximum height of 80cm and the shrub species have a height of between 10m and 15m. The species in the surrounding pastureland were also recorded. The following species were recorded in these environments:

*Abutilon umbelliflorum*, *Acianthera pubescens*, *Aechmea recurvata*, *Alternanthera philoxeroides*, *Allophylus edulis*, *Anogramma chaerophylla*, *Anchietea parviflora*, *Aspilla pascaloides*, *Asplenium sellowianum*, *Baccharis* sp., *Blechnum brasiliense*, *Begonia cucullata*, *Blepharocalyx salicifolia*, *Byttneria urticifolia*, *Canavalia bonariensis*, *Carex riparia*, *Centella asiatica*, *Cissus striata*, *Clytostoma callistegioides*, *Cuphea racemosa*, *Cyperus virens*, *Daphnopsis racemosa*, *Eichhornia crassipes*, *Equisetum giganteum*, *Eryngium pandanifolium*, *Erythrina crista-galli*, *Eugenia uruguayensis*, *Ficus luschnatiana*, *Galium hirtum*, *Galium richardianum*, *Hedyotis salzmannii*, *Herbertia lahue* ssp. *amoena*, *Hibiscus striatus* *Hydrocotyle bonariensis*, *Juncus microcephalus*, *Lathyrus magellanicus* var. *tucumanensis*, *Ludwigia caparosa*, *Mecardonia tenella*, *Metastelma diffusum*, *Mikania involucrata*, *Monnina tristaniana*, *Myriophyllum aquaticum*, *Myrsine* sp., *Myrsine laetevirens*, *Nectandra megapotamica*, *Nierembergia rivularis*, *Oplismenus* sp., *Oxalis bipartita*, *Panphalea cardaminifolia*, *Plantago* sp., *Pavonia distinguenda*, *Pleopeltis pleopeltifolia*, *Peperomia catharinae*, *Peperomia tetraphylla*, *Polygonum punctatum*, , *Rhynchospora corymbosa*, *Rhipsalis lumbricoides*, *Samolus subnudicaulis*, *Scirpus giganteus*, *Psychotria carthagenensis*, *Scutellaria racemosa*, *Sebastiania brasiliensis*, *Sesbania punicea*, *Smilax campestris*, *Stigmatosema polyaden*, *Syagrus romazoffianum*, *Thelypteris* sp., *Tillandsia aeranthos*, *Trifolium polymorphum*.



**Point 104:** It consists of pastureland at risk from flooding whose plant cover is between 60% and 80% intercepting an equal percentage of light. In addition there is a marsh with a little more cover than the pastureland (40-60%). There aren't any recordings of tree species in either environment.. The cover height in the pastureland ranges between 10cm and 15cm and in the marsh between 0.80 and 1.20m. The species present at this point are: *Alternanthera philoxeroides*, *Apium leptophyllum*, *Briza minor*, *Carex phalaroides*, *Centella asiatica*, *Chevreulia sarmentosa*, *Cynodon dactylon*, *Dichondra microcalyx*, *Eclipta elliptica*, *Eclipta megapotamica*, *Eichhornia crassipes*, *Erianthus angustifolius*, *Eryngium pandanifolium*, *Glandularia selloi*, *Gymnocoronys spilanthoides*, *Habenaria* sp., *Heimia salicifolia*, *Hypochoeris microcephala*, *Ischaemun minus*, *Kyllinga odorata*, *Ludwigia* sp., *Mecardonia tenella*, *Nierembergia rivularis*, *Oxalis bipartita*, *Paspalum notatum*, *Polygala pulchella*, *Polygonum* sp., *Polygonum punctatum*, *Pterocaulon balansae*, *Rhynchospora corymbosa*, *Sagittaria montevidensis*, *Solanum commersonii*, *Soliva sessilis*, *Sporobolus indicus*, *Tibouchina nitida*, y *Trifolium polymorphum*.





### **2.3 Considerations about vegetation cover in Brazil and Uruguay**

It is advisable that a thorough survey of flora is carried out at point 37 in Brazil thus having additional elements at the time the appropriate measures are taken for preserving what remains of the native forest or wilderness. The producer should not be impeded, it should not be suggested to him that he abandons cultivation, but that he becomes aware that forest protection will not reduce his interests in a detrimental way.

With respect to Uruguay, it would be interesting to do a new survey, like in Brazil, at point 95 which consisted of a native forest, using a sample design such as the Control-Impact Design. This sample would take longer than the time dedicated to each point during the visits up until now, but they are considered as very important for the wide diversity of the species recorded up until now. 500 species are estimated to be in the forest and the surrounding area.

## **3. Bird Results**

A census was taken of birds at 56 of the 108 points marked in Brazil and Uruguay. The total of birds recorded by both countries was 134 species. Although these results resemble those obtained in the previous sample in March of this year, the new observations increased by more than 30 species in the number of birds recorded in the area of study.

In Uruguay's case, this increase in the observations is largely due to the time of year in which they were carried out. In September the arrival of two important migratory currents or flight of birds occurs. One is the short distance flight which the so-called 'summer residents' carry out and which make up approximately 12% of our birds. These species arrive from the north of South America to reproduce. This is the case of the Tropical kingbird (*Tyrannus melancholicus*), Fork-tailed flycatcher (*Tyrannus savana*), Vermillion flycatcher (*Pyrocephalus rubinus*) (Tyrannidae), various species of swallow (Hirundinidae) and species which essentially feed on seeds such as those from the *Sporophila* (seedeater) variety, (Emberizidae), among others. All these birds leave in the autumn.

The other important transmigration is by long distance migrators called 'summer visitors', which make up 10% of our birds and are mainly plovers and sandpipers. They arrive from the North of North America to feed and avoid the tough northern winter. Among these we can mention the American golden plover (*Pluvialis dominica*), Buff-breasted sandpiper (*Tryngites subruficollis*) and the Yellowlegs (*Tringa* spp.). At this time of year an absence of 'winter visitors' can be noted which take another migratory route.

This new survey shows that the total of species recorded between the March and October samples in Laguna Merin's area of influence is 143 species.

### 3.1 Brazil

The bird census was carried out between the 17th and 19th October, surveying birds in 24 of the 55 points marked. The total of birds recorded was 108 which doubles the total of birds observed in March.

In Brazil there is clear evidence of the destruction to the natural environment caused by rice cultivation; one of the main commercial activities in the region.

At point 37, the drainage of a marsh was observed and recorded as well as the destruction and burning of the remains of a native forest to prepare a field for rice cultivation (see photos). Despite this, an interesting number of song birds (list BR 37) were observed in this small isolated patch of native woodland probably due to the narrow habitat in which the species were concentrated.



The lack of environments with native woodland and also of marshes with scrubland and pastures, all of which have been destroyed by rice cultivation, has led to a sporadic observation of song birds which represent 35% of the bird total whilst in Uruguay they represent 42%.

Just as in the previous rapid ecological evaluation, important numbers of birds associated with these environments used for rice cultivation were recorded, such as: the Southern screamer (*Chauna torquata*), the Brown-hooded gull (*Larus maculipennis*), two Ibis species (*Plegadis chihi*, *Phimosus infuscatus*), the Maguari stork (*Ciconia maguari*), etc.

The land which had been cultivated in previous years as well as the ploughed fields showed populations of plovers feeding. In point BR 5 (photo right) for example, significant flocks of chorlos migrating from long distances could be observed, such as the American golden plover (*Pluvialis dominica*) which was observed at points 9 and 24, and the Buff-breasted sandpiper (*Tryngites subruficollis*) which was observed in 6 points, as well as other species of the *Calidris* and *Tringa* variety. These modified fields



and the pastureland at risk from flooding near the lagoons, for example the one at point BR 32 (photos below) are important feeding sites for these birds. The first two species of plovers are also known as ‘pasture plovers’ since they prefer open pastureland or the surrounding water.



At the end of the XIX century the *P. dominica* saw a notable decrease in its population due to the over hunting that it was subjected to in the U.S.A. Today the populations may have recovered but not in a significant way. *Tryngites subruficollis* is a species which is on the brink of endangerment. Its habitat is more restricted than the *P. Dominica*, for this reason the pastureland at risk from flooding in the Laguna Merin basin should be protected for the conservation of these species.

Shallow lagoons found in the Laguna Merin’s catchment area such as the one at point BR 32 (photos below) are fundamental to the feeding of species such as the Coscoroba swan (*Coscoroba coscoroba*), different duck species (*Anatidae*), coots (*Fulica spp.*) and other aquatic bird species which feed in shallow waters



Laguna Merin’s coastal region showed some interesting factors. A large proportion of the pastures was very wet such as at Point BR 40 (photo below). They are being used for livestock farming. In these pastures and in the lagoons (point BR 51) which form in them, an important number of birds such as the Roseate spoonbill (*Platalea ajaja*), the Southern screamer (*Chauna*

*torquata*), the Coscoroba swan (*Coscoroba coscoroba*) and the Silver teal (*Anas versicolor*) were observed. At the same point, 5 pairs of Ringed teal (*Callonetta leucophrys*) were observed.



At point BR 53 very near Laguna Merin in the woodland next to a small stream which flows into the lagoon (photo at right) an adult male *Sporophila collaris* was observed. It was the only example of its kind observed in Brazil where this species' habitat is very deteriorated.



In the journey along the coast of Laguna Merin (BR 7, 52) different species were recorded such as tern (*Sterna superciliaris*), Coscoroba swan (*Coscoroba coscoroba*), gulls (*Larus dominicanus*, *L. Maculipennis*), Oystercatcher (*Haematopus palliatus*) and plovers such as the Collared plover (*Charadrius collaris*) whose young were also seen. (photo at left).

To sum up the sightings in Brazil, there is a large impact from rice cultivation which has significantly changed the environment. Various species such as the Chestnut-capped blackbird (*Agelaius ruficapillus*) which were recorded at points 9 and 24 were thriving so much that they are becoming considered a plague. Others such as the Threskiornithidae (Ibises and Spoonbills), Ciconiidae (Storks) and gulls such as (*Larus maculipennis*) were also frequently found feeding in significant numbers on these cultivated fields or fields being prepared for cultivation.

An important point for conservation are the pastures at risk from flooding and the shallow lagoons which form in them where significant groups of plovers and aquatic birds have been sighted on various occasions. It is also important to emphasise the modest presence of native woodlands apart from those recorded at points BR 12 and 13 which should be preserved.

### 3.2 Uruguay

The censuses were conducted between 21-23 October, and the survey points visited included 32 of 53 points. We found 122 species of birds, which was 30 more than the number found in March 2004.

The study zone in Uruguay is less altered than in Brazil and this is verified in the diversity of birds found at the survey points. Nevertheless, the Uruguayan environment has suffered a deterioration in agrofiseries production.

Among species of interest can be mentioned the Viudita Blanca Grande (*Xolmis dominicana*) and the Pajonalera de Pico Recto (*Limnocites rectirostris*), found at point UY 57 (photo right). These species are considered vulnerable and almost threatened, respectively. The area has a vegetation cover largely of *Eryngium* sp.



At the entrance of fields devoted to rice we obtained results similar to those obtained in Brazil. There were important flocks of chorlos, in particular Chorlo Dorado (*Pluvialis dominica*), which was registered at 12 of the 53 points, which is different than the Playerito Canela (*Tryngites subruficollis*) which was only found in four (UY 61, 62, 65). Other birds observed include Cuervillos, Cigüeñas, Caraos, Chajás and Gaviotas which are associated with these habitats.

Environments close to the coast were constituted by lagoons associated with pajonales and some natural rises, and in these habitats it is possible to see birds coming from four habitats. Typical birds of the wetlands like the Federal (*Amblyramphus holosericeus*), Alferez (*Agelaius thilius*), Junquero (*Phleocryptes melanops*), Jacana (*Jacana jacana*), Gavilán Alilargo (*Circus buffoni*); birds of low lying lagoons like ducks (*Callonetta leucophrys*, *Anas versicolor*, *Anas flavirostris*, *Amazonetta brasiliensis*), Coscoroba (*Coscoroba coscoroba*), Biguá (*Phalacrocorax olivaceus*), Espátula Rosada (*Platalea ajaja*); birds of the wet pastures such as Chorlos y Playeros (*Tringa*

*flavipes*, *Calidris fuscicollis*, *Pluvialis dominica*, *Charadrius collaris*), Cuervillos (*Plegadis chihi*, *Phimosus infuscatus*); and coastal birds such as Gaviotines (*Sterna superciliaris*, *S. trudeaui*) and Ostrero (*Haematopus palliatus*). On the higher ground are observed passeriformes and other groups.



Other ecosystems considered of high conservation interest are the extensive wetland zones such as those found around points UY 81, 82, 91 y 92 (and in the photo below). These points in addition to being very open and utilized for cattle (but not rice), show a high diversity with large flocks of birds. Among the flocks identified were more than 100 Pato Cara Blanca (*Dendrocygna viduata*), Pato Canela (*Dendrocygna bicolor*), and other minor species, such as 20 black necked swans (*Cygnus melanocoryphus*) and various ducks such as *Anas georgica*, *A. flavirostris*, *A. versicolor*, *Amazonetta brasiliensis* y *Callonetta leucophrys*. Several flocks were feeding, such as Chorlos y Playeros, among them *Calidris melanotos*, *C. fuscicollis* y *C. bairdii*, *Tringa melanoleuca*, *T. flavipes* y, in the pasture, *Pluvialis dominica* y *Tryngites subruficollis*.



In the trees found in these wetland areas were observed de passeriformes, Duch as the Capuchino de Collar o Dominó (*Sporophila collaris*).

The most interesting survey points were UY 87, 88, 95 y 103. In these points, and especially in point UY 95 y 103 there were in excess of 50 species. There were many species from the families of Tyrannidae, Parulidae, Thraupidae, Turdidae, Emberizidae, Furnariidae, among others, whiche were not surveyed in other ecosystems.

In summary, there was observed a greater diversity of birds than was found during the March 2004 survey, when conditions were drier, and on the whole the habitats were less degraded than in Brazil. These habitats – especially the large wetlands (grandes bañados), inundated fields and lagoons, and the low hummocks or rises (montes) that surround them should be prioritized for future conservation.

#### 4. Amphibian, Reptile, Mammal and Fish Results

Amphibians, reptiles, mammals and fish were recorded at 15 points in Brazilian territory (as well as two other places requested by one of the C.M.P. participants) and at 15 points in Uruguay out of a total of 108 points for both countries. Fourteen mammals of which two are exotic varieties introduced were recorded in total (see table 1). The presence of four carnivore families were confirmed in Brazil and in Uruguay. The Felidae family includes representatives with a Vulnerable, susceptible or almost endangered status (IUCN).

In Brazil the tests of capybara (*Hydrochoeris hydrochaeris*) and otter (*Myocastor coypus*) presence are noticeably lower than in Uruguay where these two species appear to be under less pressure from hunting.

Almost all the evidence is from prints or faeces due to the twilight or nocturnal habits of the majority of the mammal species in the region. A longer rapid ecological evaluation which included the operation of traps catching animals alive such as the padded Victor, pitfall or Sherman variety would produce a lot of species present in the region which were not recorded.

The reptile recording was not as high as expected for this time of year, undoubtedly due to the temperatures which remained relatively low. The information available for the Uruguayan area showed that the list is noticeably higher, above all for some families such as Colubridae. Six species were recorded for Brazil and Uruguay with four and three species respectively. The region is an area of extreme importance for the reproduction of turtles due to localised nests and turtles getting ready to lay or laying eggs. One of the species, *Acantochelys spixii*, is considered by Uruguay to have the status 'unevaluated' and its biology is relatively unknown.

The evaluation in Brazil produced 8 species of amphibians and an equal number for Uruguay, from 4 families. The evaluation in Brazil added 8 amphibian species and the same number for Uruguay, from 4 families. Just as in the case of the reptiles, despite the rains recorded, no abnormalities in the amphibian's reproductive explosions were confirmed due to temperatures staying relatively low. One nocturnal monitoring showed four species in reproduction at just one of the points (101 UY)

Pools of stagnant, permanent, semi-permanent or seasonal waters were sampled using a hand-held net measuring 40 cm in diameter which produced a total of 17 species (10 for Brazil and 12 for Uruguay). Some varieties which appeared in Uruguay were not detected for Brazil (*Astyanax sp.*; *Crenicichla sp.*; *Cynolebias sp.*; *Otocinclus sp.*; *Siluridae*; *Oligosarcus sp.*). The number of families represented was identical for the two countries: 7



## Photographs of fauna in Brazil



Feces of carpincho



Morrocoyo



Fishing



*Scinax* sp. (rana roncadora)



*L. ocellatus* (rana criolla)



Skulls of carpincho



Skull of carpincho

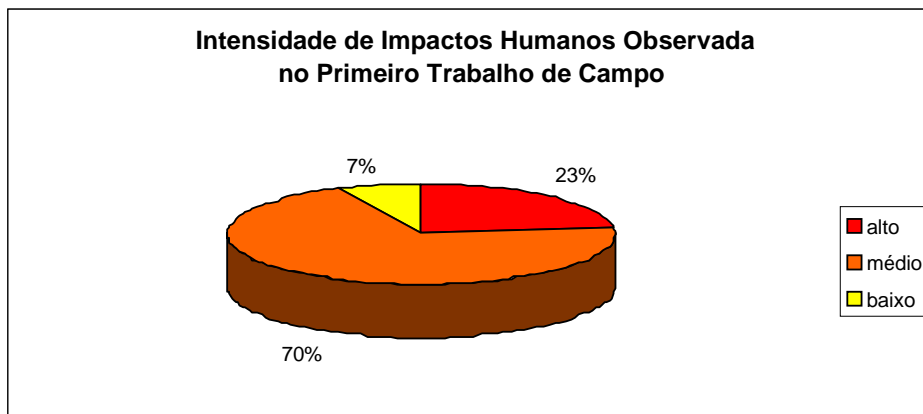


Dead vieja del agua

## 5. Human Impacts

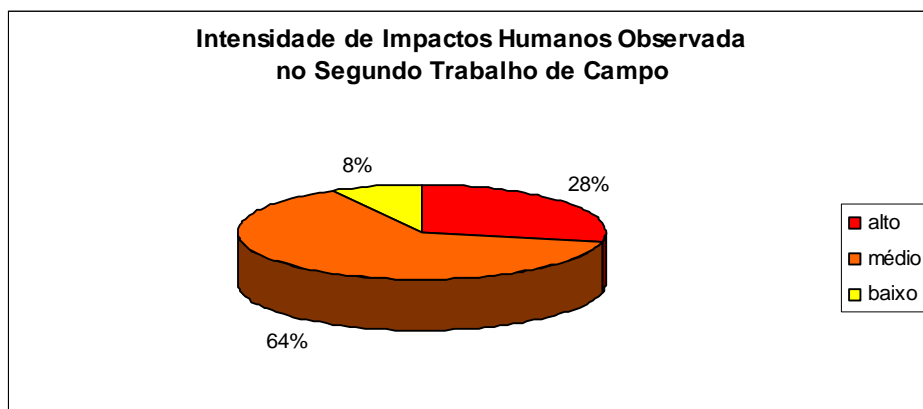
Three degrees were used as an intensity scale, high, medium and low for the study of human interactions and the evaluation of environmental alterations caused by such interactions. The environments that were classified as with high intensity were the ones that in addition to having been cleared of native vegetation have gone through consecutive periods of rice plantation where chemical fertilizers and biocides were used, and cattle raising. The ones classified as with medium intensity were the ones in which the native vegetation was cleared for cattle raising but not crops. Areas where the cutting was selective and no crop growing or cattle raising took place were classified as with low intensity degree of human impact.

In March 2004 approximately 23% of the field sample points were found to have high levels of human impacts, 70% had medium levels, and 7% had little to no alteration (Figure A).



**Figure A. Intensity of Human Impacts Observed During the March 2004 Field Work**

In October 2004 28% of the field simple points had high levels of human impacts, 64% had médium levels, and 8% had low levels (Figure B).



**Figure B. Intensity of Human Impacts Observed During the October 2004 Field Work**

It is notable that point BR 37 was observed to have wetland and wet forests (monte nativo) in a good state of conservation in March, but at the time of the second field survey in October part of the wetland was drained and the natural vegetation of the upland area was substituted for rice plantations.

Among the principal activities encountered in the two field surveys were clearing of the native vegetation for pasture and rice cultivation, inadequate disposal of solid wastes, and illegal hunting. As a consequence of the clearing of native vegetation, there is a reduction of native ecosystems and local loss of biodiversity, which is aggravated by hunting. Rice cultivation, with utilization of agrochemicals (pesticides, herbicides and fertilizers) promotes the salinization of soils and the contamination and eutrophication of water bodies, as well as promoting their drainage, which is reinforced by irrigation canal construction. The construction of dikes, canals, and other irrigation works speeds the alteration of the hydrological regime with direct consequences for the flora and fauna.

The use of land for cattle pasture increases soil compaction and intensifies the process of erosion and land drainage. The homogenization of the environment that results in biodiversity loss just as surely as rice cultivation. Removal of native vegetation reduces the percolation of rainwaters, reducing the ground-water level, and altering water bodies.

The disposal of fuel and trash close to flood prone areas promotes pollution of the soil and waters, increasing eutrophication, biodiversity loss and erosion.

Finally, local production practices dramatically reduce the multiple use of resources in the watershed of Laguna Merin, with negative impacts on, for example, fisheries, human natural resource use, and tourism. This situation, which finds moderate to high levels of human alteration in 90% of the area studied, means that the area should be in a state of high alert to further losses. Biodiversity losses are a harbinger of losses in productivity of the agroecosystems, as well as a decline in the quality of life for local communities. The rapidity of the changes, such which occurred in only six months between field surveys at point BR 37, reinforces this message.

Thus, work such as that which was completed under this project are vital for promoting social and political action that promotes changes in this situation, bringing together economic development with the social and environmental element, such as is recommended by the international treaties and environmental conferences of the UN. There needs to be a sustainable and integrated management of resources in the Laguna Merin basin. The efforts of the Unit for Education and Environmental Monitoring (Núcleo de Educación y Monitoreo Ambiental – NEMA) should be encouraged, through the project on priority actions for the sustainability the communities surrounding the Ecological Station at Taím (in Brazil). This type of action promotes an educational process that, together with the community, looks for alternatives to make more compatible biodiversity conservation with the socioeconomic activities of the region. This would include integrated sustainable rice production, without the use of agro-toxins, which is being developed in the region.

## **6. Physical Description**

The geologic and geomorphologic characteristics as well as the types of soils of the visited regions are concisely described since there were no specific studies for this aim.

The whole zone is situated in the southeast border of the south American crystalline shield, the specific zone of study is represented by plain zones with low altitudes that form the lacustrine an marshy zones around the Laguna Merín, with top elevations close to 11 metres of altitude in relation to sea level, with values that oscillate around 7 metres.

The soils are, in general, poorly drained and of a medium natural fertility and very clayish, the elevated plains are intensively used for the cultivation of rice and the areas that most time of the year are submerged are many time used for pasturing.

The hydrologic system of an environment shows very clearly the geomorphologic behaviour, in this case the hydrologic system in which the areas of study are located present the characteristics of a flat relief and a slope medium-low of 1%, what permits the flooding of diverse areas and consequently the formation of marshes mainly in the Brazilian territory.

The geologic and geomorphologic characteristics for the Uruguayan area of study are very similar, the rivers that come from regions more elevated than the Uruguayan territory, as they approach the Lagoon they found a quite flat relief and as a consequence present meandric characteristics and this fact generates the formation of marshes on its margins, feature that is presented gradually in relation to the proximity to the river's outlet.

Despite the marshes present varied formation characteristics, they have many similarities since they are both regulated by the hydric dynamics of the Laguna Merín's hydrologic system.