

❖ STANDARD 7: SELECT TERRESTRIAL, FRESHWATER AND MARINE CONSERVATION TARGETS/BIODIVERSITY ELEMENTS/FEATURES ACROSS MULTIPLE BIOLOGICAL AND SPATIAL SCALES.

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## Case Study: Freshwater Target Selection in the Pantanal and Upper Paraguay River Basin in Brazil, Paraguay and Bolivia

*Summarized and translated by Shirley Keel from:*

The Nature Conservancy-Brazil (Glauco Kimura de Freitas) 2003. Projeto implementação de práticas de gerenciamento integrado de Bacia hidrográfica para o Pantanal e Bacia do Alto Paraguai. Subprojeto 2.3 - Planejamento Ecorregional do Pantanal - MS/MT. Relatório Final. Planejamento ecorregional do Pantanal. ANA/GEF/PNUMA/OEA.

### Purpose and region of analysis

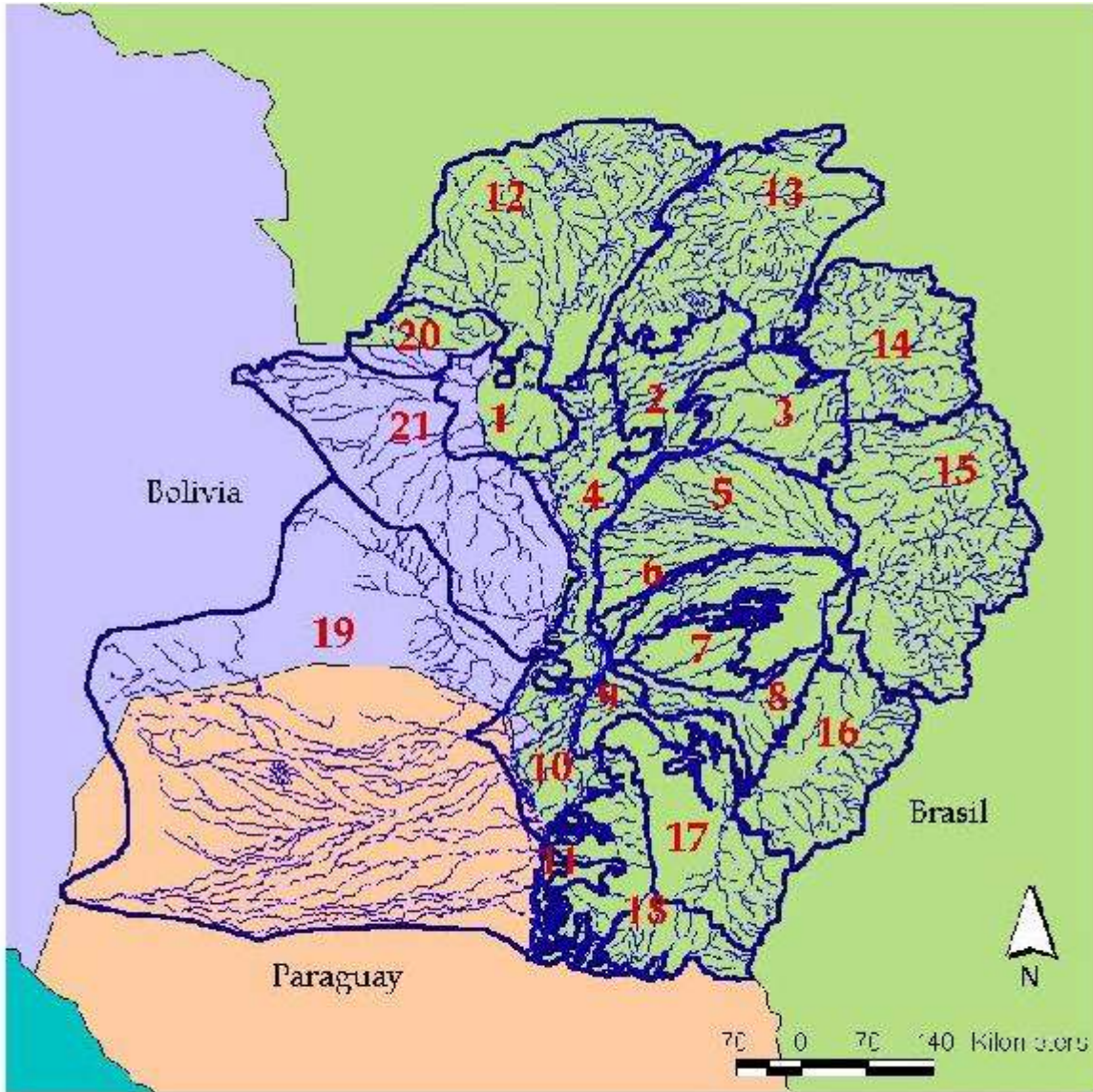
As sufficient natural resources information had been collected in previous planning efforts, the Pantanal ecoregional assessment relied on two experts' workshops to develop an aquatic ecological system classification and to select conservation targets at multiple biological scales including ecological system, natural community, and species. The Pantanal Ecoregional Assessment addresses a region that covers the entire Upper Paraguay River Basin, ca. 496,000 km<sup>2</sup>, including the flood plain as well as the surrounding plateau or "Planaltos." The Basin is shared by three nations—Brazil, Paraguay, and Bolivia. Three quarters of the planning area are in Brazilian territory.

### Criteria/Methods

#### *Classification of Aquatic Ecological Systems*

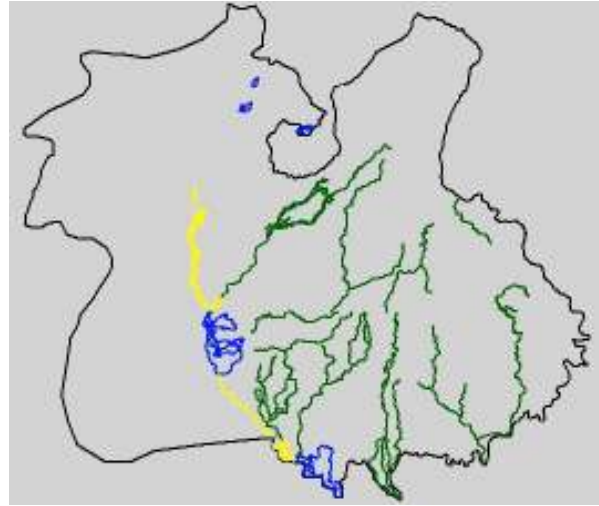
To help identify ecosystem conservation targets of the Pantanal Ecoregion, an experts' workshop for the classification of aquatic ecological systems was held. Twenty-one experts from Brazil, Bolivia, Paraguay and USA representing research institutions, universities, NGOs and Brazilian federal and state agencies participated in the workshop. Adopting methodology developed by TNC (Higgins et al. 1998), experts first delineated 21 ecological groups (Figure 1) in the ecoregion based on geology, geomorphology, hydrological regime, and biota.

Figure 1. Ecological groups defined by differences in geology, geomorphology, hydrologic regime and biota.



The ecological groups were then subdivided into drainage network units. Each unit serves as an aquatic ecological system. There are 93 such aquatic ecological systems in the Pantanal ecoregion. The ecological group Corixo Grande is used here as an example to demonstrate the descriptions, information types, and maps presented in each freshwater ecological system.

## Corixo Grande Ecological Group



Corixo Grande ecological group consists of 3 ecological systems: (1) Corixo Grande River and tributaries of Mercedes River, shown in yellow; (2) the confluence of Formoso, Sararé and Cassange Rivers with Paraguai River (lakes, river branches and meanders), shown in blue; and (3) ecological system between Corixo Grande River and Paraguai River (bottom lands and shallow waterbeds “corixos e vazantes”), shown in green.

### 1. Ecological System of Corixo Grande River and tributaries of Mercedes River

**Geology** – alluvial deposits mainly composed of sand.

**Geomorphology** – The system belongs to the Mato-Grosso Pantanal and Plains geomorphological unit: flat relief covered with sand, periodically inundated, incorporated in the drainage network.

**Size of river course** – small streams.

**Declivity** – low ground, sloping in the direction of west to east.

**Location** – Brazilian border with Bolivia.

**Hydrological Regime** – flood period from December to July.

**Biota** – The region is characterized by the following vegetation formations: savanna, grasslands, periodically inundated grassland with *Copernicia alba* palm savanna, and cerrado. No gallery forests, with some hills. Notable fauna are marsh deer *Blastocerus dichotomus* and giant otter *Pteronura brasiliensis*.

### 2. Ecological System of the confluence of Formoso, Sararé and Cassange Rivers with Paraguai River (lakes, river branches and meanders)

**Geology** – alluvial deposits mainly composed of sand.

**Geomorphology** – The system belongs to the Mato-Grosso Pantanal and Plains geomorphological unit: low-laying plain, covered with sand, periodically inundated or permanently water-logged.

**Size of river course** – small streams.

**Declivity** – flat with slight tendency of sloping from west to east.

**Location** – Brazilian border with Bolivia.

**Hydrological Regime** – flood period from December to July.

**Biota** - The region is characterized by the presence of Cerrado with gallery forests. Rich in ichthyofauna. A breeding ground for avifauna.

### 3. Ecological System between Corixo Grande River and Paraguai River (bottomlands and shallow waterbeds “Corixos e vazantes”)

**Geology** - formed from the deposit of fine sediments.

**Geomorphology** – The system belongs to the Mato-Grosso Pantanal and Plains geomorphological unit: low-laying plain, covered with sand, periodically inundated or permanently water-logged.

**Size of river course** – medium size rivers.

**Declivity** – region of decreasing declivity, with slight tendency of sloping from northwest to southwest.

**Location** – between Corixo Grande River and Paraguai River.

**Hydrological Regime** – flood period from December to July, with the highest water level between the months of February and April. The system is represented by bottomlands and shallow waterbeds (“corixos e vazantes”) which are connected during flood period.

**Biota** - The region is characterized by the presence of Cerrado, open or dense woodlands, savanna, and grassland with woody plants. The absence of gallery forest is characteristic of the region. Notable fauna include aquatic migratory birds of the Northern Hemisphere, marsh deer *Blastocerus dichotomus*, and giant otter *Pteronura brasiliensis*.

#### *Identification of Conservation Targets*

Selection of conservation targets and key ecological processes was made during a second workshop. This workshop called 43 participants from 19 different institutions from Brazil, Bolivia, Paraguay and USA. Six working groups were formed based on geographic areas familiar to the experts. Using the coarse and fine filter approach, experts considered targets of multiple biological scales—ecological system, natural community and species, and identified high quality, viable examples.

#### **Products/Outcomes**

Out of 93 ecological systems, 62 were selected as coarse filter conservation targets. The selection was largely based on the criteria of pristine vegetation, proximity to protected areas, and no roads or towns nearby. The best examples among the 62 ecological systems are those areas with watershed divides, headwaters, high diversity of landscape or aquatic microhabitats, high population density of jaguar or marsh deer, bird nesting colonies, breeding sites, stop-over sites, and feeding sites of migratory birds. Experts also identified key ecological processes indispensable for the plateau and floodplain:

Plateau	Floodplain
• presence of gallery forests	• presence of gallery forests
• organic matter inputs	• natural flooding pulse
• migration routes	• migration routes

Selecting fine filter targets, experts of various taxonomic groups—amphibians and reptiles, aquatic birds, aquatic invertebrates, mammals, fishes, and aquatic/semi-aquatic plants—used the criteria of rarity and endangerment. Other species of conservation interest such as umbrella, keystone, local endemics and migratory species were also considered. Finally, natural communities that are rare or function as keystone or umbrella were included. In total, 1,850 species and 39 community targets were identified for the Pantanal Ecoregion (Table 1). Community and species target lists are presented in Tables 3, 4, 5, and 6 of Chapter 4 in the Pantanal Ecoregional Plan.

**Table 1: Species and community targets in the Pantanal Ecoregion.**

Taxonomic Group	Number of Species Target	Number of Community Target
Amphibians/reptiles	8	-
Aquatic birds	31	3
Aquatic invertebrates	1,700	8
Mammals	5	-
Fishes	30	11
Aquatic plants	76	17
<b>TOTAL</b>	<b>1,850</b>	<b>39</b>

## Tools

Experts' workshops

## Strengths/weaknesses

Prior to the Pantanal Ecoregional Assessment, the Brazilian government prepared a Conservation Plan for the Alto Paraguay Basin. The Plan was published in 1997 with much biological, socioeconomic, and cartographic information already in place. In such advantageous environments, experts' workshops become a cost-effective and time-saving choice to update the Conservation Plan. Due to the relatively abundant biological info, the assessment was able to include targets at multiple biological scales—ecological system, natural community, and species—to ensure a good biodiversity representation in the conservation portfolio. It also opened the possibility of verifying the extent to which the ecological systems defined by physical factors could be used to predict the distribution patterns of biota. The classification of aquatic ecological system could be further developed to the level of natural communities if biota information is adequate.

## References

Higgins, J., M. Lammert, M. Bryer, M. DePhilip and D. Grossman. 1998. Freshwater Conservation in the Great Lakes Basin: Development and Application of an Aquatic Community Classification Framework. Chicago, IL: The Nature Conservancy.

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