Conservation of the Pantanal Wetlands: The Definitive Moment for Decision Making

The Pantanal is a distinctive ecosystem. The floodplain is supposed to be one of the largest in the world and corresponds to the last refuge for hundreds of animal and plant species, many of which are endangered. Pantanal is still in a rather pristine condition, because human occupation took place in a very slow pace because of the hydrogeologic regimes. However, in the last few years, high-impact economic activities have threatened the Pantanal wetland and the Upper Paraguai River Basin (local name Bacia do Alto rio Paraguai [BAP]).

The Pantanal periodic floodplain has about 160 000 km² (almost half of the area of Italy) situated in the BAP (Fig. 1). The floodplain comprises about 600 000 km² and is shared by Paraguay, Bolivia e Brazil, which holds approximately 85% of its area. The states of Mato Grosso and Mato Grosso do Sul. The surrounding plateau (planalto), which corresponds to 59% of the area of the BAP, is essential to maintain its natural processes, because it holds the sources of the Pantanal rivers and constitutes refuge for animals in periods of flood and climatic extremes (1).

The BAP is surrounded by the Amazon forest (north), the Brazilian savanna (or Cerrado) (east), the Atlantic forest (south southeast) and Chaco (west). The influence of these ecosystems, the combination of varied soil types and the flood pulse with annual and multi-annual variability, resulted in a mosaic habitat, which is responsible for an extraordinary rich wildlife. Although Pantanal does not hold high diversity or endemism values, it does hold a high abundance of animals. Nevertheless, Pantanal is the richest wetland on bird diversity in the world with 463 species (2). 130 of which are migratory and 117 are even on at least one state, national, or international list of threatened species (2–5) (Fig. 2). In addition, the Pantanal holds the largest known populations of several threatened mammals, such as pampas-deer (Ozotoceros bezoarticus), marsh-deer (Blastocerus dichotomus), giant otter (Pteronura brasiliensis), and jaguar (Panthera onca) (6–9) (Fig. 3).

The Pantanal had 17% of its area devastated (1), a small quota when compared with 20% of the largest Brazilian biome, the Amazon, to 80% of Cerrado and to 92% of the Atlantic Forest (10). The fact of being one of the largest Brazilian ecosystems still in rather pristine condition makes it a strategic area for nature conservation. It has been maintained in good conservation conditions so far because of colonizers’ purpose, in 16th century, to maintain it as a secret so to avoid disputes between Spanish and Portuguese colonial states (because it initially was regarded as a fabulous region with large treasures). Moreover, the colonial explorers did not find precious minerals in Pantanal and faced difficulties with occupying the land because of the flood cycles and also because of its isolation from major consumption centers (11).

Since the 19th century, the Pantanal economy has mainly focused on low-density cattle raising, with a low environmental impact, because of the small human population density, the lack of high technology and the lack of capital investments. Agriculture is limited by low fertility soils and by the flood cycles being restricted to the plateau. However, in the last few decades, the advances in technology and the increasing capital investment in Pantanal has intensified its utility. The intensive and competitive exploration replaced the traditional model of cattle raising, after deforestation and burning fields for regrowth and the control of cattle plagues, besides the introduction of exotic grasses and the use of herbicides (1, 12). There are problems related to jaguar and puma poaching (Puma concolor) by ranchers because of cattle predation (6, 13). The exploration of skins of giant otter and caimans (Caiman crocodilus yacare) were critical until 1990, when its cycle finished due to the international market requirements for the legalization of skins (14, 15). There are also problems related to gold mining. This activity resulted in large devastated areas revolved and in mercury contamination of the food chain (16). Also, the reservoirs for hydroelectric power generation in the catchment area modified the discharge pattern and sediment loads of the tributaries (17).

In the last few years, some industrial and farming initiatives were proposed for the BAP, which could cause large-scale disruption of ecological processes in this ecosystem. A metallurgical complex is being implemented in the city of Corumba for iron production in association with big companies that have been denounced for environmental devastation. Projects have already been proposed for setting up a thermoelectric power plant and a gas-chemical complex in Corumbá area, and then extending the Paraguai-Paraná waterway up to 3400 km. Other projects also include the installation of industrial plants in the plateau, which will extract biomass alcohol from sugar cane.

The allocation of economic projects without environmental responsibility will jeopardize the hydrologic processes and climatic stability in Pantanal, causing biodiversity loss and local, and even global, extinctions (1), and will also collapse the productivity in the Low Paraguai River Basin. The three former projects can generate water and atmospheric pollution, and increase erosive processes, leakages, and deforestation especially after the charcoal supply for metallurgy. The Paraguai-Paraná waterway will demand forceful reengineering of the Paraguai River bed, such as rock explosions and the construction of dikes in the tributaries. Flood cycles may be severely altered, which would affect biodiversity. The allocation of alcohol distilleries may lead to water pollution by agricultural toxics and vinho (a toxic byproduct generated in alcohol production), impaired soil from sugar-cane monocultures, and retention of sediments in rivers because of deforestation and flood intensification.

We already can witness serious consequences of nonsustainable practices in the surrounding plateau at the low Taquari River region. The larger socio-environmental disaster in Pantanal reached 5000 km² (corresponding to 3.6% of the Pantanal) and hampered the flood cycle, which caused permanent flooding because of deforestation in the plateau after Taquari River silting. Therefore, fish supplies diminished, there were changes in the aquatic and semi-aquatic food chain, in cattle ranching, and subsistence cultures. Also, such networked problem events led local human communities to wide displacements (18).

Pantanal was declared a National Heritage by the Brazilian Constitution in...