

World Heritage Sites

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CERRADO PROTECTED AREAS: CHAPADA DOS VEADEIROS & EMAS NATIONAL PARKS BRAZIL

The Brazilian Cerrado is the largest, oldest and biologically richest savanna in the world of which less than 10% remains in a natural state. For millennia, the wide altitude range of the area around these two sites, some 600 km apart in the centre of the continent, has permitted the survival of rare and relict species during periods of past climatic change, and the area will be vital in maintaining this biodiversity during future climatic fluctuations. The sites contain over 60% of all Cerrado plants and almost 80% of its vertebrate species, also many rare small animals that do not occur elsewhere in the region. Emas is the only protected neotropical savanna where large mammals are easily visible.

COUNTRY

Brazil

NAME

Cerrado Protected Areas: Chapada dos Veadeiros and Emas National Parks

NATURAL WORLD HERITAGE SERIAL SITE

2001: Inscribed on the World Heritage List under Natural Criteria ix and x.

STATEMENT OF OUTSTANDING UNIVERSAL VALUE

The UNESCO World Heritage Committee issued the following statement at the time of inscription:

Justification for Inscription

Criterion (ix): CPA has played a key role for millenia in maintaining the biodiversity of the Cerrado Ecoregion. Due to its central location and altitudinal variation, it has acted as a relatively stable species refuge when climate change has caused the Cerrado to move north-south or east-west. This role as a species refuge is ongoing as Earth enters another period of climate change.

Criterion (x): CAS contains samples of all key habitats that characterise the Cerrado ecoregion - one of Earth's oldest tropical ecosystems. It contains over 60% of all floral species and almost 80% of all vertebrate species described for the Cerrado. With the exception of the Giant Otter, all of the Cerrado's endangered large mammals occur in the site. In addition, the site supports many rare small mammals and bird species that do not occur elsewhere in the Cerrado and a number of species new to science have been discovered in CPA.

INTERNATIONAL DESIGNATION

1993: Chapada dos Veadeiros National Park designated part of a large Biosphere Reserve under the UNESCO Man & Biosphere Programme; extended 2000 & 2001 (core area 3,601,014 ha).

IUCN MANAGEMENT CATEGORY

Chapada dos Veadeiros National Park II National Park
Emas National Park II National Park

BIOGEOGRAPHICAL PROVINCE

Campos Cerrados (8.30.10)

GEOGRAPHICAL LOCATION

Chapada dos Veadeiros National Park is in northeastern Goiás State, 250 km north of Brasilia, between 13°53'16"-14°09'55"S and 47°25'20"-47°53'46"W. Emas National Park is 530 km southwest

of Brasilia in southwestern Goiás, bordering the states of Mato Grosso and Mato Grosso do Sul between 17°53'-18°20'S by 52°44' - 53°06'W. The sites are some 700 km apart.

DATES AND HISTORY OF ESTABLISHMENT

- 1960: Twelve National Parks created as part of the opening up of central Brazil;
- 1961: Emas National Park (ENP) (100,000 hectares) created by Federal Decree 49.874;
- 1962: Chapada dos Veadeiros National Park (CVNP) designated as part of Tocantins National Park (625,000 ha) by Federal Decree 49.875. 1972: the area reduced and given its present name;
- 1981: Chapada dos Veadeiros reduced to its current size by Federal Decree 86.173 and given definitive boundaries by Decree 86.696. One of the two areas of the Cerrado MAB Reserve;
- 1972: Emas National Park extended by Federal Decree 70.375 to its present area;
- 2001: Pouso Alto State Environmental Protection Area (872,000 ha) established around Chapada dos Veadeiros to extend the protected area for large animal survival (IUCN, 2001);
- 2001-3: Chapada dos Veadeiros National Park expanded briefly to 235,970 ha by Federal Decree;

LAND TENURE

Federal Government owned. Administered by the Institute for the Environment and Renewable Natural Resources (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis - IBAMA).

AREA

Total: 197,382 ha. Chapada dos Veadeiros National Park: 65,514 ha; Emas National Park: 131,868 ha
Pouso Alto State Environmental Protection Area (872,000 ha) surrounds Chapada dos Veadeiros NP.

ALTITUDE

Chapada dos Veadeiros: 600-1,691m (Pouso Alto); Emas: 400 - 880m.

PHYSICAL FEATURES

The Chapada dos Veadeiros (deer plateau) National Park lies in the middle of the Cerrado savanna region at its highest point, the Central Brazilian Highland plateau, a mountainous area of great beauty, with the backbone of the Serra do Santana which rises from 1,200m to 1,691m in Pouso Alto. It runs northeast-southwest either side of the valley of the Rio Preto, a headwater stream of the Rio Tocantins a major river of the Amazon Basin. The Park has three geomorphological units. The Rio Claro catchment along the northwest edge is a relatively flat to undulating lowland at 400m. A 40 km-long northeast to southwest escarpment divides it from a central ridge region which extends from the north of the Park, including the upper Rio Preto, to the south. The uplands in the centre of the Park are level with some isolated tabular hills. The southeast side of the Park is the western third of the high Central Brazilian Highland plateau. It is dissected by deep rocky canyons with walls up to 40m high and 300m long. The many streams which fall northwest to the Rio Claro basin and the Tocantinzinho headwaters in the southeast are important to the recharging of the area's aquifers. There are many waterfalls along the Rio Preto notably the 120m-high Rio Preto Falls and the Cariocas Falls (Dardenne & Campos, 2000).

The Park's PreCambrian crystalline basement rock is 1,800,000 years old, amongst the oldest on the planet. It consists largely of quartz and schist, with outcrops of rock crystal which is also scattered throughout the soil. The ridges which rise between 1,200 and 1,500m are of Araí Group quartzite in the north, of basal Paranoá quartzite in the south. Except in the valley bottoms the soils are chiefly deep well-drained cambisols and lithosols: oxidised red, leached, nutrient-poor and moderately to highly acidic. Owing to high levels of aluminium, iron and hydrogen they are often toxic. According to NASA this is one of the most luminous points seen by orbiting cameras, owing to the quantity of quartz crystals, metals and minerals in the soil. Hydromorphic soils surround most of the springs.

Emas National Park is part of Serra do Caiapó plateau, which rises from 400m in the valleys to 880m. It is on the major watershed between the La Plata and Amazon catchments and borders the Pantanal. The plateau is a grassy gently rolling plain which slopes to the north-flowing Rio Araguaia basin in the northeast, to the Rio Jacuba valley in the north and east, and to the Rio Formoso in the south. Both

the latter are tributaries of the Rio Corrente which drains southeast to the Rio Paranaibo. The Park's higher altitude grasslands, palm tree grasslands and gallery forests are divided by sharply carved canyons with high wide waterfalls and blackwater drop pools. 70% of the area is underlain by a wide variety of PreCambrian gneisses and granites. The lithosols derived from these are various but tend to be reddish and lateritic.

CLIMATE

Both Parks have a hot tropical, semi-humid climate with hot and rainy summers and cold dry winters from April to September. In PVNP the annual mean precipitation varies between 1,500 and 1,750mm, most of which falls during the summer. The average annual temperature lies between 20°C and 27°C, ranging from a minimum of 4°C and reaching a maximum of 35°C. The relative humidity ranges from 50-80%, being highest during the summer and declining through the winter (MoE, 1999). Temperatures in Emas are similar but a little cooler.

VEGETATION

For millennia of crustal movements and climatic change, the ancient ecosystems of the central Brazilian highland plateau have persisted as a stable refugium high enough to allow species to make altitudinal adjustments to change. This preserved many forms which are now endemic and has created a primary dispersal centre for plants and mammals. The tropical Cerrado savanna covers 23% of the country and forms a mosaic of vegetation dominated by grasses where seasonal drought and frequent fires are characteristic of the ecology. Goiás is the only state entirely within the Cerrado which is largely a Brazilian biome found outside Brazil only as small enclaves in northeastern Paraguay and eastern Bolivia. Over 90% of the biome is under threat of clearance for large-scale agriculture.

Chapada dos Veadeiros National Park is one of the very few remaining large blocks of relatively intact cerrado. It includes six major vegetation types: *campo cerrado* - open wooded savanna, *campo sujo* - scrubland, *cerradão* - dense wooded savanna, *campo limpo* - clear grassland, gallery forest, semi-deciduous forest; also palm swamps - *veredas* with tall stands of buriti or wine palm *Mauritia flexuosa*. and high altitude montane grasslands in a landscape of isolated inselbergs. The forests occur on the northern slopes of the Santana mountains. A total of 1,476 vascular plants has been recorded from the site, of which 50 are threatened or rare.

Typical cerrado vegetation growing on the deeper well-drained soils consists of a rich wooded savanna, with trees of up to 3-5m in height, a coverage of 10-60%, with 150 trees and up to 350-400 species of vascular plants per hectare (Eiten, 1990). 186 species of trees from 49 families, with a mean density of 1,035 individuals per hectare was verified by Felfili *et al.* in 1995. Dominant species include *Psidium myrsinoides*, *Qualea parviflora*, *Q. grandiflora* and sandpaper tree *Curatella americana* among others (IBAMA *et al.*, 2000). The *cerradão* canopy grows to 7-15m, although some trees reach 18-20m, and has a coverage greater than 70%. The trees are perennial, although some species lose their leaves briefly. The habitat has a species diversity of 75 species and an average density of 1,078 individuals per hectare (Felfili *et al.*, 1996). It is typically interspersed with areas dominated by cerrado vegetation, particularly in the headwaters of the northwest-flowing streams.

Gallery forests grow on swampy areas along the main tributaries of the Rio Preto, and in its valleys and canyons. They have trees up to 20-30m high, a coverage of 80-100%, a high species diversity of 145 species, with densities reaching 978 individuals per hectare and containing several endemic species (Felfili *et al.*, 1995). Some of the important fruit-bearing species include *Callisthene fasciculata*, *Hirtella glandulosa*, *Diospyrus hispida* and coco feijoa *Dipteryx alata*. Other trees are Tamanqueira cork tree *Stryphnodendron* sp, pau d'arco roxo *Tabebuia ipe*, *T. impetiginosa*, copal tree *Copaifera granifolia*, California pepper tree *Astronium urundeuva*, queen palm *Arecastrum romanzoffianum* and babassu palm *Orbignia martiana*. More than 25 species of orchids are also found. In 1997 several species in the Park's botanical collection still needed identification (Felfili *et al.*, 1997).

In Emas National Park grasslands predominate, with 68.1% of the area in the form of *campo limpo*, grassland *campo sujo* scrubland and *campo cerrado* wooded savanna (25.1%) alone and in combination. There are extensive gallery forests and riparian forest grasslands. Wetlands and marshes of *campo umido*, *campos de murunduns* and *veredas* types cover 4.9%, and primitive forests cover 1.24%. A floristic survey in 1998-1999 recorded 601 phanerogram species in 303 genera with 80 families being new to science. The best represented families are Asteraceae,

Fabaceae, Poaceae, Myrtaceae, and Lamiaceae that together represent 48% of all savanna species. None of the riparian habitats had been surveyed then.

FAUNA

CVNP has a high faunal diversity with more than 70 species of mammals, 307 birds, 53 amphibians and reptiles and 49 fishes, many yet unidentified. Several are threatened, many are near threatened. (In a report on the area describing the fauna flooded during the forming of the large Serra do Mesa reservoir, 30 km west, 70 species of snake, 24 lizards and 42 amphibians were recorded - Valdujo & Correa Veiga, 2005). Mammals include giant anteater *Myrmecophaga tridactyla* (VU) giant armadillo *Priodontes maximus* (VU), forest rabbit *Sylvilagus brasiliensis*, maned wolf *Chrysocyon brachyurus*, bush dog *Speothos venaticus* and hoary fox *Pseudalopex vetulus*, jaguar *Panthera onca*, lowland tapir *Tapirus terrestris* (VU), peccary *Tayassu pecari*, marsh deer *Blastoceros dichotomus* (VU) and pampas deer *Ozotoceros bezoarticus*. Also found are the chestnut striped short-tailed opossum *Monodelphus rubida*, another opossum *Thylamys velutina*, the rare monster rice rat *Euryoryzomys lamia* (EN), two species of pygmy rice-rats *Oligoryzomys* spp. and the terrace rice-rat *Oryzomys subflavus* (Lindbergh *et al.*, 1997).

Bird species recorded from CVNP total approximately 43% of all the species exclusive to the Cerrado. Notable species include greater rhea *Rhea americana*, Brazilian merganser *Mergus octosetaceus* (CR), crowned eagle *Harpyhaliaetus coronatus* (EN), black hawk-eagle *Spizaetus tyrannus*, king vulture *Sarcoramphus papa*, black vulture *Coragyps atratus*, cock-tailed tyrant *Alectrurus tricolor* (VU), ocellated crane *Micropygia schomburgkii*, redlegged seriema *Cariama cristata*, sun parakeet *Aratinga solstitialis* (EN), scarlet macaw *Ara macao*, yellow-faced amazon *Alipiopsitta xanthops*, white-winged nightjar *Caprimulgus candicans* (EN), saffron toucanet *Pteroglossus bailloni*, lesser nothura *Nothura minor* (VU), dwarf tinamou *Taoniscus nanus* (VU), black-masked finch *Coryphaspiza melanotis* (VU) and cinereous warbling-finch *Poospiza cinerea* (VU). There is a high diversity of invertebrates, with more than 1,000 species of moths and 160 bees, among many other groups.

ENP: At least 13 endangered mammal species are found in the Park, which is considered one of the best sites for observing large Cerrado fauna. The area is in the range of 17 carnivores, of which eight are listed as endangered. The Park is also one of the best places to see fruit-eating vertebrates such as the tapir and many birds, including toucans and rheas, pampas deer, giant armadillos, herds of giant anteaters, jaguars, and other, often elusive, creatures. When the fauna of ENP was surveyed from 1998 to 2000 78 mammal, 354 bird, 69 reptile, 21 amphibian and 9 fish species were recorded. Mammals include pygmy short-tailed opossum *Monodelphis kunsii*, giant anteater, giant armadillo (VU), maned wolf, bush dog, jaguar, lowland tapir (VU), pampas deer and marsh deer (VU). Four new species of small mammal have been discovered in ENP, including the woolly giant rat *Kunsia tomentosus*, an echymid rodent and an opossum.

The avifauna of ENP contains many Cerrado grassland specialists and endemic species. Threatened species include lesser nothura (VU), dwarf tinamou (VU), Brazilian merganser (CR), yellow-faced amazon, white-winged nightjar (EN), rufous-sided pygmy-tyrant *Euscarthmus rufomarginatus*, cinereous warbling finch (VU), marsh seedeater *Sporophila palustris* (EN), and black-masked finch (VU). Of the 69 reptile species recorded in ENP 10 are very rare, such as the snakes *Philodryas livida* (VU), *Liophis paucidens*, *Liophis maryellenae*, and the lizard *Bachia cacerensis*. The number of reptile species is expected to reach 90 species with more extensive sampling. CVNP and ENP together have 84 reptile species, of which 25 are common to both areas.

CONSERVATION VALUE

The Brazilian Cerrado is the largest, oldest and biologically richest savanna in the world, of which less than 10% remains in a natural state as it is the Brazilian biome being transformed the fastest. For millennia the wide altitude range of CVNP has permitted the survival of rare and relict species during periods of past climate change and the area will be vital in maintaining the biodiversity of central Brazil during future climatic fluctuations. The sites contain many endemic species, over 60% of all Cerrado plants and almost 80% of its vertebrate species. Emas is the only protected neotropical savanna where large mammals are easily visible. The Parks lie within a Conservation International-designated Conservation Hotspot, a WWF Global 200 Freshwater Eco-region, a WWF/IUCN Centre of Plant Diversity and an MAB Biosphere Reserve.

CULTURAL HERITAGE

No record except for archaeological relics is available of the original inhabitants of either Park which are now uninhabited. However, the valleys of the Rio Tocantins which rises in the Chapada dos Veadeiros, and of Rio Araguaia which rises in Emas Park have long been highways first for Indian tribes then, from the mid 18th century on for the Portuguese and, for the Chapada dos Veadeiros since 1960, for the mechanised invasion of government-sponsored forest-clearing agribusiness along the line of the Belen-Brasilia Highway which followed the creation of Brasilia.

LOCAL HUMAN POPULATION

There are few towns near these Parks and northern Goiás is relatively undisturbed country. The closest to CVNP are Alto Paraíso de Goiás, a small town of approximately 4,580 people to its east, and Sao Jorge village at its southern end. Some 2,050 people live in the surrounding area; no-one now lives in the Park though a few locals use it illegally. There was for a time an industry exporting rock crystal for industrial use. Nowadays nature therapists and nature lovers come to Alto Paraíso for the crystals' supposed curative powers. No-one lives within ENP, but it is surrounded by agricultural land. Two small towns are located about 20 km northwest, one, Chapadao do Ceu, is 25 km southeast of the Park and there are several small communities in the surrounding country.

VISITORS AND VISITOR FACILITIES

CVNP is one of the ten most visited National Parks in Brazil. The annual visitor numbers vary depending on local climatic conditions. Flash floods can be dangerous in the wet season when the Park is closed. In 1995 the Park received 11,951 visitors and in 2000, 26,000. Many are drawn to Alto Paraíso by the supposed energising powers of the quartz crystals as well as by the scenery in a form of spiritual ecotourism. Visitor facilities include an interpretation centre with an auditorium, exhibition room, reading room, office, kitchen facilities and lodging for staff and researchers. There is a *pousada* at São Jorge and camping at Alto Paraíso. Visitors are not permitted in the Park unless accompanied by a guide. There are over 200 self-employed guides in the Tourist Guide Association who live in Alto Paraíso and São Jorge. They also help with garbage removal, fire control and trail maintenance. Two trails are open to the public, limited to 450 people per day: one to the two Rio Preto canyons and Cariocas waterfall, the other to the two Rio Preto falls. Access to the Park from Brasilia is by the state highway which runs through Alto Paraíso. An unpaved secondary road runs 37 km west from Alto Paraíso along half the southern border to the Park entrance and visitors' centre near São Jorge. The nearest airport is at Brasilia.

ENP is 550 km southeast of Goiania city and is reached by a state road from Chapadao do Ceu, 26 km southeast. Visitors are few: 50-100 a year by 2000, mainly to see large animals. They require permission from IBAMA and can be accommodated in the research facilities. Accommodation is available in Chapadao do Ceu, where guides can be found at the local tourist centre, or in farm hostels close to the park.

SCIENTIFIC RESEARCH AND FACILITIES

CVNP is important for its geomorphology because it preserves rare geomorphological units, studying the origin and evolution of which is useful to understanding the region's geodynamic processes. From 1992 to 1999 ten research projects were undertaken but relatively little extensive biological research or biological records exist for CVNP. ENP has had over 30 years of continuous biological research, primarily through collaboration with regional universities. From 1992 to 1999 twenty-nine research projects were undertaken. This research includes the impact of the wildlife on agricultural production in the surrounding area, the ecology and conservation of tapirs and anteaters in the Park and the farmland. There is a research lodge with adequate facilities.

MANAGEMENT

During the last fifty years, about 67% of the Cerrado ecoregion has been converted to agriculture or modified in a major way with the help of government subsidies and only 1% protected (da Silva, 2001), However, Chapada dos Veadeiros, has been well protected from exploitation by its complex relief and poor soils (CVNP). The management of the two Parks is the responsibility of the Brazilian Institute of the Environment (IBAMA) under the Ministry of the Environment. The administration of CDNP is developed in collaboration with two local organisations, the Chapada dos Veadeiros Tourist Guide Association and the Chapada dos Veadeiros Flower Extractors Association, Eight surrounding communities are involved in park management activities but have no powers of enforcement. The Management Plan completed in 1998 included zoning and action plans for research, monitoring, protection, tourism and recreation, infrastructure, environmental education and regional integration.

Six zones were created: Pristine, Low Use, Extensive Use, Intensive, Special and Recovery. Several outposts and more viewpoints along the bordering road are planned, and a trail running across the south end of the Park, with the help of Conservation International. Monitoring indicators proposed included water quality, wildfires and reduction, birds, research projects and publications, numbers educated on the environment, comparative satellite images and regional land use.

Emas is more isolated and remote though it is surrounded by farmland. A 1981 management plan for EMP was revised beginning from 2001 on, using the findings of research projects. Zones are similar to those used in Chapada dos Veadeiros with large Intangible (40%) and Rehabilitation (35%) zones. The *Fundação Ecológica de Mineiros* (Emas Foundation), established in 1987, promotes educational and management programs in the Park and surrounding areas in collaboration with Conservation International. A corridor of semi-natural areas, mostly state reserves, between the site and the Pantanal, is to be developed with the help of Conservation International to lessen the ecological isolation of the site (IUCN, 2001).

MANAGEMENT CONSTRAINTS

CVNP: since its reduction to an area containing only pristine land, the state of conservation of the Park is high. Few degraded areas remain, of abandoned quartz mining pits and cattle pastures. Mining for rock crystal, amethyst and gold, widespread in the 1940s and 1950s, is still carried out in several places close to the Park boundaries. Ranching occurs close to the north and west boundaries and small numbers of cattle occasionally roam into the Park. Peripheral streams may be affected by pollution from these activities. Increasing use and paving of roads close to the Park may lead to the introduction of exotic species and isolation from adjacent Cerrado habitats. There is some pressure from hunting, commercial flower collecting for orchids and bromeliads, and from the increase in tourism, although so far this has been well controlled.

The major threat to ENP is fire during the four month dry season. Fires from the grasslands bordering the site often get out of control, which can lead to significant though relatively short-term impacts. Until 1994 a major fire ravaged the Park on average once every three years, and in 1994, some large mammal populations took four or more years to recover after 97% of the Park burnt. In response, fire brigades and breaks have now been established. The Park is also under pressure from the transformation of surrounding habitats to agriculture, with problems of pesticide contamination of the headwaters of the Jacuba and Formosa rivers. Another threat is introduced grass species, such as *Braquiaria* sp. Roadkills of armadillos, anteaters and snakes on the roads bordering the south of the Park are a regular occurrence.

STAFF

In 2000, according to the IUCN technical evaluation mission CVNP had a Park Director, a Game Warden and a technical assistant with three rangers. A staff of nine is envisaged and during the fire season, help is sent from Brasília National Park. Staff are housed at Alto Paraíso. ENP had a Director, a technical assistant and six rangers plus 9-11 researchers who contributed help (IUCN, 2001).

BUDGET

In 1995 CVNP Park received Brazilian Reais R\$221,438 (US\$115,000) from the National Environment Program (PNMA), plus a further R\$35,373 (US\$18,000) directly from the IBAMA budget. The PNMA itself is funded largely from international sources through the Directorate of Ecosystems (DIREC) and the IBAMA state agency. IBAMA via its state agency pays for expendable supplies, maintenance and capital equipment, hired services, and staff travel expenses. Entrance fees in 1995 brought in R\$14,939 (US\$7,760). The Federal Treasury pays US\$60,000-120,000 largely for staff salaries, also for the purchase of land (IUCN, 2001). In 2001 the recent annual budgets for ENP were between \$US40,000 and US\$80,000. USAID is contributing towards creation of the Pantanal-Cerrado corridor.

LOCAL ADDRESSES

Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA), Parque Nacional Chapada dos Veadeiros, Rodovia GO-327, Km 34 [Caixa Postal 9], Alto Paraíso de Goiás, Goiás.

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Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis, Directoria de Ecossistemas (DIREC), Brasília, DF 70.000-000, Brazil.

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