

Brazil's biodiversity crisis

Natural history collections are vital to preserving Brazil's biomes

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Ensuring the sustainability of our species is crucial to preserving the world's natural heritage. Natural heritage is at its highest value in the form of natural habitats and landscapes, but it is also visible in natural history collections in botanical gardens, zoos and other natural history institutions, where it is studied and where the scientific basis for conservation is developed. Brazil, one of the most naturally diverse countries in the world, is facing a major biodiversity crisis as its biomes face threats from mass deforestation and agribusiness.

Today's worldwide preservation challenge requires an interdisciplinary approach that incites action on a political, economic and social level. A significant share of our planet's natural reserves made it into

the 21st century almost by accident, mainly because these reserves were isolated or at least located far from where the economic expansion that boosted our civilisation occurred. The World Conservation Monitoring Centre recognises 17 megadiverse countries as the biologically wealthiest nations: Australia, Brazil, China, Colombia, Democratic Republic of Congo, Ecuador, India, Indonesia, Madagascar, Malaysia, Mexico, Papua New Guinea, Peru, the Philippines, South Africa, the US and Venezuela. These countries together house 70% of the world's biodiversity.

Traditionally, many of these reserves were found in countries with lesser

developed economies. However, a shift in global economic power towards developing economies in the early 21st century has altered policies significantly and Brazil, one of the BRIC economies (with Russia, India and China), has been lauded for its impressive economic growth. Despite this economic progression, natural habitats still suffer the

consequences of old economic models that are incompatible with the efforts to preserve natural heritage. BRIC countries are therefore forced to

face the conflicting pressures of economic growth for profitable activities like agriculture, farming and logging.

The role of collections

Natural history collections are a powerful source of information on the Earth's biodiversity. According to Brazilian Herpetologist Miguel Trefaut Rodrigues, the informational content of these collections can collectively surpass the value of all the world's libraries.

Today, three traditional museums house Brazil's most important and representative collections of Neotropical fauna: *Museu Nacional do Rio de Janeiro*, *Museu Paraense*

Emílio Goeldi and the *Museu de Zoologia da Universidade de São Paulo*. These collections, along with some additional ones housed in Europe and North America, hold key information on Brazilian and Neotropical biodiversity. The development and protection of natural history collections in the context of threatened natural habitats is crucial. Collections provide the basic source of information on biodiversity for the description of new species, the revision of taxonomic groups and accurate inventories of fauna and flora. Without scientific specimens as a source of comparative studies and funding for taxonomic studies we cannot understand what must be preserved prior to salvaging unknown species. However, the resources generated to address the biodiversity crisis are concentrated in programmes that focus on the digital management of collections databases, and fail to provide adequate support for the maintenance and expansion of these collections and their proper curation.

Brazil claims between 10% and 20% of the world's biodiversity. Across the nation's 8,547,906km² lie six different biomes (Campos Sulinos, Floresta Atlântica, Cerrado, Pantanal, Caatinga and Amazonia), all uniquely diverse in their response to complex



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Facing page: Bird collection in the Zoology Museum, University of São Paulo

Right: Carlos Botelho State Park, Mata Atlântica (top), a Micraster Mintoni (bottom)

topography, micro-climate and hydric dynamics, resulting in complex ecosystems processes related to the interaction of species in these rich environments.

Two of these biomes, Atlantic Forest and Cerrado, which have a high number of endemic species, are highly threatened and have become hotspots for preservation policies. The Atlantic Forest is the most diverse biome in Brazil. According to NGO SOS *Mata Atlântica*, today only 7% of its original surface is preserved. Its destruction started in the 16th century with the European exploration of Brazil's littoral resources. The position of the Atlantic Forest along the Brazilian coast, where the first settlements were established following colonisation, and where some of the larger cities are situated, is partly responsible for its destruction. Surprisingly, none of the vertebrate species that inhabit the Atlantic Forest are considered extinct, although 70% of the threatened vertebrates in Brazil are endemic to this biome.

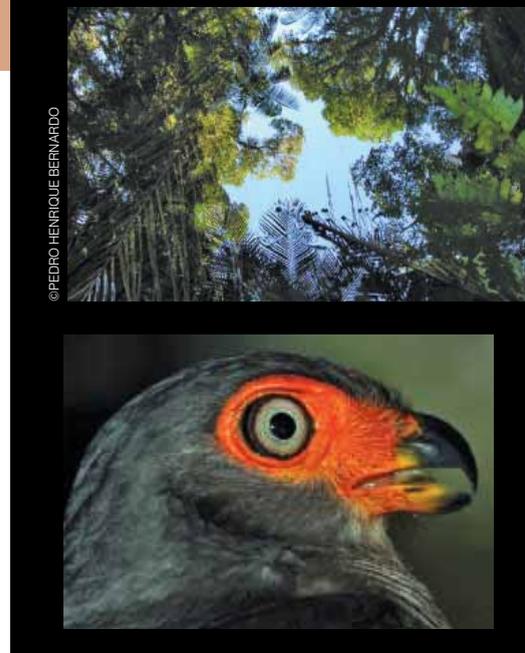
The Cerrado, in Central Brazil, the second largest Brazilian biome, is giving way to endless fields of soya bean cultivation, resulting in the loss of more than 50% of its original surface in recent decades. It is still considered the most diverse savanna biome in the world, with a high degree of endemism (44% of the plant species are endemic) and more than 2,500 known species of vertebrates. Paradoxically, only 2.2% of this biome is protected as National or State Parks. Ricardo Machado, Director of the Program Cerrado Pantanal of NGO *Conservation International*, predicts that if today's

deforestation patterns are maintained, the Cerrado will be extinguished in 2030.

Climactic threats

In addition to their destructive effect on biodiversity, deforestation activities also produce drastic climactic consequences. This practice releases carbon dioxide into the atmosphere directly from the burning forest. Today, Brazil is the 10th largest emitter of greenhouse gases, half of which come from burning forests, mainly in Amazonia. If the market continues to place a heavy emphasis on soya bean production and other such commodities, the final destruction of the already endangered Brazilian Cerrado will be completed within a few decades and Amazonia will follow. But if the value of carbon release is incorporated into commodities in the near future, we can hope to see part of Cerrado and Amazonia intact.

In response to the destruction of natural habitats, our ability to generate taxonomic information in a megadiverse context is slow. After 30 years of governmental policies, first focused on zoology (*Programa Nacional de Zoologia - CNPq*) and more recently on taxonomy (*Programa Nacional de Capacitação em Taxonomia - CNPq*), Brazil significantly increased its number of taxonomists. The aim of these programmes was to diagnose the status of zoological collections in Brazil and improve their technical management with specialised publications. They also provided funds for taxonomic research and professional training. However, today the country lacks compatible funding programmes and trained



specialists. For instance, it is estimated that for each Brazilian species described, 10 are undescribed. The observed rate of species description per year is around 0.6% of the total number of known species. At this rate, 10 more centuries would pass before all Brazilian species were described.

Brazil is nevertheless in a stronger position to address the biodiversity crisis compared to other megadiverse countries, due to its participation in the production of taxonomic information through research programmes on biodiversity and conservation. The country still has a long way to go, however, in achieving reasonable conditions for its collections and biodiversity management. The main objective now is to find alternative means of economic development and natural history museums need to focus heavily on increasing collections. But the biggest challenge is to slow down the destruction of natural habitats and ensure the preservation of megadiversity for future generations. n

Brazilian Forest Law: a new threat to Brazilian biodiversity

Brazil was the first nation to implement a REDD (Reducing Emissions from Deforestation and Forest Degradation) programme, as part of the Amazon Fund implemented by the Brazilian government in 2009. Allied to an efficient monitoring system for forest coverage since 1988 with annual reports by the INPE (*Instituto Nacional de Pesquisas Espaciais*) and other positive initiatives, Brazil

is responding to the challenge of economic growth through sustainable measures. At the same time, all preservation acts from past decades are now facing major threats due to the revision of Brazilian Forest Law. The Forest Act (1965) regulates the uses of land in Brazil and is responsible for the preservation of a considerable amount of forest cover (80% for each property in Amazonia).

Proposed changes, to be voted after the presidential elections in October include the reduction in size of protected areas, the mandatory restoration of forests illegally cleared, the transfer of control of forest management to local governments and amnesty for landowners that illegally promoted deforestation in recent years (around 40 million hectares).

Brazilian scientists estimate

that more than 100,000 species may be extinct, with the extra suppression of forests and savannas. As a result of the new law, forest reduction will lead to a massive increase in CO₂ emissions. It is time for society, governments and NGOs worldwide to join the scientific community in urging the Brazilian Congress to put an end to this threat, which puts our common heritage at further risk.