



RESTORING RIO

Eduardo Gallo-Cajiao takes us on a tour of Tijuca Forest in Rio de Janeiro, one of the largest protected urban parks in the world and one of the most extensive tropical forest restoration projects ever undertaken.

Above: It is difficult to believe that this beautiful rainforest is nestled within the heart of a city of over twelve million people. Photo by Marcus Vinicius Lameiras

Rio de Janeiro is undoubtedly one of the world's most iconic cities. Nestled in the dramatic landscape of south-east Brazil, Rio—known as the 'marvellous city'—is crowded with over 12 million people, and is well known for its cultural charms, such as *samba*, the core ingredient of Rio's famous Carnival. But Rio is not just a city of festivals and dancing, it also has a gem of a conservation tale to tell—the story of the replanting of the Tijuca Forest.

The city—founded in 1565—rests on soils that would have otherwise been Atlantic Forest. The *Mata Atlântica*, as it is known in Portuguese, is one of the most bird-rich regions of the world, with a total of 620 species (30 per cent of which are endemic) calling this ecosystem home. This tropical forest reaches from north-eastern Brazil along the coast to Uruguay, extending inland in Argentina and Paraguay. Originally, it covered over 1.2 million square kilometres, stretching from inland and coastal lowlands to mountains over 2,000 metres above sea level.

This incredible region is currently under huge human pressure. Brazil, where most of the forest is found, has 120 million people living along its Atlantic coast. Not surprisingly, the Atlantic Forest holds the highest concentration of threatened birds in the Americas, with only eight per cent of the original forest remaining. Just 36 per cent of these remnants are protected, mostly at higher elevations, with the lowland forest reduced to isolated fragments surrounded by agricultural systems.



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Above: One of the highlights of the park, the beautiful Channel-billed Toucan was reintroduced into Tijuca in the early 1970s. Photo by Marcus Vinicius Lameiras

Opposite, from top: The Chestnut-backed Antshrike is a common species throughout South America's Atlantic Forest. Photo by Marcus Vinicius Lameiras

A dash of colour amongst a forest of green, the Red-necked Tanager is one of 221 species recorded at Tijuca National Park. Photo by Arthur Grosset

Catching a glimpse of the sparkling Violet-capped Woodnymph is a highlight of any visit to Tijuca National Park. Photo by Marcus Vinicius Lameiras

Rio de Janeiro is surrounded by steep monoliths, which are part of the Tijuca Massif. The most famous of these is the *Corcovado*, where one of the seven wonders of the modern world stands—the famous statue of Christ the Redeemer. Rio's original forest was only lightly disturbed by the Tupinambá, a local indigenous group, and when the Portuguese settled around Guanabara Bay, the forests of the Tijuca Massif provided the water supply to the thriving city. By the end of the 18th century, however, this mountain system had been heavily cleared for coffee plantations with just a few forest patches remaining. This process, combined with lower than average rainfall, caused the streams running through the mountains to dry up, and resulted in water shortages during the first half of the 19th century, something a constantly growing city could not afford.

These droughts led to a pioneering restoration initiative that attempted to re-establish the hydrological cycle of the region. In 1861, Don Pedro II, Emperor of Brazil, ordered on-ground revegetation works in an area allocated for watershed protection in the Tijuca Massif. The area included forest remnants, cleared areas left to revegetate naturally and others designated for active conservation management. At least 76,000 seedlings were successfully planted on this mountain system between 1862 and 1892. The trees mainly comprised native species, but interestingly enough some exotic ones, among them *Eucalyptus*, were also planted. Ironically, the initial works to restore water flows from this mountain system were completed almost at the same time that the water supply for Rio de Janeiro became available from bigger rivers further away, beyond the Tijuca Massif.

Nowadays, the Tijuca Massif is densely forested, protected, and part of the city. The region was declared a National Park in 1961, and is a mosaic of small patches of original forest, second-growth vegetation and replanted areas, which covers 3,958 hectares and includes 148 streams. These forests, which reach up to 1,021 metres, are used for leisure, research and education and receive two million visitors each year.

The establishment of the National Park was followed by a 'refaunation' project. As this protected area is isolated from other large tracts of forest and recovered from small remnants of original forest, many species of vertebrates were lacking. Taking advantage of animals seized from traffickers, a total of one snake, 25 bird and seven mammal species were introduced to Tijuca during the early 1970s. Though not all introductions were of species indigenous to the

region, perhaps the most successful reintroduction was the Channel-billed Toucan, of which 47 individuals were released. Today, this species is one of the highlights of the Park, common and conspicuous both visually and vocally. This magnificent species can travel in flocks of up to ten individuals and can be seen from people's windows in suburbs adjacent to the Park.

Tijuca is also very important for bird conservation on a global scale. Approximately 221 species have been recorded in the Park, of which 46 are endemic to the Atlantic Forest and six are globally listed as threatened. The Brown-backed Parrolet, of which no more than 1,000 adult individuals are estimated to survive, is one of Tijuca's most endangered residents.

Many typical Neotropical elements, absent from Australasia and the Old World, occur in the park. Guans, New World vultures, hummingbirds, motmots, toucans, cotingas, puffbirds, antbirds, manakins and tanagers are all present. These species range widely in colour, feeding habit and size. The Red-necked Tanager presents an incredibly colourful plumage, whereas the Rusty-margined Guan is particularly dull. The Channel-billed Toucan chiefly feeds on fruits in the forest canopy, while the Scaled Antbird prefers to look for insects in the understorey. The Swallow-tailed Hummingbird is the smallest bird in the forest, weighing just a few grams, while the Black Vulture is at the opposite extreme, reaching over 1.5 kilograms.

Possibly the greatest bird spectacle to be witnessed at Tijuca is the mating behaviour of manakins. Three species occur in this forest, including the Pin-tailed Manakin, which mates in a *lek* system in which the brightly coloured males display a complex repertoire of movements, calls and mechanical sounds produced by their wings. The birds also undertake gardening chores at their display perches, removing twigs, leaves and mosses in order to keep them clear for their performances.

The silence of Tijuca's dense forests is sometimes interrupted by a bonanza of chattering mixed flocks. Many insectivorous birds, such as antbirds and woodcreepers, travel along together as they feed, sometimes following swarms of army ants to take advantage of flushed arthropods. These mixed flocks can be complex, with some species, such as the Red-crowned Ant-tanager, playing a leading role, while others, like the occasionally kleptoparasitical Black-goggled Tanager, steal prey from other birds' beaks.

The conservation of Tijuca is not without challenges. The National Park is totally embedded within Brazil's second-largest city. Encroaching urban sprawl, bushfires and the extraction of flora species, such as bromeliads and orchids, all threaten the forest. The area is managed by the Chico Mendes Institute of Conservation and Biodiversity, part of the Ministry of Environment of Brazil, through an advisory board with representatives from multiple sectors.

While the rehabilitation of Tijuca is by no means an adequate substitute for the loss of so much pristine Atlantic Forest, Tijuca's story is a history lesson that reminds us of the consequences our actions have on natural ecosystems, for both good and ill. Clearing watersheds can result in droughts, whereas restoring forests can provide an abundant and reliable water supply. It sounds obvious, but so often the mistakes of the past are repeated over and over again. Thanks to political will, the revegetation and protection of Tijuca was achieved with the limited scientific, technological and management tools available at the end of the 19th century. With the knowledge we have today we should surely be taking advantage of our far better developed toolkit to work even more tirelessly for biodiversity conservation.

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Further reading

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