



# New heights with the Hidden Universe: Biodiversity foundation

ARAÇÁ project's headquarters – Brazil



# Discover the hidden universe of biodiversity with Green Cubes

Green Cubes is supporting leading biodiversity research through a strategic collaboration with the Hidden Universe: Biodiversity (HUB) Foundation and ARAÇÁ to advance research, conservation, and community engagement in Brazil's Atlantic Forest. Using world-leading measurement technology from Hexagon and partners, Green Cubes makes nature visible to enhance science through digital twin and AI technology, setting the foundation for natural capital and establishing HUB's Alto da Figueira reserve as a reference site for restoration in the Mata Atlântica biome.

## About ARAÇÁ

ARAÇÁ, the Atlantic Forest Research and Conservation Alliance, is a research initiative established as a collaborative effort to understand and conserve the Atlantic Forest biome, of which only 7–8% remains intact. With its headquarters at the Alto da Figueira field station, ARAÇÁ works to protect biodiversity through research, education, community engagement, and ecological monitoring. Researchers visit for interdisciplinary field studies on species diversity and distribution, ecosystem dynamics, and climate impacts, while also actively collaborating with nearby communities to integrate local knowledge into conservation strategies. At the heart of the initiative is the HUB Foundation's sister organisation, the Brazilian nonprofit Fundação Antonelli para a Pesquisa e Conservação da Biodiversidade, which established ARAÇÁ to scale local insights into global strategies and solutions.



## Alexandre Antonelli

Alexandre Antonelli (PhD) is a Brazilian–Swedish biodiversity scientist specialising in the evolution, distribution, conservation, and sustainable use of biodiversity. He is leading global developments in biodiversity science, both at renowned universities worldwide and as the lead scientist overseeing more than 600 scientists at the Royal Botanic Gardens, Kew, in the UK. He is the author of over 300 scientific publications, has mentored 90 postgraduate researchers, is a recipient of numerous awards, and is a member of WWF International's Board. His mission is to halt biodiversity loss and restore ecosystems, drawing on extensive fieldwork in the tropics and strategic roles across science and policy.

***“This is the most important issue of our time. It’s no exaggeration to say this is about life and death – certainly for many species, and likely for us too.”***

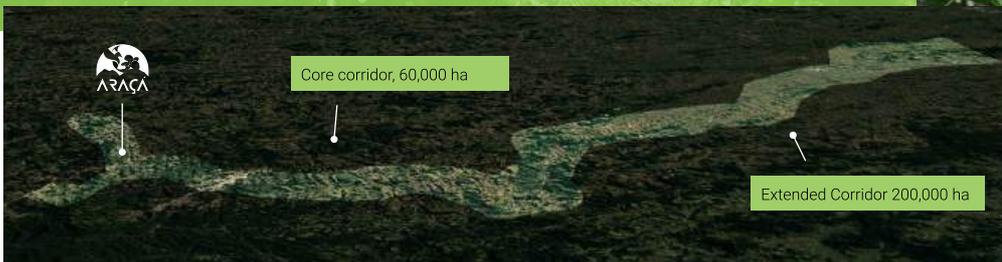


Seeing the degradation with his own eyes, Alexandre and his family decided to commit their family savings to purchase the 120-hectare reserve that forms the heart of ARAÇÁ. Alexandre was part of shaping Green Cubes in 2022, and has been an informal strategic advisor since then. By activating Green Cubes at ARAÇÁ, Alexandre believes in the power of technology to boost science, moving beyond single trees and pieces of land to thinking in terms of volume to measure the quality of ecosystems in a much faster and more scalable way.

## The power of technology to enhance science

Biodiversity is hard to measure, and scientists can spend years making an inventory of nature. Using digital twin technology, nature can be measured faster and multi-dimensionally, enabling a more accurate analysis. Green Cubes is an accessible way to visualise nature in 3D – making nature visible for scientific analysis and continuous improvement – but also valuable, as Green Cubes unlocks new possibilities for research collaboration and a digital foundation for natural capital.

***“There is not a single metric which can tell everything about an ecosystem, and that is why multi-dimensional measurement is key.”*** – Alexandre Antonelli



One key mission at ARAÇA is to accelerate the restoration of the Caminho da Mata Atlântica biodiversity corridor, focusing on the segment that stretches between two large state parks: Tres Picos and Desengano, a vital ecological link within the Atlantic Forest – one of the world’s most biodiverse and threatened biomes. The corridor enables genetic flow between fragmented habitats, supports endangered species, and strengthens ecosystem resilience against climate change and deforestation. Today, a fragmented forest remains. To reconnect the state parks, ARAÇA needs to work with local communities and various partners to secure funding. Here, Green Cubes plays a key role going forward.

## Connecting the dots



The conservation activities at ARAÇA are driven by the HUB Foundation, which acts as a creative and collaborative platform, bringing biodiversity science to life through storytelling, immersive media, and public engagement. Complementing the restoration and conservation efforts at ARAÇA, where Green Cubes contributes world-leading technology for biodiversity monitoring, Green Cubes also helps HUB to communicate the immersive experience by making nature visible. Learn more about Hidden Universe: Biodiversity and Green Cubes in the link below.

[Learn more](#)

# Green Cubes – from space to soil at ARAÇÁ

Leveraging the power of technology and the leadership of science, data is collected from space to soil. Green Cubes is activated at three primary areas of interest: Seriemas, Alto da Figueira, and Pirineus; the first two in close proximity to Caminho da Mata Atlântica corridor. These plots were scanned using satellite imagery and airborne LiDAR, while three experience points (XP) were activated in Alto da Figueira with additional terrestrial LiDAR and in-situ sampling using camera and audio traps.



The Green Cubes methodology enables AI-powered multi-dimensional measurement, covering accurate assessments of extent and condition, as well as indications of biodiversity on site. Earth observation provides insights into condition, extent, and change detection, representative of forest types, at a resolution of 1–10 metres. Airborne LiDAR delivers detailed 3D data with approximately 5–10 cm resolution, leveraging machine learning and deep learning to generate digital elevation models, canopy height models, and volume assessments at a granular level. Terrestrial LiDAR offers ultra-high resolution, with over 1,000 points per metre, that is then used to calibrate the airborne data. Traditional tape measurement is applied to 10% of the terrestrial LiDAR plots for precise ground-truthing. To assess fauna intactness, AI-powered analysis is conducted using audio and camera trap data.

All data is integrated into the Green Cubes platform, providing a digital window into the forest – visualising data for actionable insights, immersive experiences, and research collaboration at ARAÇÁ.

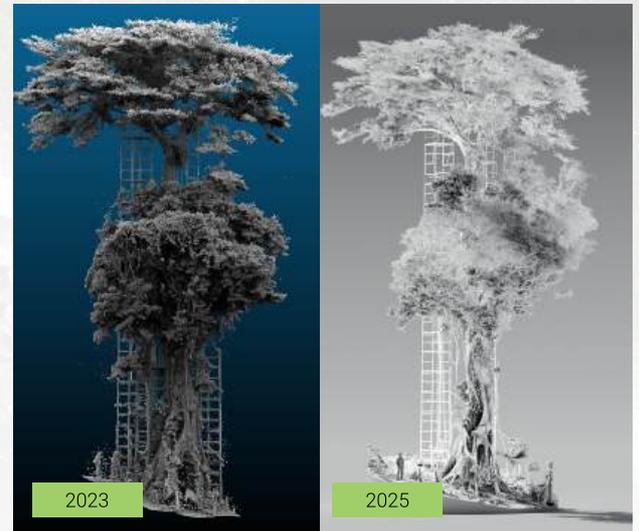


## The output

The collaboration with HUB and the power of Green Cubes makes nature visible and valuable, accelerating biodiversity science, enabling next-level of conservation actions and shaping immersive experience to unlock financing and set a foundation for natural capital.

### 30-metre tree scanned to centimetre accuracy

The Alto da Figueira Reserve is home to a remarkable old-growth fig tree. At ARAÇÁ, researchers are working to learn as much as possible about the diversity associated with the tree. Green Cubes introduce Canopy Lidar Scanning (CLS) with Hexagon Leica RTC360, generating up to 2 million points per second. Through the resulting point cloud data, changes can be monitored, and the tree's volume can be compared for scientific analysis with the previous LiDAR scan from 2023 (Kim Calders, University of Ghent, Belgium).



## Green Cubes Experience points and 3,000+ hectares in 3D

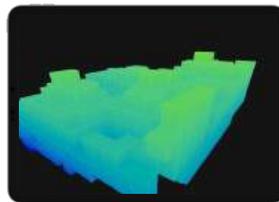
The data acquired from the airborne LiDAR capture for complete 3D digital twin, with a point density up to 40 points per square meter, covering over 3,000 hectares and the three experience points in Alto da Figueira, are visualised in the Green Cubes platform. The data are available to ARAÇÁ, both to boost scientific research and engage the local community, share knowledge, and attract partners and funding.



Immersive Experience



3D point cloud



Biovolume

Green Cubes experience points educate partners, collaborators, investors and community on the rich biodiversity, with 360 views, sound, 3D point clouds and biovolume assessments, complemented with fauna camera traps and acoustics. The Green Cubes collaboration data is getting further enriched every day as more research and solutions get integrated to make nature visible at Alto da Figueira and beyond.

## Enhancing Conservation and Unlocking New Funding Opportunities

HUB's vision is to conserve and restore the full biodiversity corridor of 200,000 hectares, moving beyond the primary areas of interest. This would not only generate accurate data to support conservation, but also unlock new funding opportunities for the entire area and for the activities led by ARAÇÁ at Alto da Figueira – making the hidden universe of biodiversity both visible and valuable.

Learn More about Hidden  
Universe: Biodiversity

[www.hu-b.org](http://www.hu-b.org)



**HEXAGON**



**Revolution**

Hexagon is the global leader in measurement technologies. We provide the confidence that vital industries rely on to build, navigate, and innovate. From microns to Mars, our solutions ensure productivity, quality, safety, and sustainability in everything from manufacturing and construction to mining and autonomous systems.

Hexagon (Nasdaq Stockholm: HEXA B) has approximately 24,800 employees in 50 countries and net sales of approximately 5.4bn EUR.

Learn more at [hexagon.com](https://www.hexagon.com)