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SOLUTION CATALOGUE

THE INNOVATIVE TECHNOLOGIES REVOLUTIONIZING TROPICAL RAINFOREST CONSERVATION

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OVERVIEW

ABOUT XPRIZE

XPRIZE is the recognized global leader in designing and executing large-scale competitions to solve humanity's greatest challenges. For 30 years, our unique model has democratized crowd-sourced innovation and scientifically scalable solutions that accelerate a more equitable and abundant future. Donate, learn more, and co-architect a world of abundance with us at XPRIZE.org.

ABOUT XPRIZE RAINFOREST

XPRIZE Rainforest is a global 5-year, $10 million competition sponsored by Alana that convenes innovators and experts across disciplines – from conservationists and Indigenous scientists to engineers and roboticists – and challenges them to use novel technologies to expedite the monitoring of tropical biodiversity.

Tropical rainforests are the most biodiverse ecosystems on Earth but our ability to fully assess them is restricted as they are so vast and complex. By deploying rapid and autonomous technology into the forest, researchers can gain near real-time insights about biodiversity – providing necessary data that can inform conservation action and policy, support sustainable bioeconomies, and empower Indigenous Peoples and local communities who are the primary stewards, protectors, and knowledge holders of the planet's tropical rainforests.

XPRIZE Rainforest is part of XPRIZE's Biodiversity + Conservation domain, which is accelerating the development of novel technologies to rapidly and comprehensively survey biodiversity and improve our understanding of complex ecosystems. Work in this domain aims to ensure the future of all life and ecosystems on earth and reshape humanity's role and responsibilities in the greater system.

XPRIZE RAINFOREST TEAM

PETER HOULIHAN
EVP, XPRIZE Biodiversity & Conservation

JOHN GREISBERGER
Program Director, XPRIZE Rainforest

MICHELLE SIQUEIRA
Prize Manager, XPRIZE Rainforest

KEV MARRIOTT
Technical Lead, XPRIZE Rainforest

CAT KUTZ
Marketing + Comms Lead, XPRIZE Biodiversity & Conservation

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TESTING + VALIDATION

HOW TO WIN

The winning teams developed novel technologies to rapidly and comprehensively survey rainforest biodiversity and use that data to improve our understanding of this complex ecosystem to benefit both biodiversity and forest communities. To effectively disrupt the biodiversity assessment landscape, the teams would need to achieve the prize criteria (learn more below) and demonstrate the scalability and effectiveness of their technological solutions.

EVALUATING AND ADVANCING THE TEAMS

Following a targeted team recruitment phase, the XPRIZE Rainforest competition began with 300 teams from 70 countries. Over the next two years, the teams submitted detailed proposals outlining their experience, technologies, progress, and approaches to the competition. Each of these submissions was followed by a judging summit and the advancement of teams. At the 2022 World Biodiversity Forum in Davos, Switzerland, the judges selected 15 teams to advance to semifinals - the first field testing phase - the following year in Singapore and share a $250,000 milestone prize for their achievements. In 2023 in Singapore, the teams had 24 hours to survey as much biodiversity as possible in a 60-hectare plot, 48 hours to analyze their data and highlight pathways to insights as part of their biodiversity reports. The judging panel advanced 6 of these global teams to the finals testing which took place in the remote Brazilian Amazon in July 2024. These teams shared a $2 Million milestone payment to further refine and develop their solutions ahead of finals field testing - the phase which determined the winning teams and solutions of XPRIZE Rainforest.

All 6 finalist teams demonstrated viable solutions through field testing and will be supported through the XPRIZE Rainforest Year of Impact. Learn more about the teams and their innovations in this Solution Catalogue.

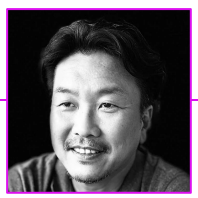
JUDGING PANEL

DR. LUISA ARNEDO

DR. JOSÉ LUÍS CAMARGO

DR. STUART DAVIES

DR. LUCIA LOHMANN



DR. ADRIAN LOO

DR. KEVIN NJABO

DR. VOJTECH NOVOTNY

ATOSSA SOLTANI

DR. DAVE THAU

XPRIZE RAINFOREST PARTNERS

XPRIZE Rainforest would like to offer special thanks to our conservation partners, who have lent their invaluable expertise and support to XPRIZE Rainforest and the competing teams. Your generous guidance has made an incredible impact on XPRIZE and our work, and we are deeply appreciative of your ongoing commitment.

LIFE OF PRIZE PARTNERS

1t.org | Esri | Foundation for Amazon Sustainability | GBIF | Governors' Climate & Forests Task Force | iNaturalist | International Union of Forest Research Organizations | KICKOFF | Project Management Institute | Rainforest Kids Challenge | Silverstrand Capital | Society for Conservation Biology | Wicked Problem Solving

TESTING PARTNERS

SEMIFINALS

Civil Aviation Authority of Singapore | National University of Singapore Centre for Nature-based Climate Solutions | National Parks Board Singapore | Pan Pacific Hotels Group | Republic of Singapore Air Force | Singapore Tourism Board

FINALS

Brazilian Ministry of Development, Industry, Trade and Services | Brazilian Ministry of Environment and Climate | Cambridge Consultants | Dream Factory company | Institute of Amazonian Research (INPA) | Sustainable Amazon Foundation (FAS) | Glocal Experience | National Council for Scientific and Technological Development (Brazil) | National Civil Aviation Agency of Brazil (ANAC) | Secretariat of Environment of Amazonas | Secretariat of Public Security of Amazonas | Tumbira Community

IMPACT PARTNERS

Conservation International | UNDP | State of Acre | State of Amazonas | National University of Singapore Centre for Nature-based Climate Solutions| One Tree Planted | Ponterra

FINALIST TEAMS

BRAZILIAN TEAM
THIRD PLACE WINNER
Piracicaba, Brazil

ETH BIODIVX
BONUS PRIZE WINNER
Zurich, Switzerland

LIMELIGHT RAINFOREST
GRAND PRIZE WINNER
Grand Junction, Colorado

MAP OF LIFE RAPID ASSESSMENTS
SECOND PLACE WINNER
New Haven, Connecticut

PROVIDENCE+
FINALIST TEAM
Barcelona, Spain

WELCOME TO THE JUNGLE
FINALIST TEAM
Chicago, Illinois

AUTONOMOUS UAVS

Autonomous Unmanned Aerial Vehicles (UAVs) have transformed biodiversity monitoring by providing efficient, scalable, and non-invasive methods to survey complex ecosystems like rainforests. Equipped with advanced sensors and AI integration, these drones can autonomously collect diverse data types, including high-resolution imagery, environmental DNA (eDNA) samples, and bioacoustic recordings, enabling comprehensive assessments of flora and fauna.

In the XPRIZE Rainforest competition, finalist teams deployed autonomous UAVs to gather audio, visual, and eDNA data. This approach allowed for data-rich biodiversity assessments without setting foot inside the study site, demonstrating the potential for non-invasive monitoring techniques.

STRENGTHS

- Efficient Data Collection: Autonomous UAVs can cover large and inaccessible areas swiftly, reducing the time and labor traditionally required for biodiversity surveys.
- Non-Invasive Monitoring: Drones minimize human disturbance in sensitive ecosystems, allowing for more accurate observations of wildlife behavior and habitat conditions.
- Multi-Sensor Integration: Equipped with various sensors, UAVs can simultaneously collect multiple data types—such as high-resolution imagery, thermal data, and eDNA samples—providing a holistic view of the ecosystem.
- Real-Time Data Processing: Advanced AI integration enables the immediate analysis of collected data, facilitating rapid decision-making for conservation efforts.

LIMITATIONS

- Technical Complexity: Operating autonomous UAVs requires specialized expertise in programming, navigation, and data analysis, which may not be readily available in all research teams.
- Regulatory Constraints: Airspace regulations and restrictions can limit UAV deployment, especially in protected areas or regions with strict aviation laws.
- Environmental Challenges: Adverse weather conditions, dense canopy cover, and rugged terrain can impede UAV operations and data accuracy.
- High Initial Costs: The acquisition and maintenance of advanced autonomous UAV systems can be expensive, potentially limiting their accessibility for some organizations or communities.

TEAMS USING THIS TECH

BRAZILIAN TEAM	
ETH BIODIVX	
LIMELIGHT RAINFOREST	
MAP OF LIFE RAPID ASSESSMENTS	
PROVIDENCE+	
WELCOME TO THE JUNGLE	

BIOACOUSTIC TECHNOLOGIES

Bioacoustic technology leverages sound to monitor wildlife in dense environments where traditional camera traps face limitations. Many organisms, including birds, frogs, bats, and aquatic species, produce unique acoustic signatures that can be detected and analyzed. By capturing and processing sound data, bioacoustics offers insights into species presence, behavior, and ecological activity over time.

Use of autonomous UAVs with tethered directional microphones operating transect survey methodologies that follows the ecological tradition, interpretation, and standardized repeatability of on-the-ground expert transects. This approach is a powerful complement and potential substitute to laborious foot-based transects.

The XPRIZE Rainforest finalist teams developed extensive acoustic libraries and innovative AI models to identify reptiles and amphibians by their unique calls. These breakthroughs expanded the utility of bioacoustic monitoring in tropical forests, enabling more precise species detection and avian movement ecology in challenging environments.

STRENGTHS

- Species-Specific Identification: Detects and identifies species through their unique acoustic signatures, such as bird calls, frog croaks, and ultrasonic bat signals.
- Spatial Insights: Microphone arrays triangulate species' locations, identifying nesting sites, flight paths, and movement patterns to reveal ecological dynamics.
- Existing Data Libraries: Extensive libraries for bird calls and some other taxa enable accurate species identification.
- Sound Over Distance: Ideal for environments like tropical rainforests where sound travels farther than light, surpassing the limitations of visual sensors.

LIMITATIONS

- Data Gaps: Limited libraries for certain taxa, such as insects and amphibians, hinder accurate identification.
- Signal Overlap: AI models face challenges in distinguishing multiple overlapping calls or signals from different species.
- Sound Contamination: Microphones must be placed away from UAVs or other tools to avoid interference from mechanical noise.
- Taxa-Specific Bias: Bioacoustics may be less effective for species that do not produce distinct or detectable sounds.

TEAMS USING THIS TECH

BRAZILIAN TEAM	
ETH BIODIVX	
LIMELIGHT RAINFOREST	
MAP OF LIFE RAPID ASSESSMENTS	
PROVIDENCE+	
WELCOME TO THE JUNGLE	

LIDAR

LiDAR (Laser Detection and Ranging) uses laser pulses to measure distances by calculating the time it takes for light to bounce off objects and return to the sensor. This enables the creation of detailed 3D maps of environments, including forests, landscapes, and urban areas. LiDAR has a wide range of applications, from self-driving cars to monitoring environmental changes.

The finalist teams that utilized LiDAR via UAVs as part of their solution were able to generate precise 3D models of rainforest canopies, revealing structural details like tree heights, canopy density, and biomass. These models informed biodiversity assessments and helped teams estimate carbon storage in their surveyed areas.

STRENGTHS

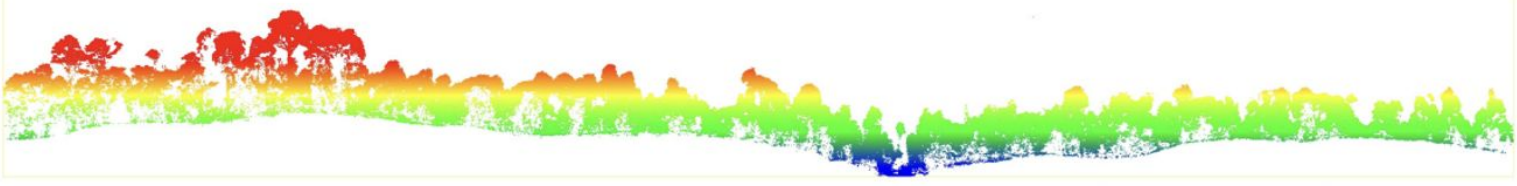
- 3D Visualization: Captures detailed three-dimensional images of forest structures, including canopy density and tree height.
- Ground Penetration: Maps forest floors through dense tree canopies to identify water sources, archaeological sites, cultural deposits, and other anthropogenic disturbances.
- Change Detection: Tracks deforestation, forest growth, and biomass changes over time.
- Carbon Insights: Collaborates with AI models to measure CO2 sequestration and support sustainable forestry management.
- Environmental Planning: Aids in identifying areas requiring maintenance or smart forestry interventions.

LIMITATIONS

- High Costs: Equipment, data processing, and operational expenses are substantial.
- Survey Intensity: Requires significant field effort for data collection and validation.
- Environmental Sensitivity: Can be less effective in highly variable weather conditions, such as heavy rain or dense fog.
- Data Overload: Generates large datasets requiring advanced processing capabilities and expertise.
- Accessibility: High precision sensors may be difficult to procure or transport to remote areas.

TEAMS USING THIS TECH

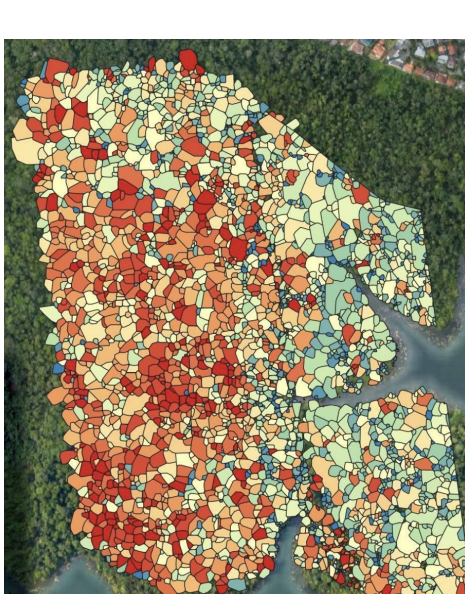
BRAZILIAN TEAM
ETH BIODIVX
LIMELIGHT RAINFOREST
MAP OF LIFE RAPID ASSESSMENTS
PROVIDENCE+
WELCOME TO THE JUNGLE



MULTI-SPECTRAL/HYPERSPECTRAL SENSORS

Multi-spectral and hyperspectral sensors capture detailed data beyond the capabilities of conventional cameras by collecting light across multiple spectral bands. Multi-spectral sensors focus on a few broad bands, such as visible and infrared light, to assess factors like plant health or water stress and produce 3D digital surface models (DSM). Hyperspectral sensors capture hundreds of narrow bands, producing unique "fingerprints" that distinguish materials, including tree species. Thermal sensors, leveraging infrared, can detect canopy-dwelling mammals, birds, and nesting sites.

Several XPRIZE Rainforest teams used hyperspectral sensors to identify tree species by analyzing their unique spectral signatures. These systems, combined with AI models, enabled teams to classify trees with unprecedented accuracy, even in dense rainforest canopies.



mated canopy Carbon content (mg/g 522 - 680)

STRENGTHS

- Enhanced Detail: Captures more data than conventional cameras, providing deeper insights into ecosystems.
- Unique Signatures: Identifies plant and tree species by detecting their distinct spectral fingerprints.
- Comprehensive Analysis: Supports plant phenotyping, enabling the detailed study of traits such as growth patterns and stress responses.

LIMITATIONS

- Environmental Sensitivity: Changes in frequencies or environmental conditions can reduce detection accuracy.
- Limited Scope: More effective for plant species identification; less effective for detecting animals or insects.
- High Costs: Equipment is expensive and often requires importing or shipping to survey locations.
- Satellite Constraints: Satellite sensors may lack the resolution needed for detailed analysis and are affected by environmental factors like cloud cover.
- Data Gaps: A lack of comprehensive data libraries limits species-level identification accuracy.

TEAMS USING THIS TECH

BRAZILIAN TEAM	■
ETH BIODIVX	
LIMELIGHT RAINFOREST	
MAP OF LIFE RAPID ASSESSMENTS	■
PROVIDENCE+	
WELCOME TO THE JUNGLE	■

NOVEL EDNA METHODS

Environmental DNA (eDNA) sampling collects trace genetic material left behind by organisms, enabling species identification without direct observation. During XPRIZE Rainforest, Finalist teams created the largest coordinated eDNA barcode library ever, combining samples from tropical rainforests and global museum, zoo, and lab collections to advance biodiversity assessments.

Innovations included portable molecular labs, novel analysis techniques, and UAV-based remote sampling to access challenging or dangerous areas. These breakthroughs adapted cutting-edge public health technology for eDNA science, setting a new standard for biodiversity monitoring in remote ecosystems.

STRENGTHS

- Species Detection: Enables accurate identification of species or taxa presence, even in challenging environments.
- Non-Invasive Monitoring: Captures data on elusive organisms that are difficult to detect with visual or bioacoustic methods.
- Dietary Insights: Analyzes gut DNA to identify consumed species, unlocking new perspectives on food webs.
- Ecotoxicology Applications: Measures the impact of pollutants and contaminants on ecosystems with precision.
- Health Monitoring: Detects pathogens, parasites, and symbionts, providing an early warning system for disease outbreaks.

LIMITATIONS

- Technical Expertise Required: Demands trained personnel with specialized technical skills.
- Time-Intensive Process: Often slower compared to other methodologies.
- Risk of Contamination: Accuracy can be compromised by sample contamination during collection or processing.
- Resource Gaps: Insufficient DNA barcode libraries hinder comprehensive species identification.
- Logistical Challenges: Exporting and importing reagents across borders can pose significant obstacles.
- Interpretation Issues: False positives/negatives can occur due to eDNA transport from outside the sampling area or persistence after an organism's death.
- Data Gaps: DNA barcodes for many species still need to be developed to realize the full potential of eDNA science.

TEAMS USING THIS TECH

BRAZILIAN TEAM
ETH BIODIVX
LIMELIGHT RAINFOREST
MAP OF LIFE RAPID ASSESSMENTS
PROVIDENCE+
WELCOME TO THE JUNGLE

RGB CAMERA/HIGH RES CAMERAS

RGB (Red, Green, Blue) cameras replicate human vision by capturing and combining the three primary colors of light to produce full-spectrum images. In biodiversity monitoring, high-resolution RGB cameras mounted on UAVs enable the creation of centimeter-precision orthomosaic maps. These maps allow researchers to delineate individual tree crowns, detect canopy gaps, monitor fallen trees, and classify plants and trees. Teams also utilized RGB cameras for opportunistic observations of vertebrates like birds and canopy-dwelling mammals.

XPRIZE Rainforest teams pushed the boundaries of RGB camera applications, combining them with advanced AI and machine learning tools. These systems analyzed ultra-high-resolution imagery to identify plant species, monitor ecosystem health, and significantly enhance the speed and scale of biodiversity surveys.

TEAMS USING THIS TECH

BRAZILIAN TEAM
ETH BIODIVX
LIMELIGHT RAINFOREST
MAP OF LIFE RAPID ASSESSMENTS
PROVIDENCE+
WELCOME TO THE JUNGLE

STRENGTHS

- Affordable and Accessible: High-quality RGB cameras are widely available, affordable, and often integrated into existing UAV systems, making them easy to deploy.
- High-Resolution Imaging: Ultra-high-resolution cameras produce detailed orthomosaic maps, supporting accurate tree and plant classification and ecological assessments.
- Data Compatibility: Extensive existing data libraries enhance AI-driven species identification, mapping, and segmentation capabilities.
- Versatile Use Cases: Effective for both large-scale environmental mapping and opportunistic observations of vertebrates like birds and mammals.
- Export-Friendly: Free from export/import restrictions, facilitating deployment in diverse regions.

LIMITATIONS

- Lighting Dependence: Performance is contingent on adequate lighting; poor light conditions can reduce image clarity and accuracy.
- Optical Variability: The quality of assessments depends on the camera's zoom and optics capabilities; higher-quality models ensure better results.
- Limited Depth Information: Unlike other sensors, RGB cameras cannot capture depth or structural data without being paired with additional technologies like LiDAR.

TRAPS (LIGHT, MALAISE, VACUUM, BAIT)

Traps, including light, malaise, vacuum, and bait traps, are essential tools for capturing insects and small animals to monitor biodiversity. Each type of trap targets organisms differently: light traps attract with bright light, malaise traps intercept flying insects, vacuum traps collect from plants, and bait traps lure species with food or scents. Traditionally, deploying these traps has been labor-intensive and time-consuming.

The finalist teams revolutionized trap deployment by using UAVs to access hard-to-reach forest layers, particularly the canopy. This innovation streamlined deployment, expanded sampling coverage, and enabled the collection of specimens from previously inaccessible areas.

STRENGTHS

- Physical Specimens: Collects specimens essential for accurate species identification and validation.
- DNA Sampling: Enables the extraction of DNA for inclusion in barcode libraries, aiding species identification.
- New Discoveries: Supports the identification of new and cryptic species, advancing taxonomic classification.
- Canopy Access: UAV-assisted deployment facilitates sampling from forest canopies, enhancing data collection in this under-studied layer.

LIMITATIONS

- Limited No-Kill Options: Ethical concerns arise with traps that do not offer no-kill alternatives.
- Variable Sample Volume: Sample size depends on the type and size of the trap used.
- Timing Sensitivity: The diversity and number of species captured can vary significantly based on the timing of deployment.
- Labor Intensive: While UAVs mitigate some challenges, traditional methods remain time-consuming and require significant effort in dense environments.
- Environmental Impact: Improper deployment can disturb sensitive habitats or non-target species.

TEAMS USING THIS TECH

BRAZILIAN TEAM	■
ETH BIODIVX	■
LIMELIGHT RAINFOREST	■
MAP OF LIFE RAPID ASSESSMENTS	
PROVIDENCE+	■
WELCOME TO THE JUNGLE	■

BRAZILIAN TEAM — 03RD PLACE

ABOUT THE TEAM

The Brazilian Team is a group of 100+ researchers from top Brazilian institutions that competed in the Xprize Rainforest to map biodiversity using robots, drones, AI, and 3D scanning for data collection and analysis in tropical forests. fealq.org.br/brazilianteam_rainforest/

THE SOLUTION

The Brazilian Team advances biodiversity research with robots, drones, and sensors for data collection from soil to treetops. Using AI, eDNA, and 3D mapping, they analyze species, carbon stocks, and ecosystem services while valuing local knowledge and promoting sustainability and social inclusion.

AREAS OF EXPERTISE

- Terrestrial robots and drones with customized accessories for sample collection
- Sample Collection and Analysis
- DNA Sequencing and Environmental Analysis (eDNA and iDNA)
- 3D Forest Mapping
- Artificial Intelligence for Biodiversity
- Data Integration: Incorporation of academic databases, citizen science, and traditional community knowledge.
- Data Analysis for sustainable bioeconomy and ecosystem services
- Respect for traditional and Indigenous communities, emphasizing ethical scientific practices
- Remote Sensing

CURRENT + PREVIOUS PROJECTS

- The team proposed the CESSABR platform to categorize Amazon species and ecosystem services, integrating knowledge for conservation and sustainable use.
- Bioflore, founded by the Brazilian Team, is an AI-driven platform for monitoring biodiversity and carbon in conserved and restored forests.
- Bioacoustics made important partnerships to monitor tropical species and advocate acoustic policies. Upcoming publications will detail these methodologies and results.

WHAT'S NEXT

The Brazilian Team is planning to use the prize earnings from XPRIZE Rainforest to set up a research and training fund geared towards conserving and restoring the Amazon and Atlantic forests, the main two forest ecosystems in Brazil.

CONTACT

BRAZILIAN TEAM

Dr. Vlnicius Souza vcsouza@usp.br +55 19 98205-0474
Dr. Carla Lopes: cmlopes82@hotmail.com +55 19 98925-1485

fealq.org.br/brazilianteam_rainforest/

ETH BIODIVX — BONUS PRIZE

ABOUT THE TEAM

ETH BioDivX is a partnership of universities, startups and individuals dedicated to addressing the environmental challenges of our time. We tackle environmental challenges, blending expertise in eDNA for biodiversity monitoring, conservation, and frontline efforts with Indigenous Peoples and communities. biodivx.org

THE SOLUTION

We collect eDNA, images, and sounds via drones, sensors, and satellites, analyzing data in real-time with AI co-designed by Indigenous communities and scientists. Insights are visualized on dashboards, creating economic incentives for local communities to empower conservation through biodiversity observation income.

AREAS OF EXPERTISE

- High-throughput robot-based eDNA sampling from vegetation, water and air
- Deployment of cameras and bioacoustic sensors in tree canopies with drones
- Satellite- and drone-based remote sensing
- High-throughput lab-based and rapid in field-based genetic analysis of specimens and environmental DNA for all branches of the tree of life

CURRENT + PREVIOUS PROJECTS

- Early detection of invasive terrestrial insects using robot-based eDNA survey
- Measure the impact of different farming practices on biodiversity using robot-based eDNA survey
- Robot-based eDNA surveys compared with conventional methods for biodiversity assessment of preserved forests in Peru in collaboration with NGO Wilderness International

WHAT'S NEXT

ETH BioDivX has established an Endowment Fund using our entire Bonus Prize of $250,000. The fund represents a commitment to long-term collaboration between Western and Indigenous science. Additionally, we are spinning off the robot-based eDNA sampling technology through the startup NAMU (https://namurobotics.ch), and commercializing the backpack lab and training program for low resource genetic analysis of environmental DNA.

CONTACT

ETH BIODIVX

Kristy Deiner: kristy.deiner@simplexDNA.com +41794764045
David Dao: david@gainforest.net +33769967953
Stefano Mintchev, smintchev@ethz.ch +41788418623

biodivx.org

LIMELIGHT RAINFOREST — 01 ST PLACE

ABOUT THE TEAM

Limelight Rainforest is based in Grand Junction, Colorado. We are a nonprofit organization specializing in the development of high speed multimodal biodiversity measurement tools. We partner with the startup companies that helped generate the winning solution for the XPRIZE Rainforest competition.
limelightrainforest.org

THE SOLUTION

The Limelight sensor platform is designed to be deployed via drone to the rainforest canopy, the most under-researched layer of the rainforest, to collect bioacoustic data, images of insects, and insect specimens that are attracted to the technology's novel light trap. The platform provides a real-time feed of data to its base technology, which rapidly identifies species using machine learning. Canopy rafts are fast, economical, and scalable. Spatial acoustic mapping of individual abundance in space and time for birds and amphibians. Canopy tree crown mapping can segment 23,000 trees in 2 hours with close up photos of 500 trees per day. eDNA sampling by drones of water, leaf surfaces and air with robotic sample contamination controls provides scalable, standardized sampling of environmental DNA.

AREAS OF EXPERTISE

- Canopy tree crown mapping using affordable RGB drones and AI
- Insect monitoring canopy and understory using camera traps, pitfall traps, and AI identifications.
- Acoustic data collection using microphone arrays to spatially map movement and abundance of individual birds, and amphibians.
- Drone delivered solutions for canopy tree samples using the "DeLeaves" tool by Outreach Robotics
- On-site, in-field eDNA/RNA sampling and analysis for species identification
- Indigenous knowledge and cultural storytelling Kichwa and Waorani of Ecuador
- Demonstrated integration of Kichwa peoples into the biomonitoring technology pipeline

CURRENT + PREVIOUS PROJECTS

- Canopy tree and liana biodiversity mapping at three major tropical research stations: Barro Colorado Island, Panama (Smithsonian Tropical Research Institute), Tiputini Biodiversity Station (Universidad San Francisco de Quito), ZF-2 (INPA), and at various reserves and community forests across Ecuador in collaboration with Selvatek, a Kichwa owned company.
- Insect Barcoding partnership with Universidade Federal do Paraná, Brazil barcoding more than 2500 insects from the Brazilian Amazon.

WHAT'S NEXT

Research and Development will continue through our Limelight Rainforest nonprofit. Successful tools will be spun out to Limelight Biodiversity (limelightbiodiversity.com), a for profit company with the mission to power conservation and local empowerment through multimodal biodiversity measurement at scale. Limelight will work with its partners that developed components of our winning solution to make those available to conservation organizations across the world.

CONTACT

LIMELIGHT RAINFOREST

Tom Walla: metawalla@gmail.com +1-970-270-3298
Niyomi House: niyomi@tracedna.us
Etienne Laliberté etienne@rubisco.ai
Harold Greeney: antpittanest@gmail.com

limelightrainforest.org | limelightbiodiversity.com

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MAP OF LIFE — 02ND PLACE

ABOUT THE TEAM

Map of Life is a Yale University-based initiative that supports effective conservation outcomes by delivering biodiversity insights for locations anywhere. By integrating standardized global metrics, innovative survey technologies, and cutting-edge informatics tools, we provide comprehensive biodiversity measurement and decision-support solutions. We are a multi-cultural, multidisciplinary team of conservation scientists, technologists, and data experts with over a decade of combined experience, passionate about advancing biodiversity conservation through innovative solutions. mol.org/rapidassessments

THE SOLUTION

Our solution utilizes a fleet of semi-autonomous UAVs to collect audio, visual, and eDNA samples from a project site, eliminating the need for direct site access. These surveys are powered by the global Map of Life biodiversity database and modeling engine, advanced machine learning and AI models, innovative eDNA processing techniques, and the decades-long expertise of our team in rainforest and biodiversity studies.

AREAS OF EXPERTISE

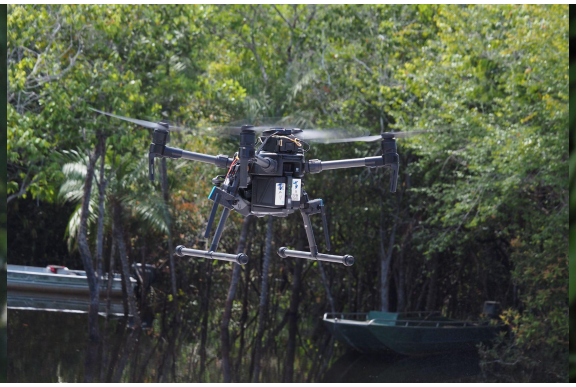
- Fine-scale prediction of biodiversity and its change
- Local to regional measurement of global biodiversity significance
- Standardized biodiversity indicators adopted by the UN Biodiversity Framework
- Autonomous UAV-supported biodiversity surveys at landscape scale
- Detailed acoustic species mapping
- UAV-driven eDNA surveys combined with rapid on site species identification

CURRENT PARTNERS

- Esri
- E.O. Wilson Biodiversity Foundation
- Sony

WHAT'S NEXT

In 2025, our focus will be on product development, scaling operational capacities, and securing key strategic partnerships to propel Map of Life, with its partners, as the leader in biodiversity-focused solutions. These initiatives represent a significant step in achieving our mission to support a thriving, biodiverse planet.


CONTACT

MAP OF LIFE

Dr. Walter Jetz: walter.jetz@yale.edu
Bourhan Yassin: byassin@gmail.com +1-832-441-4444

mol.org/rapidassessments

PROVIDENCE+ FINALIST

ABOUT THE TEAM

The Providence+ team is a binational team, which includes researchers from Spain and Brazil, from the Laboratory of Applied Bioacoustics at Technical University of Catalonia – Barcelona Tech (UPC-Spain), Mamirauá Sustainable Development Institute (Brazil) and Pompeu Fabra University. www.providenceplus.upc.edu

THE SOLUTION

Our solution monitors biodiversity in aquatic and terrestrial environments, assessing species trends, ecosystem health, forest quality, and abiotic factors. It identifies conservation priorities, human intrusion, and IPLC territories, supporting targeted and informed conservation efforts.

AREAS OF EXPERTISE

- Remote and real-time sensing
- Bioacoustics
- Image classification
- eDNA and biodiversity environment analysis
- Satellite image processing
- Ecology functionality

CURRENT + PREVIOUS PROJECTS

- Project Providence (Brazil, 2016–today): Rainforest monitoring with the Gordon and Betty Moore Foundation.
- Ear to the Wild (India, 2016–today): Mitigating elephant-human conflict with The Sense of Silence Foundation.
- Listen to the Deep-Ocean (Worldwide, 1999–today): Ocean biodiversity monitoring supported by the European Commission, Rolex, and Fondation Prince Albert II de Monaco.
- Siren Song (Belize, Vanuatu, 2021–today): Manatee and dugong conservation supported by Fondation Prince Albert II de Monaco and Fondation Lemarchand.
- Blue Boat Initiative (Chile, 2021–2023): Preventing whale collisions in Chilean Patagonia with Fundación Meri.
- Great Apes (Cameroon, 2022–2023): Population monitoring with The Sense of Silence Foundation.
- Atlas of Illegal Trafficking of Great Apes (Worldwide, 2024–2025): Global great apes monitoring with Revive & Restore.
- DiverSea (Worldwide, 2024–2027): Coastal eDNA surveys with the European Commission.
- Great Apes Genetic Assessment (Worldwide, 2024–2025): Population monitoring using genetic data with the European Commission.
- JESAC, Oxfam (Sahel, 2020–2022): Carbon stock monitoring in semi-arid areas funded by the European Commission and African Union.
- Soil Moisture Monitoring for Locust Control (Africa and Asia, 2020–today): Soil moisture mapping for FAO's locust monitoring.
- Biomass Assessment for One Acre Fund (Rwanda and Zambia, 2024): High-resolution forest monitoring using remote sensing for vegetation and forest management with Lobelia.

WHAT'S NEXT

The future technological planning for Providence+ focuses on enhancing the scalability and efficiency of our biodiversity monitoring systems. We plan to leverage the success of the Deep-Rainforest Operational Platforms (DROPs) by transforming them into autonomously flying, solar-powered drones to be deployed in aquatic and terrestrial environments.

CONTACT

PROVIDENCE+

Michel André: michel.andre@upc.edu +34 659 55 37 23

www.providenceplus.upc.edu

WELCOME TO THE JUNGLE — FINALIST

ABOUT THE TEAM

Welcome to the Jungle is a team of engineers, biologists, conservation practitioners and students from Illinois Tech, Purdue University, The Morton Arboretum, Chinese Academy of Sciences and Natural State, a conservation technology organization in Kenya. We prioritize undergraduate and graduate students training through specialized courses during the regular semester and focused internship programs. The majority of the work performed was completed by students without advanced degrees, with a large cohort of undergraduate engineering students introduced to the exciting field of conservation tech. w2j.team/

THE SOLUTION

The team focused on developing conservation strategies and affordable tools that can easily be scaled and used by non-experts. The field-ready innovations include : Development of a lightweight modular drone-based sensor platform (acoustic, camera trap, eDNA air capture trap) to tree canopy (Illinois Institute of Technology). Adaptation of medical diagnostic tools for real time biodiversity identification from EDNA and simple colorimetric single species assay with eDNA (Morton Arboretum, Chinese Academy of Sciences). Landscape level mapping of forest structure and tree crowns using drone-based LiDAR and multispectral imagery to create centimeter scale, wall-to-wall point clouds, digital surface models, and interactive tree identification protocols. (Purdue University). A dashboard for emerging nature markets, offering streamlined field data management, AI analyses and key insights presented on intuitive dashboards for investors, land stewards, and auditors. (Natural State)

AREAS OF EXPERTISE

- Autonomous robotics/ Mechatronics
- eDNA
- AI/ML analysis of bioacoustics and images
- Landscape scale geomatics, high resolution remote forest structure analysis and tree identification
- Conservation planning and strategies

CURRENT PROJECTS

- Quantifying and mapping relict populations of a threatened oak species using UAS imagery and AI analysis, Mexico
- Collaborations in Southeast Asia via BGCI (Botanical Gardens Conservation International) and local organizations such as TRCRC (Tropical Rainforest Conservation & Research Center, Malaysia) on capacity building and threatened trees conservation, and restoration projects.
- Collaboration with the Orange River Karoo Conservation Area (Namibia) to assess the impact of landscape connectivity and rewilding for improving climate resilience
- Collaboration with 4R Digital to use smartphone-based micropayments and monitoring tools to link reforestation carbon and biodiversity outcomes in Kenya to premium carbon markets.

WHAT'S NEXT

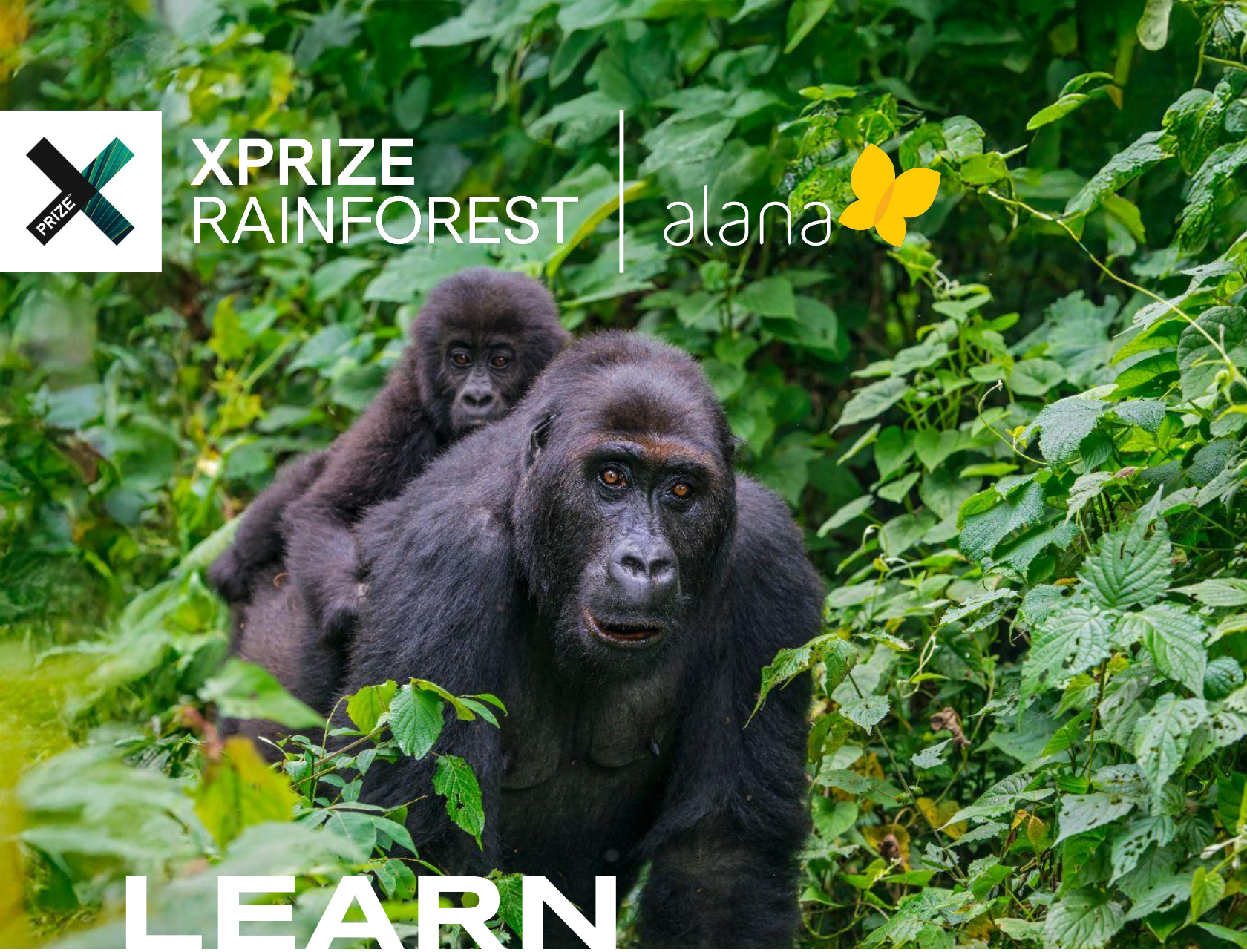
Welcome to the Jungle is working on developing autonomy for the solution in an attempt to completely remove a drone operator and also automate and optimize our placement of sub-canopy sensors.

CONTACT

WELCOME TO THE JUNGLE

Matthew Spenko: mspenko@gmail.com +1-617-510-1874
Molly Blank: mblank@naturalstate.org
Chai-Shian Kua : cscannon410@gmail.com

w2j.team/



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xprize.org/rainforest
rainforest@xprize.org

XPRIZE is a global future-positive movement of 1M+ people and rising, delivering truly radical breakthroughs to solve some of humanity's greatest challenges.