Advancing biodiversity with AI

Oct 21, 2024 | Juan Lavista Ferres, Chief Data Scientist, and Melanie Nakagawa, Chief Sustainability Officer

The health of our society is deeply intertwined with the health of our planet. While much of the global conversation around the environment focuses on the devastating impacts of climate change, it is crucial to recognize that climate and biodiversity are part of a broader ecological system. The loss and degradation of nature is both a result of and a contributor to climate disruption, as healthy ecosystems play a vital role in regulating the climate. Since 1970, global wildlife populations have plummeted by 70%. And in the last century, nearly 500 vertebrate species have been lost forever.

This week, leaders from around the world are gathering for COP16, a United Nations conference in Cali, Colombia, to drive actions to reverse this trend. COP16 will focus on advancing global efforts to implement the UN Biodiversity Plan, which highlights the critical role that companies must play in building a nature-positive world.

Microsoft is committed to helping the world drive progress on the UN Biodiversity Plan. Using our technology, investment, and voice, we work to advance the protection and restoration of

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nature. Microsoft will be participating in COP16 to share our work and learnings, participate in high-level meetings and panel discussions, and perhaps most importantly, listen, to explore what more we can do to tackle this critical challenge together.

Leveraging AI to Boost Biodiversity

At Microsoft, we believe we must use technology that matches the scale and complexity of the challenges we face. Given the vastness and complexity of Earth's ecosystems, AI is emerging as an indispensable conservation tool. AI can empower us with the speed and scale necessary to analyze and better understand Earth's biodiversity.

Technology can not only coexist with nature but help it thrive. One such example is Project Guacamaya, which combines the power of AI with satellite imagery, wildlife imagery, and acoustic data to monitor deforestation and protect biodiversity in the Amazon. Nearly five million acres of the Amazon were deforested in 2022, a 21% increase from the previous year. Thanks to Project Guacamaya, a joint effort of the CinfonIA Research Center at Universidad de los Andes, Instituto SINCHI, Instituto Humboldt, Planet Labs PBC and Microsoft AI for Good Lab, AI is helping protect this tremendous natural resource.

One aspect of Project Guacamaya involves using AI to identify bird and non-bird sounds in the Amazon. The project has so far analyzed more than 100,000 sounds and achieved over 80% reliability in species identification. Because AI offers real-time analysis, this tool allows researchers and conservationists to respond quickly and effectively to ecological shifts. As Zhongqi Miao, AI for Good Lab's lead bioacoustics research scientist,

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noted, "By converting sounds from nature into measurable data, AI helps monitor wildlife populations and track changes in ecosystems."

Building AI and Conservation Skills

It's imperative that the global workforce be prepared to address the biodiversity crisis. This means training more green talent. A LinkedIn study found that the share of green talent in 48 evaluated countries increased by a median of 12.3% between 2022 and 2023. This is promising progress, but we must increase the momentum: the same study found that only one in eight workers around the world has at least one green skill, such as those related to solar power or electric vehicles.

We also need to ensure that our green workforce can leverage technology to advance sustainability. Applying advanced AI models in real-world conservation scenarios can be challenging due to their complexity and the need for specialized knowledge. That's why researchers involved with Project Guacamaya released Pytorch Wildlife, an open-source platform available on GitHub designed for creating, modifying, and sharing powerful AI conservation models.

Pytorch Wildlife's intuitive, user-friendly interface, accessible through local installation or Hugging Face, enables users to detect and classify animals in images and videos. With an emphasis on usability and accessibility, Pytorch Wildlife can be used by individuals with limited or no technical background. It also offers a modular codebase to simplify feature expansion and further development.

Strengthening Corporate Investments in Nature

In 2020, Microsoft launched a new ecosystems and biodiversity initiative in which we pledged to protect more land than we use while leveraging our voice, tools, and investments to protect and restore ecosystems. We know that our efforts alone won't be enough to drive the pace and scale of progress needed. When it comes to advancing biodiversity and sustainability, governments, the science community, NGOs, and the private sector all have a vital role to play.

Other Microsoft efforts to boost biodiversity in Latin America include projects to restore and protect freshwater ecosystems

in São Paulo; drive wetland restoration through on-the-ground efforts, public policy advocacy, collective action, and scientific research in Chile; restore traditional wetland agriculture methods to conserve Lake Xochimilco and the Axolotl; and protect 236,000 acres in the biodiversity hotspot of Belize's Maya Forest.

Our nature-based carbon removal investments, including those with Mombak and BTG Pactual, are also aligned with our commitment to become carbon negative by 2030. Our agreement with BTG Pactual, which is the largest known carbon dioxide removal credit transaction to date, is part of BTG Pactual's $1 billion reforestation and restoration strategy in Latin America. *Parties interested in learning more should join us for a panel discussion with BTG Pactual at the Bloom 24 event in Cali, Colombia, on October 25.*

Through our $1 billion Climate Innovation Fund, we support innovative solutions that can provide scaled positive impact for people and the planet across our four sustainability pillars: carbon, water, waste, and ecosystem. The companies in our portfolio are pairing cutting-edge technologies and datasets with the latest in Internet of Things (IoT), machine learning, and cloud computing, to create data-driven solutions that enable better decision-making and action for natural ecosystems. Our recent investments include:

- Yard Stick – a soil carbon monitoring, reporting, and verification (MRV) company that has created an innovative soil carbon IoT device, paired with data analytics and insights to measure and track soil carbon at farm scale.
- Vibrant Planet – a prioritization system for land management restoration efforts.
- Farmland LP – an investment management firm that buys conventional farmland and transitions it to organic farmland, utilizing regenerative agriculture practices.

Lessons for the Future

Over the last four years, we have made progress in contributing to a nature-positive world. However, our journey has not been without challenges. There is more to do and more to learn. It can be difficult for companies to invest holistically in ecosystem health because they often lack the knowledge, tools, and incentives needed to do so. Recently, we collaborated with an

international team of experts to explore what is needed to overcome these challenges. In this whitepaper, we outline eight important lessons:

1. **Build incentives to invest in ecosystem health**: Establish mechanisms that recognize and reward companies for investing in nature-based solutions that improve ecosystem health and ensure local community benefits and stewardship.

2. **Agree on science-based standards for ecosystem health**: Civil society and companies need to collaborate with scientists to agree on corporate standards for characterizing how sustainability investments affect ecosystem health.

3. **Make science accessible and build capacity to use it**: All actors need to use the best available science to evaluate ecological and social risks, design projects that enhance ecosystem health, and assess it effectively.

4. **Accept tradeoffs and work to minimize them**: While not all sustainability benefits can be maximized at once, strategic planning can reduce negative impacts and optimize positive outcomes.

5. **Innovate to derisk investment**: Nature-based investments face risks from the variability of natural systems; better tools are needed to understand, insure, and manage these risks.

6. **Expand blended finance**: Combining public and private capital can reduce financial risks to private investors and attract more investment into nature-based solutions.

7. **Invest beyond capital**: While funding is vital, projects and startups also need strategic support, including expertise, long-term demand signals, and market access.

8. **Leverage AI for scale, speed, and reliability**: AI can help companies prioritize ecosystem health by enabling cheaper, more effective measurement, trade-off analysis, and risk management.

The challenges facing our ecosystems are substantial, but so too are the resources at our disposal. Our COP16 convening in Cali ahead of COP30 in Brazil next year will help bring much-needed global focus to this critical topic in a vibrant part of our planet – known for its unparalleled biodiversity and its important role in regulating climate patterns and safeguarding ecosystems globally. We are looking forward to continuing to

explore ways we can collectively take action and leverage technology to protect and preserve ecosystems for generations to come.

Tags: AI, AI for Earth, AI for Good, AI for Good Labs, biodiversity, Climate Innovation Fund, Environment, Environmental Sustainability, sustainability

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