Saving species through genomics in megadiverse Colombia

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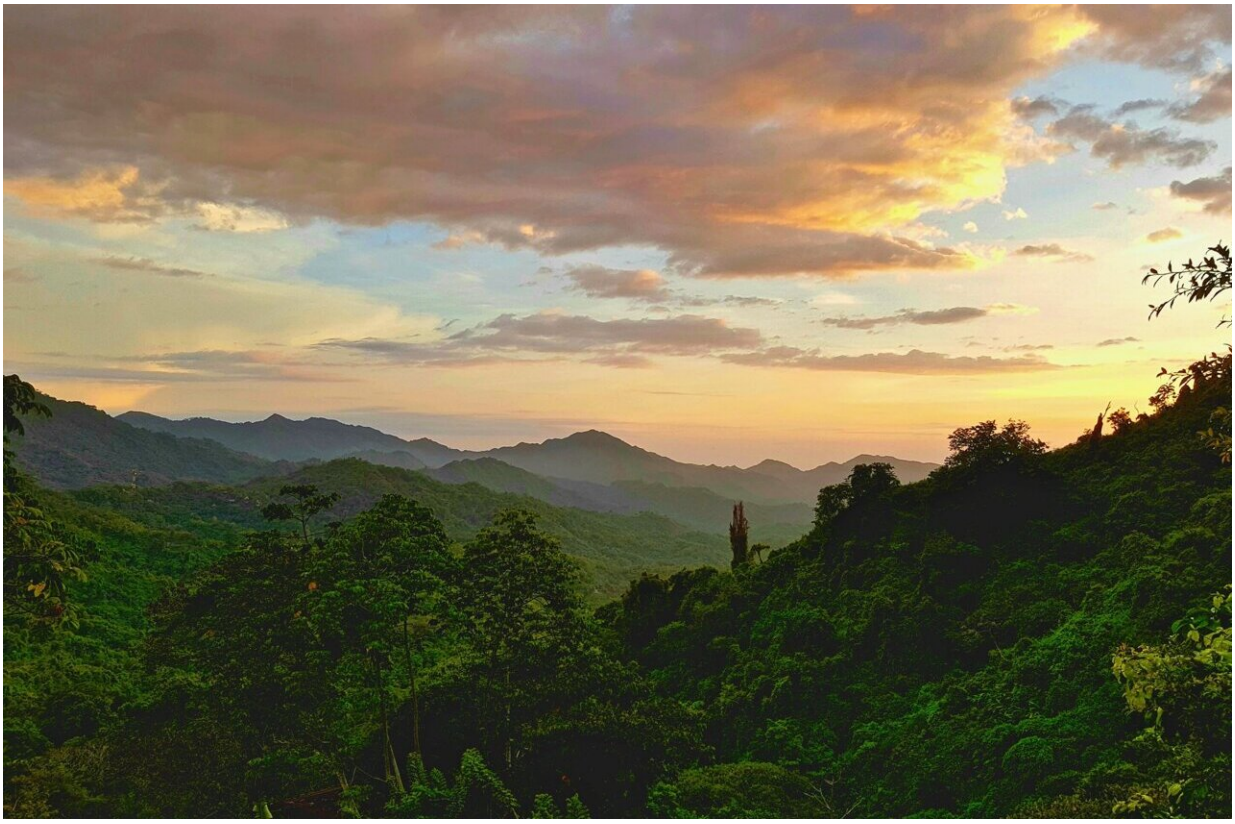

Minca, Santa Marta, Magdalena, Colombia. Credit: Unsplash/CC0 Public Domain

The world's second-most megadiverse country stands to benefit ecologically, economically and socially through membership in the Earth

Biogenome Project, according to research from the University of East Anglia (UEA).

In 2019, Colombia joined the Earth Biogenome Project (EBP), which aims to sequence the genomes of all eukaryotic (plant, animal and fungi) life on Earth. The collaboration between governments, academia and the private sector will integrate research with sustainable, environment-focused strategies to develop Colombia's post-conflict bioeconomy, while conserving its rich biological and cultural diversity.

A combination of factors has preserved Colombia's biodiversity, with much of it still inaccessible, understudied and intact. Since the 2016 Peace Agreement, however, the country has begun opening up to economic activities such as timber, mining and agriculture—in particular, cattle farming. These activities threaten Colombia's unique ecosystems and could accelerate biodiversity loss.

An international team of researchers say joining the EBP and launching a National Bioeconomy Strategy (NBS) will have a range of positive outcomes for Colombia, from preserving the country's vast biological wealth, working to alleviate inequality and poverty — and even discovering species new to science that could benefit human health.

Dr. Joseph Huddart, a Senior Research Associate in UEA's School of Biological Sciences, was lead author on the study, "EBP-Colombia and the bioeconomy: Genomics in the service of biodiversity conservation and sustainable development." The paper is published today in the *Proceedings of the National Academy of Sciences*.

Dr. Huddart said: "We are at the beginning of an exciting new era of molecular research, where technological advances mean we can potentially sequence species DNA in the field cost-effectively and in real-time.

"Through equitable, capacity-building partnerships with local institutions, this is set to both disrupt and democratize the outdated colonial model of scientific exploration where biological material is exported out of megadiverse countries like Colombia to richer countries for analysis."

Colombia's NBS is a long-term, post-conflict, bioeconomic development plan focused on evaluating, conserving, managing and sustainably using its valuable biological resources.

Prof Federica Di Palma, a Professorial Fellow in Biodiversity in UEA's School of Biological Sciences and an Honorary Professor in the Norwich Medical School, leads the EBP-Colombia consortium with Prof Silvia Restrepo at the University of Los Andes, Colombia.

Prof Di Palma said: "Colombia has enormous and internationally important untapped genomic wealth.

"By establishing a collaborative community to develop Colombia's molecular research capacity and creating a bioeconomy, we can work toward sustainable management and conservation."

The goal of the EBP is to provide a complete DNA sequence catalog of all 1.8 million named species of plants, animals and fungi as well as single-celled eukaryotes, so Colombia is well-placed to make exceptional contributions, such as further understanding its many cacao species and threatened animals including the Andean bear.

The sequencing could therefore provide the discovery of novel molecules, fibers and proteins that could have health and industrial applications, and also provide food and nutritional security.

EBP-Colombia has established a collaborative Colombian community of

stakeholders developing molecular research capacity, driving the political will for the project while also training future generations of Colombian genomicists, conservationists, technicians and other scientists.

Prof Di Palma hopes the strategies will ultimately help to alleviate poverty, inequality and conflict, and sustain peace. The plans promote innovative approaches to agriculture, tourism, recycling, medicine and more, while addressing societal, environmental and economic challenges.

Prof Di Palma said: "The NBS and the EBP can also serve as alternative models for economic development that similarly placed countries can adopt."

As of December 2021, the EBP includes 5,000 scientists and technical staff at 44 member institutions in 22 countries on every continent except Antarctica. There are 49 affiliated projects covering most of the major taxonomic groups of eukaryotes, which have access to tens of thousands of high-quality samples from museum collections and field biologists.

Earth is forecast to lose 50 percent of its biodiversity by the end of this century without action to curb climate change and protect the health of global ecosystems. Creating a digital library of DNA sequences for all known eukaryotic life can help generate effective tools for preventing biodiversity loss and pathogen spread, monitoring and protecting ecosystems, and enhancing ecosystem services.

"EBP-Colombia and the bioeconomy: Genomics in the service of biodiversity conservation and sustainable development," was published on 17 January 2022 in the *Proceedings of the National Academy of Sciences*.

More information: EBP-Colombia and the bioeconomy: Genomics in

the service of biodiversity conservation and sustainable development, *Proceedings of the National Academy of Sciences* (2022). doi.org/10.1073/pnas.2115641119