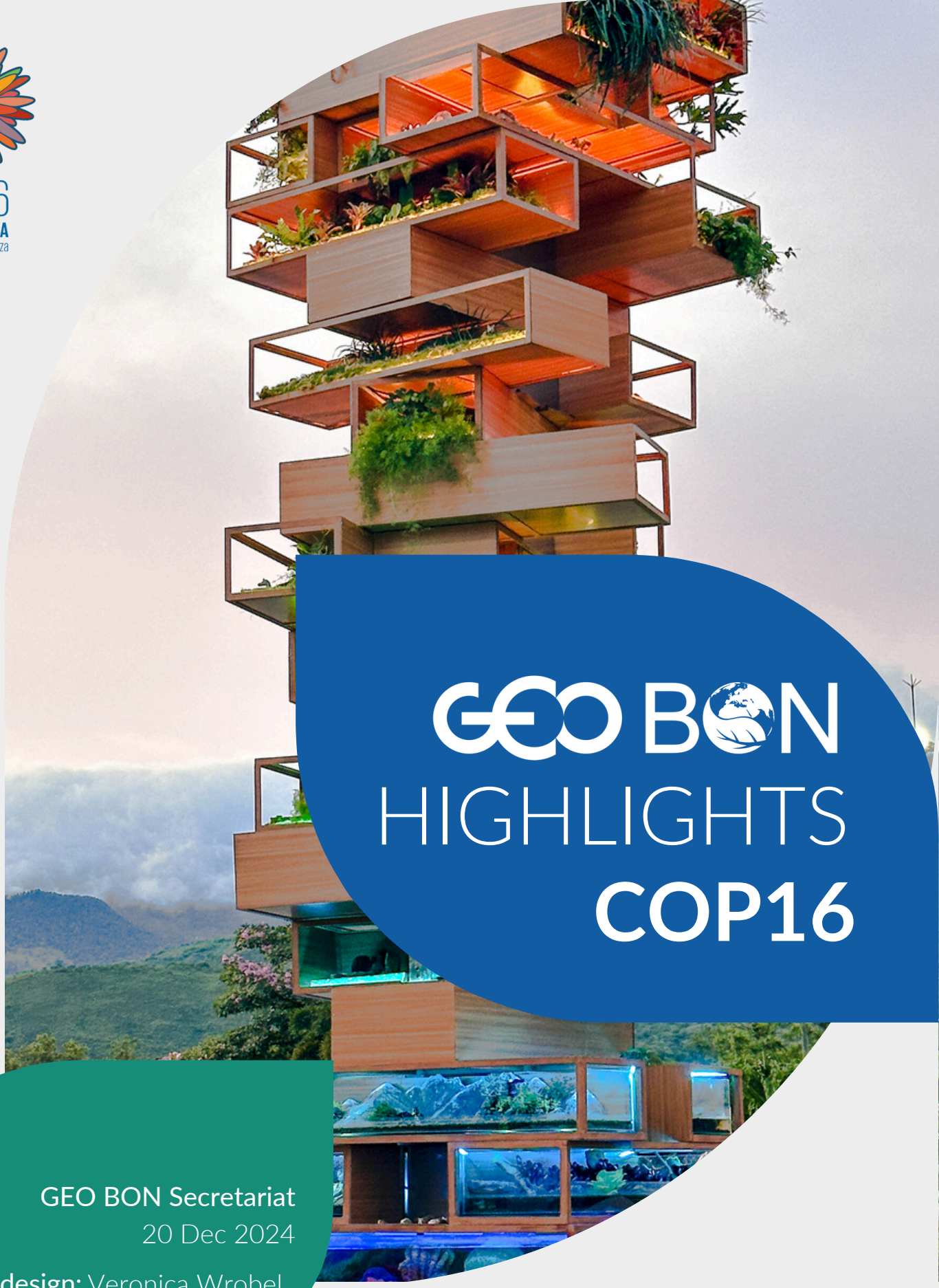
COP16 COLOMBIA
Paz con la Naturaleza



GEO BON HIGHLIGHTS COP16

GEO BON Secretariat
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GEO BON | Group on Earth Observations Biodiversity Observation Network

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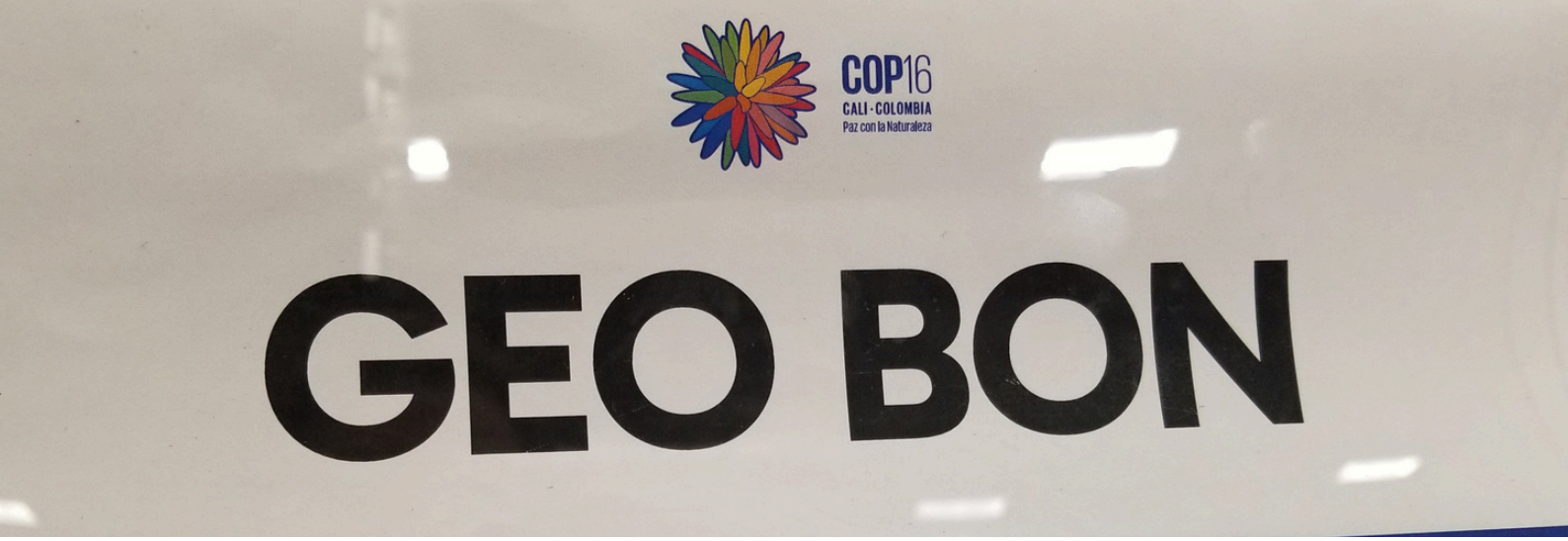


Introduction

The 16th meeting of the Conference of the Parties (COP16) to the Convention on Biological Diversity (CBD) was set to be an important moment in global efforts to address the biodiversity crisis. Building on the Kunming-Montreal Global Biodiversity Framework (KMGBF) adopted at COP15, COP16 focused on showing alignment of national biodiversity strategies and action plans with the KMGBF and implementing the targets to halt and reverse biodiversity loss by 2030.

Hosted by Cali, Colombia, from 21 October to 1 November 2024, and under the theme of "Paz con la Naturaleza" (Peace with Nature) and publically-dubbed, the People's COP, the conference brought together representatives from governments, indigenous communities, NGOs, IGOs, and the private sector to strengthen commitments, mobilize resources, share biodiversity action plans, and promote collaborative action. Key discussions were expected to revolve around financing biodiversity protection and ensuring equity in benefit-sharing, particularly around the topic of digital sequence information (DSI).

COP16 reminded the world about the interlinkages of biodiversity with climate change, pollution and land degradation, the foundational role of biodiversity to human livelihood and the importance of fairness, equity and the full participation of all of society.

For GEO BON, COP16 was an opportunity to engage with Parties and share our expertise and tools at various events. Our delegation was 18-members strong, and for the first time, GEO BON co-hosted a pavilion to reach participants from a fixed location throughout the entire conference. The pavilion served as a gathering hub to showcase our initiatives and engage with the global community on biodiversity monitoring. This document summarizes GEO BON's activities and events at COP16 and is intended for our members, partners and collaborators.

Negotiation highlights for biodiversity monitoring

Negotiations on the monitoring framework and mechanisms for planning, monitoring, reporting and review (PMRR) were handled under Working Group I of the meeting (see CBD/COP/16/2/Rev.1, item 10).

The paragraphs to be negotiated addressed the technical updates to the monitoring framework, the addition of headline indicator for Target 22, including headline indicator 22.1 on land-use change and land tenure in the traditional territories of indigenous peoples and local communities, and binary indicator for Target 5 on trade in wild species, as well as the list of binary indicator questions, and the guidance on the monitoring framework provided by the AHTEG on indicators. Parties also needed to finalize paragraphs on realizing the importance of all relevant multilateral environmental agreements, the use of the Global Ecosystem Typology when aligning national approaches to ecosystem monitoring, the financial resources provided by the Global Environment Facility, and at a time before COP17, requesting the SBSTTA to review the needs of Parties in the implementation of the monitoring framework, including by strengthening national biodiversity observing systems and connecting national systems at the regional and global levels.

Parties exchanged views during the negotiations over two weeks and several contact group meetings on these items. Parties agreed to request the Global Environment Facility to provide financial resources to contribute to the development and implementation of national biodiversity monitoring systems, including support for community-based monitoring and information systems (CBMIS).

Several brackets remained to be addressed in the final contact group. Party intervention pointed out that PMRR, financial mobilization and financial mechanism decisions constitute a package, and thus should be adopted together. Due to the interlinkages of these items and the remaining unresolved differences on PMRR, the decision was suspended. The draft decisions approved by the Working Group in the end on the monitoring framework and mechanisms for planning, monitoring, reporting and review are available as the following:

- Monitoring framework for the Kunming-Montreal Global Biodiversity Framework (CBD/COP/16/L.26)
- Mechanisms for planning, monitoring, reporting and review, including the global review of collective progress in the implementation of the Kunming-Montreal Global Biodiversity Framework to be conducted at the seventeenth and nineteenth meetings of the Conference of the Parties (CBD/COP/16/L.33)

Next steps for the monitoring framework

While unresolved items continued to be negotiated at the ministerial level, the deliberations continued late into the last hours of the conference. Delegates began leaving to catch their flights back home, and there was no quorum to finalize the conference. As a result, the meeting was suspended and several draft decisions were put on hold due to their interrelations: resource mobilization, the financial mechanism, planning, monitoring, reporting, and review, and the operational budget were not adopted.

A resumed meeting of the COP will convene in Rome, Italy from 25 to 27 February 2025 (Notification 2024-110) to consider the pending decisions.

GEO BON in the COP 16 negotiations

Members of GEO BON were present on-site during COP 16 negotiations, following discussions on the monitoring framework and indicators, digital sequence information (DSI) as well as mechanisms for planning, monitoring, reporting and review, and capacity-building and development and technical and scientific cooperation.

This COP was buzzing with activity. Even if the negotiation outcome wasn't what we were hoping for as far as the monitoring framework is concerned, it is clear that people are keen to get things done and implement the GBF. I have never seen so many people from so many backgrounds gathered in one place for biodiversity. The atmosphere was one of determination and action. We had many positive conversations and new collaborations getting started, there is a big appetite for what GEO BON has to offer in informing the monitoring of the GBF.

– Flavio Affinito, co-lead of GEO BON Ecosystem Services Working Group

Attending COP 16 was certainly useful for us all- we learned how to communicate to had the impression that GEO BON was a well recognized and appreciated partner in implementation of the Kunming Montreal GBF. I felt that many Parties and NGOs welcomed and were interested in the resources that GEO BON is providing - tools, knowledge, advice, leadership and collaboration. It was an overwhelming and exhausting conference, to be sure, but it was important and inspirational to attend, and it strengthened my confidence in GEO BON's work.

– Sean Hoban, co-lead of GEO BON Genetic Composition Working Group

This was my first COP, and it was an amazing experience to meet so many intelligent people working towards common goals and trying to figure out how we can all collaborate to meet the targets of the GBF. We were able to present BON in a Box three different times, both in a side event and in our pavilion, and it was wonderful to receive so much positive feedback and support for our mission. There is a clear need for a tool like BON in a Box, and so many people were excited to contribute and collaborate. This experience helped me to see how our work fits into the bigger picture, and how BON in a Box could actually be used to overcome some of the challenges of implementing the monitoring framework.

– Jory Griffith, BON in a Box team

This COP was different for GEO BON. We had our largest delegation representation yet and a pavilion space. The pavilion was a major success for gathering and meeting new people. Representatives from other organizations were eager to engage with us and while the biodiversity monitoring negotiations were disappointing in other rooms, the overall positive spirit for collaboration and commitment to progress was enlightening.

– Katie Millette, Executive Secretary of GEO BON

Science-Policy Forum

> *Accelerating the transfer of scientific knowledge and capacities is essential to meet the KM-GBF targets and enable timely decision-making. One of the challenges is that scientific questions and policy did not converge for a very long time. Nevertheless, this has started to change and became a clear commitment of the GEO BON community at COP16 which begins with a collaborative effort for integrating existing infrastructure to answering policy needs.*
>
> - Lina Estupinan Suarez, GEO BON member

The Science-Policy Forum - organized in parallel with the CBD Conference of the Parties - aims to strengthen the policy–science–society interface that each COP offers, and support objective and well-informed decision-making.

This year, the two-day event was jointly hosted by the Alexander von Humboldt Institute and the Smithsonian Institution on behalf of the Consortium of Scientific Partners (CSP), the International Union of Biological Sciences (IUBS), the University of Tokyo and the Secretariat of the Convention on Biological Diversity (SCBD). A suite of discussions and knowledge-sharing exchanges took place to harness the collective wisdom and expertise necessary to address the complex challenges facing the world's biodiversity and sustainable development.

The full programme and description is available online.

Sessions of interest include:

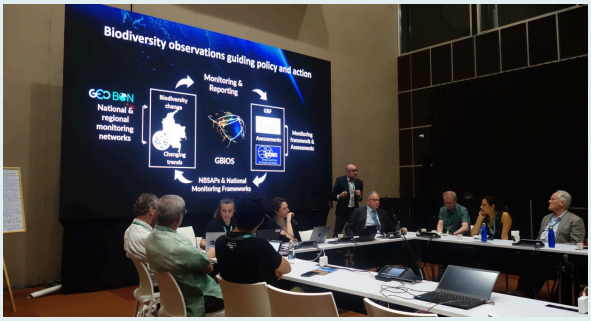
Monitoring - Advances of scientific networks for addressing gaps in the implementation of the Monitoring Framework of COP 15 Decision 15/5

- Facilitated and organized by María Cecilia Londoño - Humboldt Institute
- Joe Miller and Andrew Rodriguez - GBIF-OBIS
- Andrew Gonzalez and Andy Purvis - GEOBON
- Emily Nicholson - IUCN

Discussion panel by regions:

- Latin America: Victor Chocho, Ecuador
- Africa: Ntakadzeni Tshidada, SANBI
- Asia: Dr. Arvin C. Diezmos, Asean Center for Biodiversity
- Australia: Dr. Simon Ferrier, CSIRO

This session discussed how to improve biodiversity monitoring efforts, including through innovations and international cooperation and collaboration efforts. It aimed to promote synergies and facilitate the exchange of experiences among scientists, countries and organizations in light of the implementation of the monitoring framework.

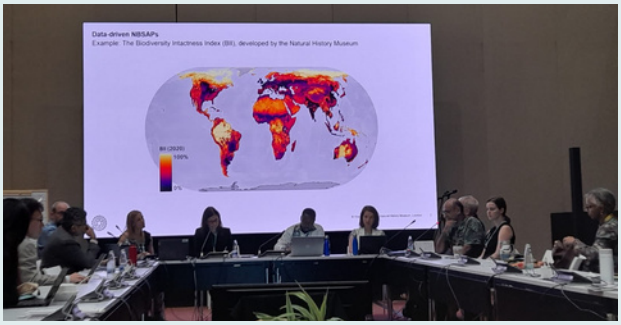


Monitoring event at Science-Policy Forum. Photos by Maria Helena Olaya

Science for NBSAPs - Integrating Science and Data for Effective NBSAPs and Community Engagement (Targets 20 and 21)

- Rebecca Johnson, Chief Scientist, Smithsonian National Museum of Natural History
- Joe Miller, Executive Director, Global Biodiversity Information Facility (GBIF)
- Mahlodi Tau, Chief Director Biodiversity Information and Policy Advice, South African National Biodiversity Institute (SANBI)
- Emma Woods, Policy Director, NMNH London
- Vainuupo Jungblut, Environmental Monitoring and Governance, SPREP
- Katie Millette, Executive Secretary, GEOBON
- Jamison Ervin, UNDP
- Omar Lopez Alfano, Science Director, Inter-American Institute for Global Change Research (IAI)

This event presented technological and data-driven approaches to applying biodiversity data and information to decision-making. It offered guidance on how Parties can mobilize biodiversity expertise in the development and enhancement of national biodiversity strategies and action plans (NBSAPs).



NBSAPs event at Science-Policy Forum. Photos by Katie Millette

Technology, AI, & data for Biodiversity (Targets 20 & 21)

- Tanya Berger-Wolf (moderator)
- María Cecilia Londoño (GEO BON co-Chair, Humboldt Institute, Colombia)
- Joshua Tewksbury (Smithsonian Tropical Research Institute)
- Sara Beery (MIT)
- Millie Chapman (ETH Europe)
- Lis Nelis (Ramboll, ESA)
- Andrew Gonzalez (GEO BON co-Chair, co-Chair IPBES Monitoring Assessment, Director Quebec Centre for Biodiversity Science, McGill University)

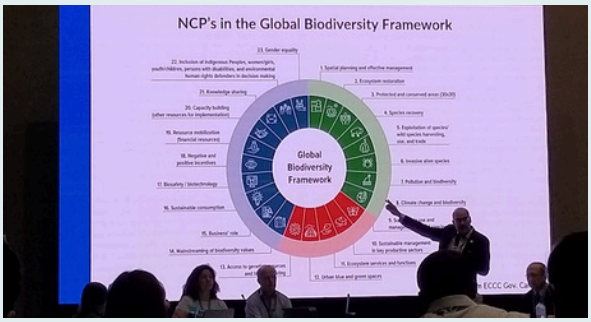
This event synthesized the current state of technology and AI applications within biodiversity science. Speakers discussed the readiness of AI for the application of biodiversity monitoring, the potential impact of the technology in practice and challenges to be overcome as well as introduced on biodiversity.

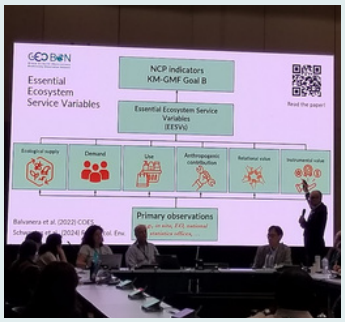

AI event at Science-Policy Forum. Photos by Maria Helena Olaya

Sustainability and NCP in the GBF: accounting for value systems

- Andrew Gonzalez, GEO BON, McGill University. Essential Ecosystem Service Variables and examples of that approach applied to monitor NCPs.
- Suneetha Subramanian (UNU) Diverse values of nature for sustainability
- Joanna Smallwood (University of Sussex) Can the global framework on biodiversity truly deliver on respecting nature' intrinsic value?
- Osamu Saito, the University of Tokyo/Institute for Global Environmental Strategies (IGES). Valuation of nature & NCP by an integrated assessment model linking biodiversity and socio-economic drivers
- Alexandra Marques PBL Netherlands Environmental Assessment Agency.
- Mr. Wataru Suzuki, Director, Biodiversity Strategy Office, Ministry of the Environment, Japan (MOEJ)

This session explored several aspects of nature's contributions to people (NCP) and the diverse value systems we use to evaluable them. The role that essential ecosystem service variables can play in monitoring NCPs was presented and discussed.





NCP event at Science-Policy Forum. Photos by Katie Millette

BON in a Box

The BON in a Box team gave a series of presentations to showcase BON in a Box at COP16. They received a lot of positive feedback, which highlighted the need for a tool like BON in a Box to assist with biodiversity monitoring and reporting. The team also had a number of discussions with potential collaborators and people interested in contributing, from which we drew many ideas for future developments.

Event highlights:

The BON in a Box team presented at three different events. The first was an official CBD side event, which provided an overview of BON in a Box with short but diverse presentations from contributors and users: Sean Hoban from the Genetic Composition Working Group gave a presentation of the Ne > 500 pipeline that uses satellite data to estimate Ne; Lina Sánchez Clavijo presented how Humboldt uses BON in a Box within their organization; and Aboubacar Samoura from the Guinean office of national parks and wildlife preserves presented Guinea's efforts towards 2030 objectives and how BON in a Box will help consolidate these efforts through indicator tracking and reporting. This event was offered with live language translation to English, Spanish, French and Chinese with funding provided by Cardiff University. The side event recording is available online.

BiaB official CBD side event. Top left to right: **Jory Griffith**, **Jean-Michel Lord**, **Sean Hoban**, **Lina M. Sánchez**. Bottom left to right: **Aboubacar Samoura** and audience view (photos by Veronica Wrobel).

The BON in a Box team gave a similar presentation in the GEO BON pavilion with a slightly different speaker lineup, including Andy Purvis from the Natural History Museum who talked about the Biodiversity Intactness Index pipeline that was recently added to BON in a Box, and Alicia Mastretta-Yanes for the Genetic Composition Working Group. The team followed up with a technical presentation in the pavilion that was aimed at potential contributors. It outlined how BON in a Box works and explained the steps for adapting an analysis workflow to a pipeline in the tool. The team received many questions and helpful suggestions that will greatly improve the tool.

BiaB event at the Pavilion. Top left: **Jory Griffith**, top right: **Andy Purvis**. Bottom left: **Alicia Mastretta-Yanes**, bottom right: **Victor J Rincón-Parra** (photos by Veronica Wrobel).

New partnerships and collaborations:

The BON in a Box team was able to expand their collaborative network during COP16 with initiatives and organizations working on related topics in order to assist with the accessibility of tools for indicator calculation. The BON in a Box team also discussed creating pipeline standards with the Biodiversity Building Blocks for Policy (B-cubed) group. The team also brainstormed with GBIF about using species occurrence cubes in indicator pipelines to showcase a full data to pipeline standard for the 2025 Living Data Conference, as well as potential engagement with GBIF nodes to provide BON in a Box training.

BON in a Box formalized working agreements with Guinea to assist with the planning of protected areas and reporting to the GBF, and with the Alberta Biodiversity Monitoring Institute (ABMI) to develop indicator pipelines in a Canadian context and beyond. The signature with Guinea confirms GEO BON's vocation to offer support to organizations wishing to report on their impact on biodiversity, and will serve as an example for future collaborations.

Signature event: Left photo (from left to right): **Andrew Gonzalez** (GEO BON), **Aboubacar Samoura** (OGPNRF), **Jérôme Dupras** (Habitat). Right photo (from left to right): **Magali Delomier** (UPA), **Seydou Bari Sidibe** (Ministry of Environment and Sustainable Development of Guinea), **Aboubacar Samoura** (OGPNRF), **Andrew Gonzalez** (GEO BON), **Jérôme Dupras** (Habitat). Photos by Veronica Wrobel.

Next steps and priorities:

To build on the progress made at COP16, GEO BON will prioritize expanding technical support and capacity-building, particularly in countries such as Guinea, Congo, Peru, and Madagascar, where interest in BiaB applications was evident. Efforts will also focus on piloting restoration tools in collaboration with platforms like Restor and UNBL, refining shared data infrastructures with Yale and GBIF, and fostering more direct engagement with country delegates to align tools with national reporting needs. COP16 reaffirmed GEO BON's pivotal role in biodiversity monitoring and laid a strong foundation for future collaborations and innovations.

GEO BON's Pavilion

For the first time, GEO BON hosted a shared pavilion together with GEO, Ai2 and Esri under the theme "From Genes to Ecosystems". This theme integrated a wide spectrum of biodiversity observation approaches, from satellite imagery to community-based monitoring, addressing the critical need for data and knowledge across scales.

The pavilion was a significant milestone for GEO BON, serving as a vital hub to showcase our initiatives and engage with the global community on biodiversity monitoring. It provided a dedicated space for hosting our partners, allowing for meaningful discussions around collaborative projects and shared goals. This interaction was crucial not only for raising awareness of our work but also for fostering relationships with key stakeholders, policymakers, and researchers.

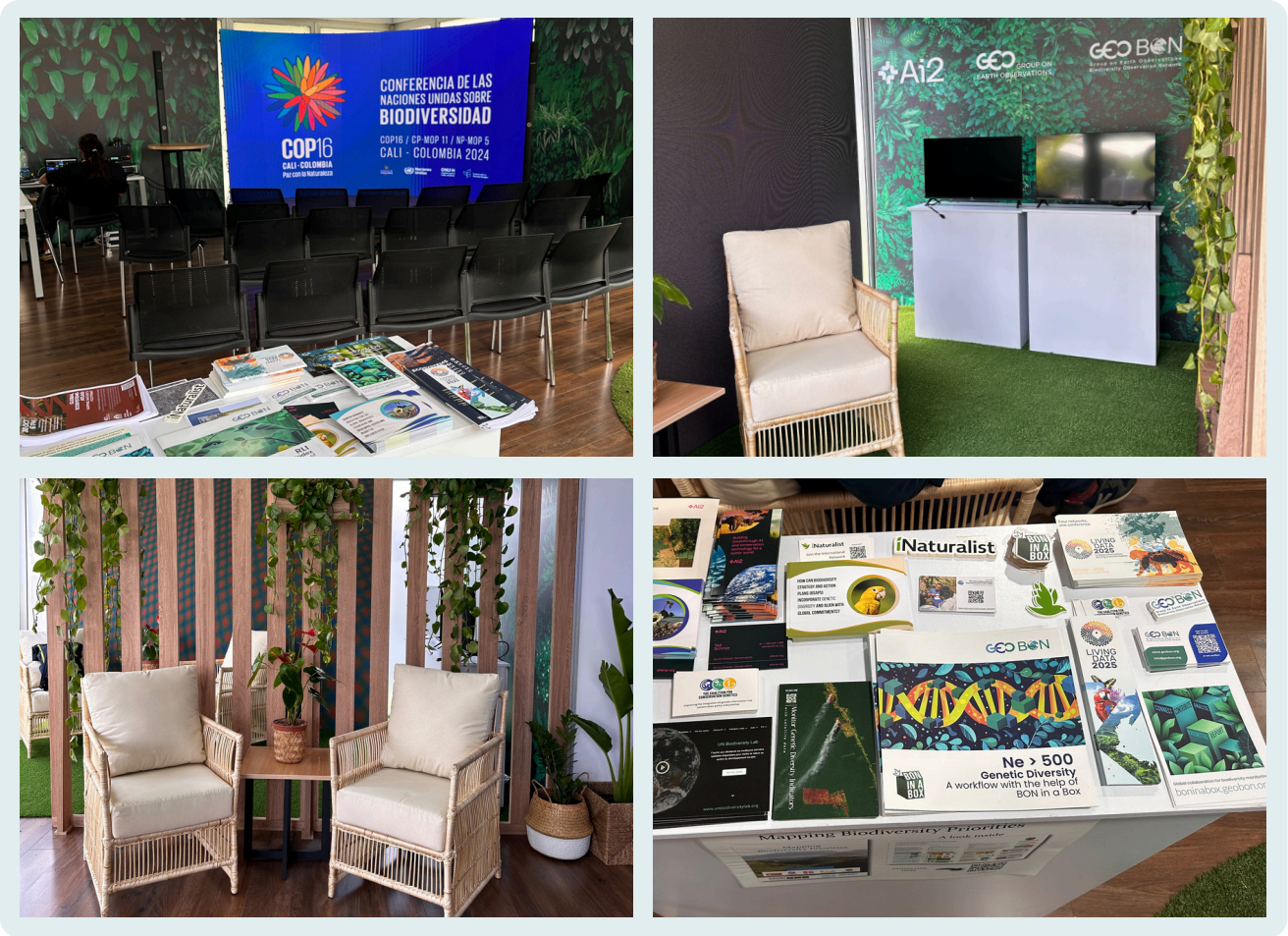
Ai2 | GEO BON | GEO Pavilion at COP16

The full pavilion programme consisted of 50 events across 10 days, including presentations, panel discussions and interactive workshops. By presenting our projects, we highlighted how GEO BON operates, the importance of biodiversity and Earth observation data for informed policy, as well as how tools like BON in a Box support biodiversity conservation and decision-making.

We connected with international audiences and showcased how data-driven approaches can support effective conservation strategies, thereby reinforcing our position as a trusted organization for biodiversity monitoring. This engagement was essential in allowing us to gather insights and feedback, which will guide developments on ongoing projects and start new ones.

The welcoming space the pavilion provided was a respite for COP16 participants and quickly became our meeting hub to speak with leading experts and organizations in biodiversity monitoring. Overall, this sort of presence underscored the importance of collaboration in addressing the biodiversity crisis and highlighted our commitment to advancing monitoring practices worldwide.

Thank you to our pavilion funders Ai2, Esri, GEO, the Government of Switzerland, and Maxar.



Ai2 | GEO BON | GEO Pavilion at COP16

Engagement during pavilion events

Updates on the indicator for Target 21.1 on biodiversity information and knowledge

Target 21 should ensure that the best available data, information and knowledge are accessible for the public and decision makers to guide effective and equitable governance, as well as strengthen communication, education, monitoring and knowledge management of biodiversity. This event discussed developments on the indicator for Target 21 on biodiversity information and sought to engage with stakeholders to develop and fill gaps in this indicator.

Andy Gonzalez provided an overview of indicator 21.1, its development status and availability of its revised metadata (CBD/COP/16/INF/3/Rev.1). Tim Hirsch provided remarks on this indicator from the perspective of a chaperone of the AHTEG on indicators, while Andrew Rodrigues described GBIF approaches to addressing the biodiversity data gaps and biases for the indicator. Simor Ferrier demonstrated how survey gap analysis can be applied to determine whether existing biodiversity surveys are sampling the diversity of environments and geographic space to support biodiversity data collection and develop monitoring schemes. Emily Nicholson presented ecosystem-level data and information available from the IUCN Red List of Ecosystems, highlighting the need for maps of change in extent of ecosystems, change in integrity, as well as threat status and nature's contributions to people and ecosystem services. Walter Jetz provided an overview of the Species Status Information Index (SSII) and newly available resources for mapping the status of species protection (Species Protection Index; SPI Report 2024). Joji Carino provided developments in the community-based metric for this indicator, including updates from the indigenous community following consultations on the biodiversity module of the Indigenous Navigator tool and progress on the development of Indigenous Peoples Biodiversity Strategies and Action Plans.

Side event. Top: **Andrew Gonzalez**, **Tim Hirsh**, Bottom: **Emily Nicholson**, **Walter Jetz**

Side event. Top: **Andrew Rodrigues**, **Simon Ferrier**. Bottom: **Joji Carino**, audience

From monitoring to transformative action on inland water ecosystems: Why are local communities critical?

Freshwater BON organized an event in the GEO BON Pavilion at COP16 to discuss the participation of Indigenous and Local Communities in biodiversity monitoring, assessment, and reporting for inland waters. The event featured a panel discussion and round-table audience discussion. Panelists shared their experiences from involvement in Indigenous and Local Community monitoring of freshwater biodiversity in North and South America, Africa, and Asia. Discussions centered around how we can ensure action is taken to intensify the role of the local community in monitoring inland water biodiversity, mobilizing data, and supporting indicator and reporting requirements for adaptive management and restoration of freshwater ecosystems. There was also a focus on the need for community engagement, training, and knowledge exchange through improved communication. The event was well attended and sparked conversations about meaningful engagement and community-led solutions to support freshwater biodiversity action.

FWBON side event. Bottom left picture of panelists: **Clara Baringo Fonseca** (Brazilian Biodiversity Information System -node of GBIF), **Britta Hackenberg** (Freshwater and Fisheires Program - Namibia Nature Foundation), **Josiel Juruna** (Associação yudjá miratu Volta grande do Xingu), **Angélica Batista-Morales** (FWBON), **Jessica Judith Grefa** (Piatua Resiste), **Denielle Perry** (Network of Participatory Community-based Water Monitoring), **Peter McIntyre** (Natural Resources and the Environment at Cornell University)

A Global Biodiversity Observing System (GBiOS) connecting national and regional monitoring

GEO BON and its partner institutions have proposed the establishment of a global biodiversity observing system (GBiOS). GBiOS would interlink and federate existing capacities and organizations to monitor what, where and why biodiversity is changing. The network would progressively grow to help realize the targets and goals of the KMGBF. National biodiversity observation networks (BONs) are proposed as key units that would make up GBiOS, with regional and thematic BONs (e.g., on freshwater, soils or marine systems) playing key roles to integrate across scales. Earth observations, including the application of Satellite Remote Sensing (SRS), across the various dimensions of biodiversity are necessary to fill data gaps and inform national observation networks. Tools like the EBV data ecosystem and BON in a Box are designed to enhance collaboration among stakeholders and foster the strengthening of institutional linkages that are critical to achieving the KMGBF.

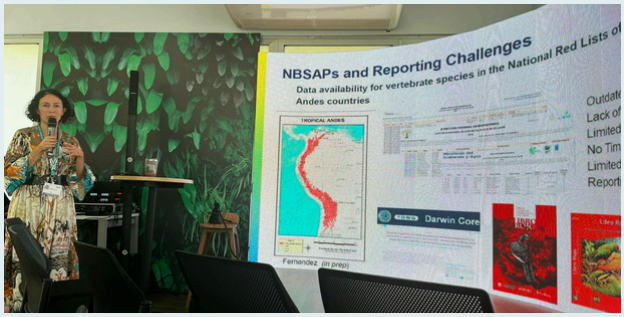
This event had opening remarks by Jillian Campbell (SCBD), an introduction of BONs and the benefits to participating countries by Andy Gonzalez, followed by an overview of BON design and development by Mike Gill, a description of Asia-Pacific BON and the role of regional BONs by Alice Hughes, the integration of Earth observation and satellite observation by Marc Paganini, a description of the EBV portal and data ecosystem by Lina Estupinan Suarez, and the role of BON in a Box in harmonizing all these efforts in support of GBiOS by Helena Olaya.

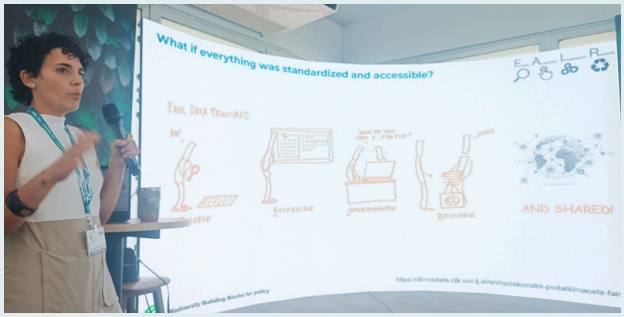
GBiOS side event. Top left to right: **Andrew Gonzalez**, **Mike Gill**, **Lina Estupinan Suarez**. Bottom left to right: **Alice Hughes**, **Marc Paganini**, **Helena Olaya**.

Advancing NBSAP reporting using GEO BON's EBV Data Ecosystem: live demonstration and training

As the global community advances towards the ambitious targets set by the Kunming-Montreal Global Biodiversity Framework (KMGBF), the need for robust, accessible, and reliable data becomes more critical than ever. National Biodiversity Strategies and Action Plans (NBSAPs) are vital components in tracking and reporting on these targets. However, many countries often face significant challenges in obtaining and utilizing the necessary data, particularly in relation to species occurrence, which is a key dimension of biodiversity.

This GEO BON-hosted session introduced a comprehensive ecosystem of interlinked tools designed to streamline and enhance data processes for NBSAP reporting. Yanina Sica and Lina Estupinan Suarez presented a virtuous cycle of Findable, Accessible, Interoperable and Reproducible (FAIR) information and knowledge that flows from primary data (e.g. species observations), through harmonised spatial biodiversity data (Essential Biodiversity Variables or EBVs), to indicators of biodiversity status (such as headline indicators). Built upon the concept of EBVs and supported by B-Cubed, NaturaConnect, and TDWG, these tools offer a transformative approach to biodiversity data sharing, access, management, standardization, and visualization. This approach makes calculating indicators and reporting progress at the national level more efficient and effective.





EBV Data Ecosystem event. Top right: **Lina Estupinan** Suarez. Bottom right: **Yanina Sica**.

Key features of this ecosystem include:

- Mobilization and availability of biodiversity primary data using well-developed and widely accepted data standards such as Darwin Core and Humboldt Extension.
- EBV Data Portal as the central repository for EBV-related data and metadata, offering a unified platform for data storage, access, and dissemination.
- Integration with the Global Biodiversity Information Facility (GBIF) API for data access, data integration, and creation of species occurrence cubes using software developed by B-Cubed.
- A powerful R package designed for the creation and manipulation of EBV Data Cubes, providing advanced analytical capabilities to support biodiversity assessments.
- A Shiny app that allows users to explore and manage species taxonomy efficiently, enhancing data accuracy and usability.
- A specialized QGIS plug-in that facilitates the visualization of biodiversity data, allowing for insightful spatial analyses and reporting.
- A user-friendly interface to calculate biodiversity indicators from Data cubes.
- A comprehensive policy brief that equips decision-makers with insight into the use of the ecosystem tools following FAIR principle.

During this session, participants became familiar with different frameworks and tools to standardize their primary data and metadata and engaged in hands-on training focused on the availability and use of species occurrence cubes related to species listed on both regional and national red lists. Particular emphasis was placed on birds, amphibians, reptiles, and mammals within the Tropical Andes—a globally recognized biodiversity hotspot.

This event supported biodiversity technicians, researchers, and policymakers by providing tools and knowledge to overcome data challenges and meet the GBF targets effectively. By leveraging these innovative bioinformatics solutions, countries were better equipped to contribute to global biodiversity goals and ensure the sustainable management of their natural resources.

Genetic diversity goal, target, and indicators – including update on ongoing application of genetic diversity indicators

A number of GEO BON GCWG members, also representing the Coalition for Conservation Genetics, attended the 16th meeting of the Conference of the Parties to the Convention on Biological Diversity: Roberta Gargiulo, Alicia Mastretta-Yanes, Isa Rita-Russo, Catherine Grueber, Cristiano Vernesi, Chris Funk, Sean Hoban, Victor J Rincon-Parra, Katie Millette, Moiselle Exposito-Alonso, and Alice Hughes.

The main goal was to help Parties to the CBD, as well as representatives of NGOs, business, finance, academia, and indigenous groups to understand the importance of genetic diversity, and the different ways to measure and report genetic diversity. These attendees were supported by more than 20 other colleagues who helped prepare outreach materials, plan logistics, network, and secure funding.

We are grateful to Cardiff University, Stockholm University and University of Zurich for providing funding. We are also grateful to colleagues and organizations who allowed us to join the events noted below, including GEO BON, PlantLife, Royal Botanic Gardens Kew, the IUCN GBF Task Force, BGCI, and the European Union project COOP4CBD.

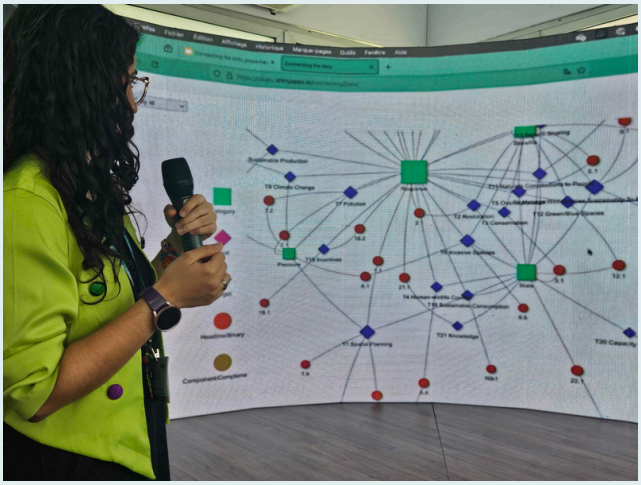
Genetic Composition WG booth. From left to right: **Cristiano Vernesi**, **Chris Funk**, **Alicia Mastretta-Yanes**, **Sean Hoban**, **Isa-Rita Russo**, **Catherine Grueber**, **Roberta Gargiulo**, **Victor J Rincon-Parra** and **Moi Exposito-Alonso**

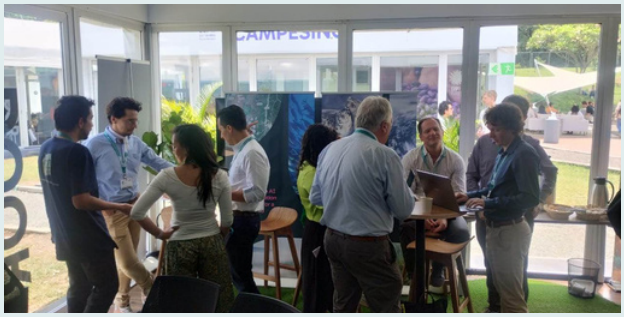
The team presented at a number of events on topics such as: BON in a Box as a tool for calculating genetic indicators, the genetic elements in the Global Strategy for Plant Conservation, the species action and population elements of Target 4, ex situ conservation, the Coalition for Conservation Genetics, tips for how scientists can support policy, NBSAPs, and calculation of genetic indicators in multiple countries.

They hosted a booth as well. Several hundred visitors came by the booth, from all sectors (business, NGO, IGO, IPLC, Youth, Parties, the CBD Secretariat, media), and we were continuously busy. Materials at the booth included policy briefs in three languages and postcards on indicators and NBSAPs, bookmarks, stickers, BON in a Box literature, and more. Several team members were interviewed (one interview is available HERE).

Connecting the dots: Bringing together scientists, policymakers and practitioners to better implement biodiversity indicators

The Computational Ecology Research Group (Université de Montréal) held a discussion event involving GEO BON members and stakeholders. We presented a network visualization tool designed to highlight connections between goals, targets, and indicators within the Global Biodiversity Framework. With input from the participants, we classified headline and binary indicators into categories following the Response-Pressure-State-Benefits Framework, highlighting conceptual overlaps and gaps in what is being monitored. We further discussed how primary data used as inputs for indicators should be added to best represent the GBF as a network of connected elements. The results of our discussions will soon be presented in a manuscript.

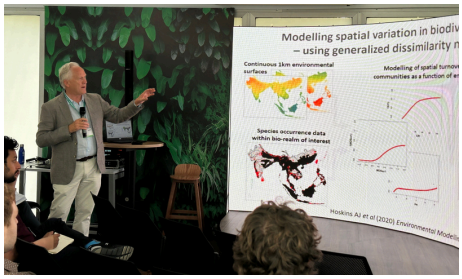




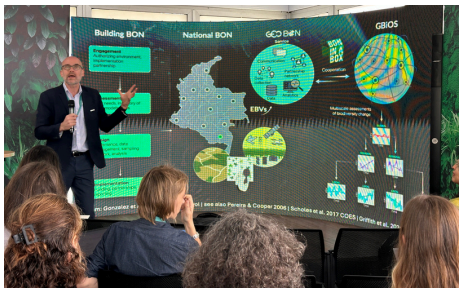
Connecting the dots event. Top left: **Maria Isabel Arce Plata**. Other photos: workshop participants..

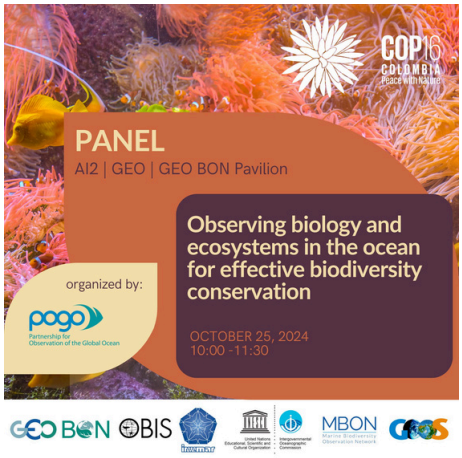
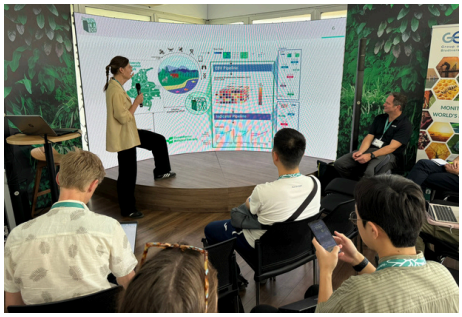
Full summary of the events at the GEO BON Pavilion

Date	Title	Key Messages	Media
21 OCT 2024	**Updates on the indicator for Target 21.1 on biodiversity information and knowledge.** Speakers: Andrew Gonzalez, Tim Hirsch, Andrew Rodrigues, Simon Ferrier, Emily Nicholson, Walter Jetz, Joji Carino	This event discussed developments on the indicator for target 21.1 on biodiversity information and knowledge. It engaged with partners on this indicator to develop and fill gaps.	 GEO BON co-chair **Andrew Gonzalez** (photo by Veronica Wrobel)
21 OCT 2024	**Advancing NBSAP reporting using GEO BON's EBV Data Ecosystem: live demonstration and training** Speakers: Lina M. Estupinan-Suarez, Yanina Sica	This session introduced a comprehensive ecosystem of interlinked tools designed to streamline and enhance data processes for NBSAP reporting. It presented a virtuous cycle of Findable, Accessible, Interoperable and Reproducible (FAIR) information and knowledge that flows from primary data (e.g. species observations), through harmonized spatial biodiversity data (Essential Biodiversity Variables or EBVs), to indicators of biodiversity status (such as headline indicators). Built upon the concept of EBVs and supported by B-Cubed, NaturaConnect, and TDWG, these tools offer a transformative approach to biodiversity data sharing, access, management, standardization, and visualization.	 flyer (by Veronica Wrobel)

Date	Title	Key Messages	Media
22 OCT 2024	**Centering biodiversity in United States policy and international partnerships** Organizer: Emmett Duffy Speakers: Elizabeth McLanahan, Emma Heslop, Tessa Francis, Francisco Chavez	This panel provided an overview of the United States' new policies and actions focused on prioritizing biodiversity in management and conservation. It explored strategies for implementing these policies through cross-sector and international collaboration. Panelists from diverse sectors and communities discussed how the U.S. is fostering co-designed, concrete actions for a nature-positive future. The session emphasized aligning social and economic policies with the sustainable management and protection of ecosystems, aiming to support biodiversity and the ecosystems that sustain life, with a focus on the collective efforts of communities across the country.	 from left: **Emmett Duffy** (Smithsonian Institution), **Elizabeth McLanahan** (NOAA), **Emma Heslop** (UNESCO), **Tessa Francis** (US Global Change Research Program), **Francisco Chavez** (Monterey Bay Aquarium Research Institute, Marine BON & Ocean Biomolecular Observing Network) (photo by Veronica Wrobel)
22 OCT 2024	**CSIRO component indicators: planning and monitoring achievement of GBF goals and targets through integration of multiple remotely-sensed and ground-based data.** Speaker: Simon Ferrier	This presentation outlined how the three CSIRO-developed indices included as component indicators in the GBF monitoring framework "the Biodiversity Habitat Index (BHI), the Bioclimatic Ecosystem Resilience Index (BERI), and Protected Area Representativeness & Connectedness Index (PARC)" can contribute to planning and monitoring achievement of GBF Goal A, and Targets 1, 2, 3 and 8, by integrating multiple sources of remotely-sensed and ground-based data.	 **Simon Ferrier** (CSIRO) (photo by Veronica Wrobel)

Date	Title	Key Messages	Media
22 OCT 2024	**Putting biodiversity-inclusive spatial planning on the map: how spatial intelligence is being harnessed to operationalize Target 1 in national contexts** Speakers: Annie Virnig, Jamal Annagylyjova, Minister Zahor el Kharousy, Mahlodi Tau, Hermenegildo Matimele, Susana Rodriguez-Buritica, Melissa de Kock	This side event highlighted tools and approaches for achieving Target 1, which focuses on reducing biodiversity loss and expanding effective management through integrated spatial planning. Four spatial planning solutions used in diverse national contexts and new guidances from DEFRA, FAO, and IUCN were presented. The event fostered peer exchange and showcased resources to help Parties meet Target 1 and related goals of the Global Biodiversity Framework.	 (photo by Veronica Wrobel)
23 OCT 2024	**Species-focused indicators and decision-support with Map of Life and the Half-Earth Project Map** Speakers: Claire Hoffmann, Alex Killion, Walter Jetz	This session explored the Map of Life (MOL) and the Half-Earth Project Map (HEPM), global resources that track species distributions and changes. These platforms provide species-specific biodiversity insights and support monitoring and planning at various scales. Attendees explored MOL and HEPM tools, data, and use cases, focusing on three GBF indicators: Species Protection Index (SPI), Species Information Index (SII), and Species Habitat Index (SHI), for assessment, reporting, and decision support.	 flyer (by Veronica Wrobel)
23 OCT 2024	**From monitoring to transformative action on inland water ecosystems: why are local communities critical?** Speakers: Clara Baringo Fonseca, Britta Hackenberg, Josiel Juruna, Angélica Batista-Morales, Jessica Judith Grefa, Denielle Perry, Peter McIntyre	This event focused on enhancing local community involvement in monitoring freshwater biodiversity, mobilizing data, and supporting adaptive management and restoration. It featured discussions on community engagement, training, and knowledge exchange, with panelists from the CAMPCA Network, the Freshwater Challenge, government, NGOs, academia, and local communities.	 flyer (by Angélica Batista-Morales)

Date	Title	Key Messages	Media
23 OCT 2024	**BON in Box as a tool for implementation and reporting on the monitoring framework** Speakers: Jory Griffith, Jean-Michel Lord, Andy Purvis, Alicia Mastretta-Yanes, Victor J Rincón-Parra	This event presented use cases of BON in a Box, a publicly available, interoperable, open-source tool developed by GEO BON that can support the implementation of the Kunming-Montreal Global Biodiversity Framework. BON in a Box aims to help governments and organizations to calculate essential biodiversity variables and indicators to monitor biodiversity change and assess progress towards Kunming-Montreal Global Biodiversity Framework targets.	 **Jory Griffith** and **Jean-Michel Lord** presenting (photo by Veronica Wrobel)
24 OCT 2024	**GBiOS connecting national and regional monitoring** Speakers: Andrew Gonzalez, Mike Gill, Alice Hughes, Marc Paganini, Lina M. Estupinan	GEO BON and its partners proposed establishing a global biodiversity observing system (GBiOS) to interlink existing capacities and organizations monitoring biodiversity changes. National biodiversity observation networks (BONs) would serve as key units within GBiOS, similar to national weather agencies in climate networks. Regional and thematic BONs (e.g., freshwater, soils, marine) would integrate data across scales, supporting the achievement of KMGBF targets and goals.	 GEO BON co-chair **Andrew Gonzalez** (photo by Veronica Wrobel)
24 OCT 2024	**Connecting the dots: Bringing together scientists, policymakers and practitioners to better implement biodiversity indicators** Speakers: Maria Isabel Arce Plata, Gabriel Dansereau, Cristian Cruz, Francis Banville, Timothee Poisot	The Computational Ecology Research Group (Université de Montréal) hosted a discussion with GEO BON members, presenting a network visualization tool for the GBF's goals, targets, and indicators. Participants classified indicators using the Response-Pressure-State-Benefits Framework, identifying overlaps and gaps, and discussed how primary data should represent the GBF's connected elements. Results will be shared in an upcoming manuscript.	 flyer (by Veronica Wrobel)

Date	Title	Key Messages	Media
25 OCT 2024	**Partnership for Observation of the Global Ocean (POGO) Observing biology and ecosystems in the ocean for effective biodiversity conservation** Speakers: Sophie Seeyave, Francisco Chavez, Steve Widdicombe, Emma Heslop, Ward Appeltans, Vanessa Yepes, David Millar	This event highlighted the latest advancements in technologies for observing Essential Ocean Variables (EOVs), focusing on biodiversity and environmental metrics. It discussed their role in supporting the Kunming-Montreal Biodiversity Framework and the development of Essential Biodiversity Variables (EBVs). EOVs are essential for marine life forecasts, scenario planning, and monitoring biodiversity, ecosystem functioning, and environmental parameters.	 flyer (by Veronica Wrobel)
25 OCT 2024	**BON in a Box technical overview** Speakers: Jory Griffith, Jean-Michel Lord	The BON in a Box pipeline engine supports indicator reporting through an open-source, community-based approach. Scientists can contribute workflows as automated analysis pipelines, enabling others to calculate biodiversity indicators for their regions. The modular, language-agnostic, and customizable pipelines aim to accelerate progress by consolidating efforts and tools.	 **Jory Griffith** presenting BON in a Box (photo by Jean-Michel Lord)
25-26 OCT 2024	**Genetic diversity indicator and implementation** Speakers: Alicia Mastretta-Yanes, Sean Hoban, Dr. Deborah Leigh	This event focused on monitoring Genetic Diversity, a key element of Goal A and Target 4 of the KMBGF. It included an introduction to its importance, the science behind indicators, and available support tools like BON in a Box. The session concluded with a discussion on incorporating genetic diversity into NBSAPs. This event was also run in Spanish.	 flyer (by Veronica Wrobel)

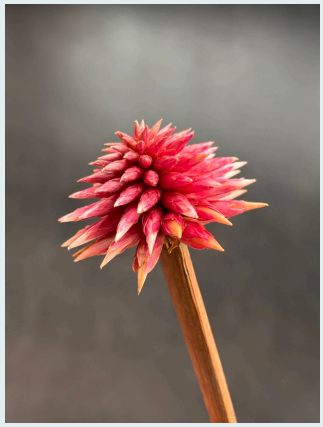
Date	Title	Key Messages	Media
26 OCT 2024	**Meeting the needs of subnational governments for biodiversity assessment** Speakers: Julie Lafortune, Jérôme Dupras	This roundtable focused on the crucial role of subnational governments in land-use planning and biodiversity protection. It aimed to clarify the data, indicators, and monitoring approaches needed to meet these challenges. The discussion, featuring three guest speakers, explored gaps and solutions in applying biodiversity data at the municipal level and engaged the audience in identifying the best tools and approaches moving forward.	 flyer (by Veronica Wrobel)
26 OCT 2024	**A Multidimensional Biodiversity Index for Colombia – Pilot results** Speakers: Lina María Sánchez Clavijo	The BON in a Box pipeline engine supports indicator reporting through an open-source, community-based approach. Scientists can contribute workflows as automated analysis pipelines, enabling others to calculate biodiversity indicators for their regions. The modular, language-agnostic, and customizable pipelines aim to accelerate progress by consolidating efforts and tools.	 flyer (by Veronica Wrobel)
30 OCT 2024	**APBON- Biodiversity in the Asia-Pacific** Speakers: Rajendra Dhungana, Sunita Chaudhary, Alice Hughes	This event addressed biodiversity loss in Asia, a region facing high rates of deforestation, mining, and wildlife extraction. It explored data gaps and challenges in the Asia-Pacific, focusing on data representativeness, research priorities, and conservation planning for the KMGBF's Target 3. The session highlighted barriers to data access, the relevance of essential biodiversity variables, and how to translate data into policy changes, offering valuable lessons for other tropical regions.	 • from left: **Rajendra Dhungana** (Under Secretary in the Ministry of Forests and Environment of Nepal), **Sunita Chaudhary** (ICIMOD), **Alice Hughes** (APBON) (photo by Veronica Wrobel

Around the Blue Zone

The Blue Zone at COP16 in Cali was full of activity, bringing together thousands of delegates from governments, NGOs, scientific organizations, and Indigenous and local communities. The venue buzzed with purposeful energy as participants engaged in discussions, attended events, and exchanged ideas across plenary halls, breakout rooms, and exhibit spaces.

The space was alive with multilingual conversations, reflecting the diverse representation at the conference. The exhibition stands featured displays of biodiversity data tools, conservation technologies, and case studies, creating opportunities for learning and collaboration. Coffee stations and lounges became informal networking spots, where delegates connected over Colombian coffee to discuss challenges and solutions.

Despite the serious nature of the work, the atmosphere was dynamic and collaborative, with a clear sense of purpose and a shared commitment to addressing global biodiversity challenges.



Half-Earth Day 2024 at COP16

The E.O. Wilson Biodiversity Foundation's annual Half-Earth Day event convenes people from around the world and across disciplines to share their perspectives and provide thought leadership on how we can work together to safeguard biodiversity and ensure the health of our planet for future generations. This year's Half-Earth Day recognized and celebrated the role of scientific, Indigenous, and ancestral knowledge in global species conservation. The 8th annual Half-Earth Day event was held in Santiago de Cali, Colombia, on October 22, alongside the 16th Conference of the Parties to the Convention on Biological Diversity (COP16).

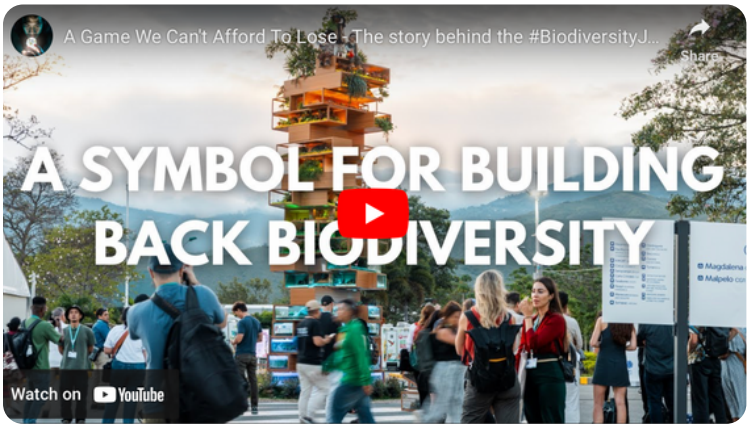
Walter Jetz, co-chair of the Species Population Working Group and the Jack and Laura Dangermond Scientific Chair of the E.O. Wilson Biodiversity Foundation, led a Science Workshop around improving the integration of biodiversity into supply chain decisions in agricultural sourcing. The Half-Earth Day Evening Program hosted critical conversations about inclusivity, equity, and our relationship with nature. We explored real-world conservation and management applications of the Half-Earth Project Map and our three species-focused GBF indicators in Ecuador and the Democratic Republic of the Congo. Dr. Jetz also provided a detailed introduction to the inaugural Species Protection Report, which was co-sponsored by The E.O. Wilson Biodiversity Foundation, the Map of Life, and GEO BON. Throughout the day, musical performances and creative showcases from local musicians and community groups brought together nature and art, creating a unique moment of convergence of science, nature, people, and culture that was later reflected in the broader COP16, dubbed "The People's COP."

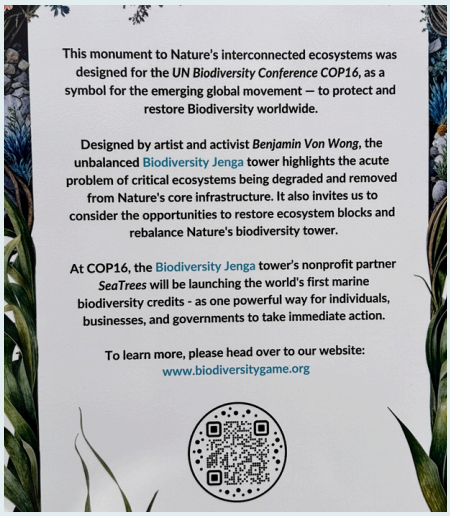
Half-Earth 2024.
Top left: **Paula J. Ehrlich**, President and CEO, E.O. Wilson Biodiversity Foundation, Co-Founder, Half-Earth Project, Founder, Half-Earth Day.
Top right: **Sara Inés Lara**, **Lucila Castro**, **Martha Cecilia Rosero Peña**, **Chadiz Valentina** shared their perspectives and experiences related to championing access, inclusion, representation, equity, and respect while working to share knowledge.
Bottom left: **María Cecilia Londoño Murcia**, **Wade Davis**, **Carmen Guerra**, and **Cristián Samper** discuss how Colombia has uniquely nurtured their connection with nature and how that knowledge can inform our lives and livelihoods aligned with the COP16 theme of Peace with Nature.
Bottom right: **Walter Jetz**, Jack and Laura Dangermond Scientific Chair, E.O. Wilson Biodiversity Foundation, launches the first Species Protection Report.

“Biodiversity Jenga” art installation

Benjamin Von Wong's "Biodiversity Jenga" art installation at COP16 in Cali was a striking six-meter-tall structure composed of hollow Jenga blocks, each symbolizing various ecosystems. The installation represented the delicate balance of our natural world, emphasizing how the removal of a single element can lead to systemic collapse.

For a deeper understanding of the inspiration and creation process behind this impactful piece, you can watch the following video:





COP16
COLOMBIA
Paz con la Naturaleza

GEO BON

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