GEO BON HIGHLIGHTS COP15

GEO BON Secretariat

31 March 2023

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Introduction

After years of delay, Parties and observers to the Convention on Biological Diversity (CBD) convened for the United Nations Biodiversity Conference, COP 15, in Montreal. This conference was convened to set the level of ambition for the next decade to slow and reverse the trend of biodiversity loss. In Montreal, the GEO BON Secretariat was delighted for this home-town meeting. This document is intended for GEO BON members, partners and collaborators and its purpose is to summarize key events and activities GEO BON took part in during this once-in-a-generation event.

The Kunming-Montreal Global Biodiversity Framework and Monitoring Framework

The Kunming-Montreal Global Biodiversity Framework (GBF) was adopted on 19 December 2022 at 3:33 am, setting the global biodiversity action agenda until 2050.

The new Framework is widely considered to be more inclusive and participatory, more comprehensive, more SMART (specific, measurable, achievable, relevant, and time-bound), and more complex than the preceding Aichi Biodiversity Targets. It consists of four global goals for the year 2050, and 23 global action targets by 2030 that can be categorized under the focus of each goal. This includes, biodiversity conservation and restoration (Targets 1-8), nature's contribution to people (Targets 9-13), access and benefit sharing (Targets 14-18), and tools and solutions for mainstreaming and implementation (Targets 19-23).

The purpose of the Kunming-Montreal GBF is to enable transformative action by governments and all of society to reverse biodiversity loss and aims to facilitate the monitoring and review of progress in the most transparent manner.

The full text of the Kunming-Montreal GBF can be found here, under Decision 15/4.

The new Framework is supported by six decisions of equal standing. One of these decisions is the monitoring framework for the Kunming-Montreal Global Biodiversity Framework. In its decision, the Conference of the Parties decided to use the period from 2011 to 2020 as the reference period unless otherwise indicated for monitoring progress, and consider a review of the monitoring framework in order to finish its development by COP 16, and thereafter keep it under review as appropriate.

Under the agreement of the monitoring framework, countries are required to monitor and report every five years, or less, on a set of headline and other related indicators relevant to progress towards achieving the goals and targets of the GBF. The headline indicators will serve to communicate progress made towards achieving the GBF and are believed to be the minimum starting point for reporting progress.

The full text of the monitoring framework can be found here, under Decision 15/5.

Highlights of the monitoring framework

- Parties are invited to support community-based monitoring and information systems and citizen science (para 6)
- Among other organizations, GEO BON is invited to support the operationalization of the monitoring framework (para 7)
- When possible, efforts are to be made so that indicators of the monitoring framework utilize existing work by GEO BON on essential biodiversity variables (Annex I, para 2(f))

Next steps for the monitoring framework

Much more progress and development on indicators will take place intersessionally (i.e. between COP meetings). The formation of an Ad Hoc Technical Expert Group, or AHTEG, is one of the avenues often used to carry out work overseen by the Secretariat of the CBD. An AHTEG group on Indicators has been requested and an invitation to nominate participants has been dispatched. The AHTEG is tasked with providing advice on remaining and unresolved issues related to the monitoring framework. The full Terms of Reference for its work can be found in Annex II of 15/5.

Implementation of the goals and targets is now crucial to see these commitments become action through local, national, regional, and corporate policies and plans. Action beyond the multilaterally agreed text is essential. GEO BON will engage with users, stakeholders and communities to go beyond the promised ambition through its Knowledge to Action (K2A) hubs. The Indicator K2A hub hopes to be able to provide technical support on topics related to the indicators in the monitoring framework, and work with members of the AHTEG and Parties to the CBD.

GEO BON in the COP 15 negotiations

Members of GEO BON were present on-site during COP 15 negotiations, following discussions on the wording of the goals and targets of GBF, the monitoring framework and indicators, as well as mechanisms for planning, monitoring, reporting and review, and capacity building and development and technical and scientific cooperation.

This was a first COP for me, and as typical in such big events, it felt a bit overwhelming in the beginning. The work of the GEO BON Secretariat however made it a lot easier to prioritize (thanks!), and thanks to that soon I found my own niche on where I thought my work could be most useful. The most positive aspect was to see that the role of GEO BON is highly regarded around the UN CBD circles, and perhaps even got reinforced through the COP 15 itself.

– Ruben Valbuena, co-lead of GEO BON Ecosystem Structure Working Group

Attending COP 15 was certainly useful for us all- we learned how to communicate to decision makers, made new connections with many types of stakeholders around the world, and were able to directly liaise with several negotiators to discuss the evolving text of the post-2020 commitments. We connected to key members of several countries who were able to bring some of our text proposals to the negotiation table.

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

It was great to be at COP and reconnect with everyone after an interminable pandemic. Honestly I am amazed we actually got a GBF out at all, and whilst it could be stronger; just having an agreement does provide a mandate for action. What is left to do now is to try to make it more successful than the Aichi targets, and that in part comes down to having the data to enable targeted and effective action and monitoring. I was most impressed by the engagement of the business and finance communities, who were a step ahead of many targets already, as they are a crucial element of effective mainstreaming of action.

– Alice Hughes, GEO BON member

We worked really hard every day, attending the sessions, being present at the booth, chasing for some good side events (and food). Our efforts have paid off considering the final text of the Kunming-Montreal GBF… Participation in the COP 15 was for me tremendously instructive: I have now a much deeper understanding of the manifold competences and skills required to get involved in the science-policy interface.

– Cristiano Vernesi, GEO BON member

The indicators of the monitoring framework were discussed over several contact group sessions. The sessions sought to reach an agreement on the list of headline indicators of the framework. For headline indicators to be considered, they must meet the criteria of having data and metadata publicly available, a method that is peer-reviewed and/or validated for national use, capable of detecting trends, and align with existing multilateral agreements or processes (e.g. Sustainable Development Goals).

Outcomes

- Reference to genetic diversity "within populations of wild and domesticated species, safeguarding their adaptive potential" was included in Goal A.
- A progression of Target 4 on species management—which originally had no mention of genetic diversity—to a specific mention of, "...to maintain and restore the genetic diversity within and between populations of native, wild and domesticated species to maintain their adaptive potential...".
- Under Goal A and Target 4, the headline indicator, proportion of populations within species with an effective population size > 500 (Hoban *et al.* 2020) was evaluated favourably by most Parties. It was deemed appropriate for capturing the elements of Goal A and Target 4 and thus adopted in the monitoring framework. Notably, some Parties like small island nations were concerned they may struggle with this indicator as many species will have small population sizes due to their geographic constraints. It was also suggested that an unbiased list of species should be used for reporting on this indicator.
- Parties to the CBD were asked to submit comments in writing to the CBD on complementary indicators so they may be compiled and circulated in another document.

GEO BON is excited to see these achievements as they reflect years of hard work and outreach by our Genetic Composition Working Group.

Science for biodiversity

> *There should be great emphasis on the role of the scientific community in implementation of the post 2020 global biodiversity framework. I will never stress enough the importance for all Parties to always seek advice of scientists in taking decisions towards the implementation of the Convention.*
>
> – Hesiquio Benítez Díaz, SBSTTA Chair, during the Fifth Science-Policy Forum for Biodiversity

In the words of the CBD, science is fundamental to support the work of the Convention and its Subsidiary Bodies (SBI and SBSTTA). The process for the development of the post-2020 global biodiversity framework (GBF) should be guided by the best available science and evidence from relevant knowledge systems. The scientific community was invited to engage in the **Science Biodiversity Workshop**, collectively organized by the Secretariats of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), GEO BON, and CBD. The workshop took place on 6 December 2022, between the closing of the fifth meeting of the Open-ended Working Group for the Post-2020 Global Biodiversity Framework (OEWG 5) and the opening of the fifteenth meeting of the Conference of the Parties (COP 15) for biodiversity.

The objectives of the workshop were:

- To provide an overview of the findings from recent reports prepared under the IPBES and the links with the draft post-2020 global biodiversity framework;
- To provide information on the scientific basis for specific issues addressed in the goals and targets of the draft post-2020 global biodiversity framework as elaborated in the scientific briefs prepared by members of the scientific community;
- To discuss the role of biodiversity observation systems as a foundation for monitoring the post-2020 global biodiversity framework;
- To stimulate an interactive discussion on science, monitoring and data for the post-2020 global biodiversity framework.

The science information document (CBD/SBSTTA/24/INF/31; Leadley et al. 2022) and briefs on GBF targets were presented by GEO BON and Future Earth, followed by a panel discussion on the related topics. Adriana Radulovici, Paul Leadley, and David Obura gave presentations of the work led by GEO BON and Future Earth on the science supporting the post-2020 global biodiversity framework, followed by a presentation by Andrew Gonzalez on biodiversity monitoring for the post-2020 GBF and plans for a Global Biodiversity Observing System (GBiOS). The presenters engaged in a panel discussion, moderated by María Cecilia Londoño Murcia, with questions from the audience.

The **Fifth Science Forum and the Eighth Conference on Sustainability** was convened to foster communication on the role of the scientific community in the implementation of the post-2020 GBF. Science has a key role in determining the causes of biodiversity loss and solutions to generate estimates of expected effects of different solutions. It is needed to inform and prioritize interventions on climate change mitigation, habitat restoration and conservation. Rigorous monitoring that includes all knowledge systems, disciplines, and sectors, with exchange of experience, challenges, and perspectives is needed to achieve the post-2020 GBF.

Tackling biodiversity loss needs bold conservation measures as well as address the direct and indirect drivers of biodiversity loss. Additional insights from GEO BON and Future Earth's information document and science briefs were highlighted during the plenary session of the Forum. Essentially, implementing the headline "30 by 30" ambition is not sufficient to bend the curve for biodiversity; action on all drivers of biodiversity loss is needed if we are going to achieve Goal A of the GBF. A clear message was made that if negotiations weaken any of the action targets on Goal A, we will have difficulties bending the curve for biodiversity. Moreover, substantial investment in monitoring capacity to detect biodiversity change and attribute the drivers of change is needed. Ambitious monitoring that will ensure the supply of, and access to, data to track progress and guide action is needed to implement the GBF at local, national, and international levels.

It was noted early in the Forum the slow progress being made in the ongoing negotiations on the indicators of the monitoring framework of the post-2020 GBF. Specific reference was made to three reasons believed to be holding an agreement on the monitoring framework back: data availability, international disparities regarding data production, and data access and sovereignty (see Gonzalez & Londoño 2022). The gap between science and policy must be bridged and the scientific process supporting biodiversity indicators must be strengthened across the globe.

> *Scientists also play a key role as translators and I invite you to go beyond the comfort zone and to move also in this transition from data to information and to provide scenarios to really achieve the much needed transformative change. You can also act as bridges with indigenous peoples and local communities, with NGOs, with governments and the private sector. It's important that you make this translation in your language to explain complicated issues in a very simple way in order to engage with different players so that the message from the science community can go to the ones that are really living next to biodiversity and taking decisions every day.*
>
> – Hesiquio Benítez Díaz, SBSTTA Chair, during the Fifth Science-Policy Forum for Biodiversity

Why haven't we reached past biodiversity targets?

Deficiencies in national policy responses (National Biodiversity Strategies and Action Plans, NBSAPs), funding shortages, science-policy knowledge gaps, and imperfect review mechanisms were described as key limitations in the past. Henrique Pereira, former GEO BON co-chair, provided an overview of how inadequacies across these challenges can be overcome and offered a message that while the targets are important, how we go about implementing them is just as important. An effective implementation framework that identifies the actions by different actors, creates the conditions for implementing the actions, and assesses progress made is needed. Identifying the many actors, including the private sector, and their actions in the biodiversity crises will ensure ownership as well as incorporate the many diverse world views of nature. Addressing the remote responsibilities of actors' contributions to biodiversity loss and holding them accountable is needed, since for example, regions in Europe and North America are driving biodiversity loss through consumption in South America. Lastly, we need to leverage in-situ observation with models to support stronger biodiversity monitoring for action.

Henrique Pereira describes an implementation framework for the global biodiversity framework (photo by Veronica Wrobel).

Monitoring for biodiversity

Gaps in our ability to monitor biodiversity and share the knowledge that arises from it will seriously hamper our ability to implement the GBF. Efficient data production, improvements in data sharing, and monitoring science are all actions required, particularly to develop future biodiversity scenarios and forecast biodiversity trends, as well as for prioritizing, planning and reporting on progress, so that we can update our levels of ambition over the course of GBF implementation.

The targets of the GBF capture the direct and indirect drivers of biodiversity loss and recovery, but we need a deeper understanding of how the drivers interact. Accurate and representative sampling of biodiversity data is still needed to fill taxonomic and spatial gaps, and inform data modelling, so that we can understand how the synergies among drivers impact biodiversity across ecosystems and spatial scales. Accurate, high-quality data can guide us in this understanding, as well as modelling scenarios. The scientific community requires the development of a formal framework for detection of biodiversity change, and attribution of that change. An inferential framework, that involves observations, making an estimation, detecting, and attributing cause will provide evidence of biodiversity change in relation to other potential drivers from contention. This detection-attribution framework will encourage formal and reproducible bounds of statistical confidence about the role of drivers so that we can guide action.

There is a need for strong monitoring science. How do we get from our existing efforts, done by research institutes, ministries, biodiversity knowledge centres, academic, civil and indigenous society, at a national level to global progress? GEO BON advocates for connecting all of these monitoring efforts as a first step towards a global goal. Within these efforts, we need strong monitoring science, where biological observations are collected in ways that are findable, accessible, interoperable, and reusable (FAIR), across all taxonomic groups and biodiversity realms. Ideally repeated over time, with an understanding and measure of uncertainty and error; and meaningful indicators that capture the multidimensionality of biodiversity. These indicators need to be able to inform us on progress (with a level of certainty) but also on what actions should be taken.

The indicators for reporting on progress towards the biodiversity targets can be challenging to calculate for many parts of the world. Data gaps are present that hinder inference about progress. However, many Parties expressed a need for workflows that facilitate the calculation of indicators. Countries need ready access to the data and methods required to calculate headline, component, and complementary indicators. GEO BON will take on the task of supporting EBV based workflows for indicators that are required to inform and guide conservation action.

Monitoring science must be enhanced, supported, and linked iteratively. Access to and sharing of biological observation data and knowledge will support a robust set of indicators that are adequate to guide progress. Monitoring must build and share capacity: local, national and international communities and governments must work together and invest in existing and new monitoring systems. An inclusive and participatory approach across local, national, sub-national and international levels, will ensure adequate access to and sharing of data. A better process to promote and enhance dialogue between IPLCs and researchers on biodiversity monitoring is needed.

Global Biodiversity Observing System (GBiOS)

To monitor progress towards the targets and goals of the GBF, there is a clear need for a Global Biodiversity Observing System (GBiOS) that will address gaps in our knowledge of biodiversity change. GBiOS will be designed to support countries with their needs to track progress, inform and guide policy and action. By aggregating national data and action on biodiversity, GBiOS is expected to inform on global trends.

The establishment of GBiOS was described on multiple occasions during COP 15: the Science Day, Science Policy Forum as well as a side event fully dedicated to this topic (see text below). This system will provide a framework for monitoring progress in biodiversity conservation, to track progress, inform and guide policy action. GBiOS can transform our collective biodiversity monitoring and conservation efforts to guide action for the GBF. It is important that GBiOS is country-led and capable of rapid biodiversity change detection and attribution.

During the Fifth Science-Policy Forum for biodiversity, the co-chairs described key elements that will be required to develop GBiOS:

- ## Detection and attribution of biodiversity change for effective indicators

  If we are to be effective in providing adaptive guidance for the GBF, what is lacking is a detection and attribution framework to mobilize scientific evidence, values, knowledge and repeated assessments of the state of nature. The biodiversity community requires a detection and attribution framework to indicate how human actions influence ecosystems at different scales, from local to global (Figure 1). Conceptually, detection of change is the process of demonstrating that biodiversity or an ecosystem process affected by biodiversity has changed in a well-defined statistical sense without providing a reason (attribution) for change, but providing a degree of confidence that a change has been detected. Attribution is the process of evaluating the relative contributions of multiple causal factors to a change either in a trend or an event with an assigned statistical confidence to that attribution process. The challenge, however, is the interactions among the drivers of biodiversity change at multiple scales of space and time. It is important that the biodiversity community can develop the appropriate counterfactuals, or the reference baselines for biodiversity, that account for the variability and uncertainties in biodiversity observations and responses that we believe are driving the outcomes. The next steps are to move beyond typical case studies and develop monitoring systems and tools that can deliver rapid reproducible assessments on shorter timescales — weeks to months, rather than years. Collective, responsive and actionable monitoring should work hand-in-hand with policy.

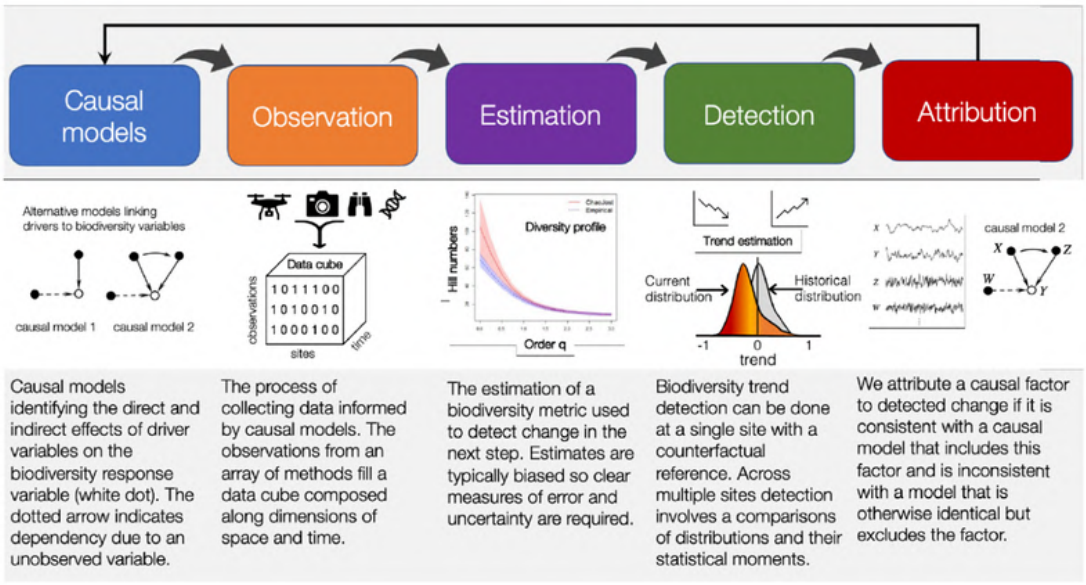


Figure 1. The framework for detection of biodiversity change and the attribution of the drivers causing the change. A rigorous transfer of information from causal models, observation, estimation, detection and attribution is needed to reliably achieve inference of biodiversity change. The biodiversity observation process currently lacks guidance from information provided by the causal models. Establishing alternative scenarios for future biodiversity and using these scenarios to guide effective monitoring should be a part of this linked framework in order to improve our confidence that the ambition of policy action is appropriate and effective. Figure adapted from Gonzalez *et al.* 2023.

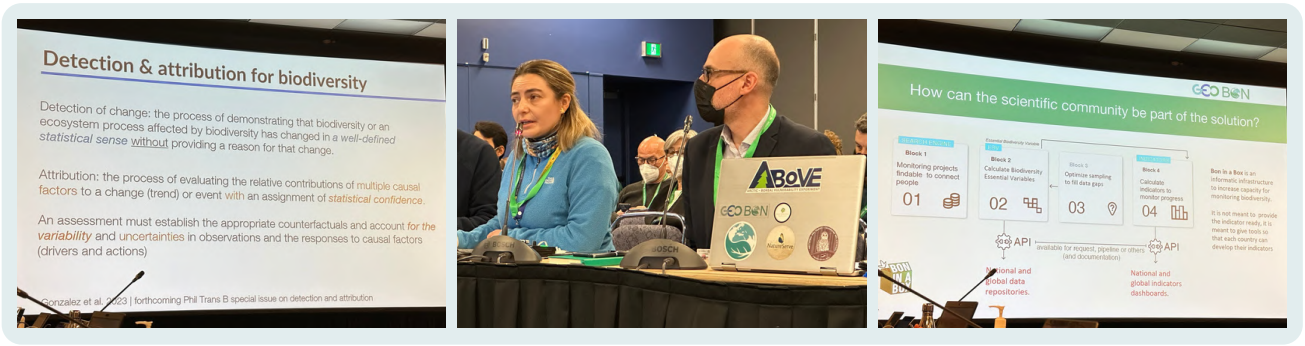
- ## National capacities for GBF monitoring

At the moment, there are approximately eight headline indicators that are ready and meet the requirements of the monitoring framework. Why do we lack indicators for the remaining targets of the GBF? Parties may not be connected to the work of others, not sharing indicators globally, regionally, nationally, nor make the data available. Many institutions do not publish their methodologies in peer-reviewed journals, or publish in different languages. Sampling for biodiversity monitoring may not be sufficient to track progress, guide planning, or is sustained and kept up-to-date. Biodiversity indicators are sometimes also developed with a narrow focus, and may not fit the broader requirements of GBF goals and targets. National institutions need enhancement so that they can sustain monitoring and indicator production. Three main requirements are:

1. An urgent need for global coordination of biodiversity monitoring
2. A detection-attribution system to guide policy action
3. Capacity and capabilities for autonomous national indicator production

The scientific community can help by supporting counties to implement their own biodiversity observing network, for example using tools like BON in a Box. The first step is to connect people and make biodiversity monitoring data and initiatives findable. Second, provide pipelines to calculate biodiversity indicators from raw data and essential biodiversity variables. Next, a methodology in place to optimize data sampling and collection to fill the gaps on biodiversity indicators. Lastly, these data workflows need to be connected with already existing national and global data repositories.

The majority of indicators require an increase in the capacity of countries in the realms of informatic infrastructure to support transparency and reproducibility. The monitoring science requires filling data gaps, better data models for forecasting and a better understanding of the cause and effect relationships. Stronger institutions at the country and regional levels to provide data ownership and data sovereignty at national levels are necessary. With these areas fulfilled, we may be in a better position to bend the curve on biodiversity loss.



GEO BON co-chairs María Cecilia Londoño and Andrew Gonzalez presenting the need for a detection and attribution framework for biodiversity and how tools like BON in a Box can be part of the solution (photos by Veronica Wrobel).

Engagement at side events and booths

A Global Biodiversity Observing System (GBiOS) to support the implementation of monitoring of the post-2020 GBF

A side event convened by GEO BON presented the Global Biodiversity Observing System (GBiOS) to support the implementation and monitoring of the post-2020 GBF by Parties. This side event demonstrated a scheme for interlinking existing and new observations and monitoring networks with the aim of assisting all Parties in their efforts to track progress.

We have a clear need and opportunity to establish a global biodiversity observing system (GBiOS) that will monitor biodiversity trends and events and use this knowledge to guide action for the GBF goals and targets. This system can be assembled as a network of existing planned national and regional biodiversity monitoring systems and communities. GBiOS could be coordinated through national and regional hubs, networking observation technologies, research capacity, with data integration, modeling and forecasting services. A systematic financing mechanism, similar to Systematic Observations Financing Facility (SOFF), will be required to scope the resources needed for GBiOS.

GBiOS side event. Top left to right: speakers Andrew Gonzalez, Nestor Fernandez, Ruben Valbuena, and Alice Hughes. Bottom left to right: audience view, Deshni Pillay, and presentation slides of GBiOS and the EBV data portal (photos by Veronica Wrobel).

Assembly of GBiOS can be facilitated by giving access to tools for designing monitoring networks that support conservation action. Earth observations via satellite information can be used to develop and assist some EBVs at several spatio-temporal scales. Autonomous vehicles and drones are expected to drive the future of Earth observations, but for EBVs, ground-truthed biodiversity data will still be needed, as well as standardized procedures to derive EBVs from satellite information.

At a regional level, EuropaBON has made important progress in analyzing current data streams, gaps and bottlenecks in monitoring initiatives across Europe (via its Monitoring database). The use of EBVs based on in situ monitoring (e.g. from long-term monitoring programs, citizen science, camera traps) and remote sensing (satellite, airborne, and weather) is helping to obtain information on the "state of nature" across the region.

Engagement throughout the Asia-Pacific region (Asia-Pacific BON) is increasing the exchange of knowledge and expertise between institutions and researchers on biodiversity. Monitoring efforts including the mapping of tropical tree species and changes in forest cover, bat distributions and zoonoses, and evaluating the impacts of hydropower dams and climate change on the diversity of fishes in Mekong are examples of how researchers are making regional strides. Findings and activities throughout the region are highlighting the emerging challenges of the global climate crisis and serious implications of infrastructure development. Biodiversity impact assessments are urgently needed and efforts should still be made to connect in situ and satellite observations of biodiversity and ecosystem functions.

Numerous biodiversity observation systems and monitoring platforms have been developed (e.g. Africa Bird Atlas Programme, Freshwater Biodiversity Information System, Global Biodiversity Information Facility). Efforts are needed to ensure these systems are interoperable and duplication is avoided. Having multiple players can build resilience in the observing system. A key message in South Africa is that bringing scientists and practitioners together is a crucial step in building a community of practice and the establishment of a BON can help this process.

BON in a Box is an information infrastructure designed to increase transparency, reproducibility, and capacity for monitoring biodiversity. By making projects findable and connectable, offering guidance in calculating EBVs, optimizing sampling to fill data gaps, and calculating indicators on progress, an updated BON in a Box is meant to provide the infrastructure (e.g. documentation, API, or pipeline) needed by users with limited capacity to develop their biodiversity indicators.

The EBV data portal is an important database developed by GEO BON for mainstreaming EBV data. The EBV data portal is an open catalogue of EBV datasets, including raster datasets, to be downloaded and uploaded for sharing with others. It is constructed across thematic, spatial and temporal dimensions, and all elements in the pipelines are traceable to increase transparency and useability.

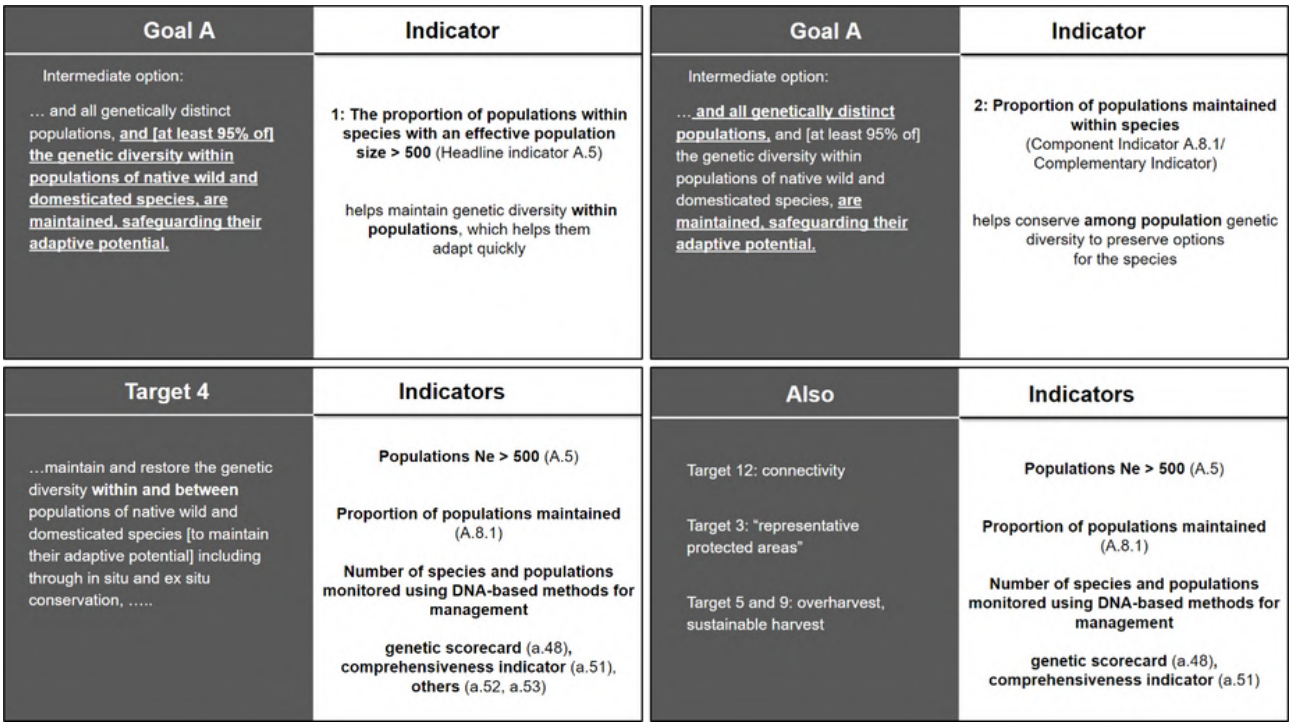
From EBVs, GEO BON has produced biodiversity indicators in support of the post-2020 GBF and its monitoring framework. The Biodiversity Habitat Index (BHI), Bioclimatic Ecosystem Resilience Index (BERI), Global Ecosystem Restoration Index (GERI), Local Biodiversity Intactness Index (LBII), Protected Area Representativeness and Connectedness Index (PARC), Rate of Invasive Alien Species Spread Indicator (RIASS), Species Habitat Index (SHI), Species Protection Index (SPI), Species Status Information Index (SSI; see https://geobon.org/ebvs/indicators/ for more), and the proportion of species populations with effective population size greater than 500 (Ne > 500; Genetic diversity targets and indicators policy brief; Hoban *et al*. 2020) are examples of indicators based on the EBV framework. The Species Habitat Index, for example, is based on raw species population data collected on many populations at several locations and across time. When paired with environmental data, it can quantify the proportion of suitable habitats that remain intact for a particular species and can inform countries to take special care to protect the remaining habitat tracts.

Linking the Global Biodiversity Information Facility (GBIF) to GBiOS will accelerate the use of biodiversity data into policy action. By working together, GEO BON and GBIF can mobilize biodiversity data, manage biodiversity actions, and measure the effect of conservation action through an iterative process. Data published through GBIF is integrated into EBVs, which provide indicator data for the GBF. This process can identify data and knowledge gaps to improve data collection over time, as well as help prioritize action in areas of concern. Collaborations with GEO BON's thematic networks (Soil BON, Freshwater BON) are underway to mobilize data available and fill data gaps.

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

The Genetic Composition Working Group, in collaboration with G-BiKE COST Action, and supported by over 40 organizations, held a lively side event to share knowledge about genetic biodiversity, both within and between species. They demonstrated the importance of genetic diversity, how feasible it is to measure, and presented recent examples of how indicators for genetic diversity have been deployed at the national level in several countries, including Australia, Belgium, France, Mexico, South Africa and Sweden.

The direct link between genetic diversity indicators and Goal A and Target 4 of the GBF under negotiation was made explicitly clear (see below). The team also described the link between gene flow and healthy species populations and habitat connectivity (Targets 3, 4, 5, 9, and 12). At the same time, the working group published an open-access article in Conservation Genetics, summarizing the updated GBF text as it relates to genetic diversity (see Hoban et al. 2023).

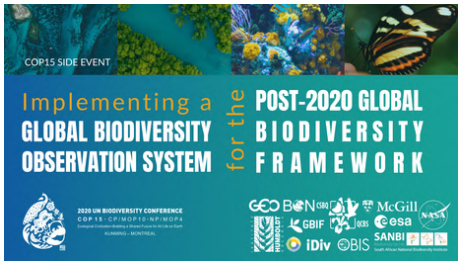


Slides from the side event demonstrating the link between global biodiversity framework text and genetic diversity indicators in the monitoring framework. The full slide deck is available online.

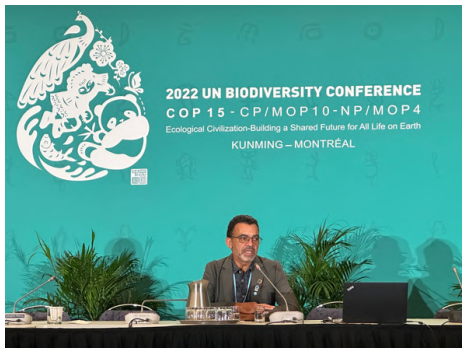
Audience members found the event particularly informative, and took many photos of the presentations. Lastly, the event was praised for offering the best catered lunch at COP, not to mention the colourful international treats the team provided.

GEO BON speakers (from top left to right) Linda Laikre, Sean Hoban, Jessica da Silva, and Alicia Mastretta-Yanes presenting during the side event on genetic diversity. Bottom panel: view of the audience (photos by Veronica Wrobel).

Summary of the side events directly involving GEO BON

Date	Title	Key Messages	Media
7 DEC 2022	Global Knowledge Support Service for Biodiversity – a service to support Parties and stakeholders' implementation on the post-2020 global biodiversity framework (GKSSB) (No recording available)	This event, co-organized by UNEP-WCMC, SCBD, GBIF, and the European Union, facilitated a discussion among partners, Parties and stakeholders to determine the needs and opportunities for global knowledge support services for biodiversity. A declaration of intent was made for GKSSB in order to support the implementation of the Kunming-Montreal GBF.	Global Knowledge Support Service for Biodiversity
7 DEC 2022	A Global Biodiversity Observation System (GBiOS) to support the implementation and monitoring of the post-2020 global biodiversity framework by Parties (No recording available)	A systematic biodiversity monitoring system designed to fill data gaps and assess outcomes of action is required to achieve the post-2020 GBF. This system would federate all stakeholders and actors in the monitoring community, transferring capacities and technologies up and down social and ecological scales. Next steps of GBiOS require an assessment of needs on technologies, infrastructure, governance, partnerships, costs and benefits.	 GBiOS flyer (by Veronica Wrobel)
9 DEC 2022	Making nature count through natural capital accounting (No recording available)	The System of Environmental Economic Accounting (SEEA) provides a framework for statistics on nature and its relationship with the economy. Mainstreaming biodiversity into policies and projects and for some indicators can strengthen monitoring progress. The biodiversity and statistical accounting communities should continue to develop this integration using essential biodiversity variables.	 (right) GEO BON co-lead María Cecilia Londoño (photo by Katie Millette)

Date	Title	Key Messages	Media
10 DEC 2022	Genetic Diversity Goal, Target, and Indicators - including update on ongoing application of genetic diversity indicators (No recording available)	Genetic diversity is essential for the adaptive potential of species and the resiliency of ecosystems. The Genetic Composition Working Group convened this side event to promote knowledge exchange on the importance of genetic diversity, how to measure and report on species genetic diversity, and describe resources and support available to deploy the relevant indicators.	
11 DEC 2022	Fifth Science-Policy Forum Recording available	On Day 1 of the Fifth Science-Policy Forum, Henrique Pereira spoke during the session on the role of the scientific community in the implementation of the post-2020 global biodiversity framework, and Katie Millette spoke during the session on transformative actions on all drivers of biodiversity loss urgently required to achieve the global goals by 2050.	 Katie Millette (photo by Veronica Wrobel)
12 DEC 2022	Fifth Science-Policy Forum Recording available	On Day 2 of the Fifth Science-Policy Forum, GEO BON co-chairs Andrew Gonzalez and María Cecilia Londoño facilitated and presented the session on mobilizing tools and technologies to support implementation and monitoring of the post-2020 Global Biodiversity Framework - towards a global biodiversity observing system, followed by a panel discussion on a road map for integrating technologies and scientific tools into a global observing system for supporting the implementation of the monitoring framework of the post-2020 GBF with Mike Gill. The session begins at the 2:01:47 time mark.	 María Cecilia Londoño and Andrew Gonzalez (photo by Veronica Wrobel)

Date	Title	Key Messages	Media
14 DEC 2022	Montréal: Hub of international action on biodiversity (No recording available)	GEO BON was featured during this round table event as an important international environmental organization in Montreal. This event, hosted by Montréal International (MTL INTL), demonstrated the strength of the relationship developed between GEO BON and the CBD Secretariat as a result of Montreal being a strategic hub for sustainable development organizations.	 GEO BON co-lead Andrew Gonzalez (right; photo by Veronica Wrobel)
15 DEC 2022	Sustainable Seabed Knowledge Initiative (SSKI): Innovating global scientific collaboration to advance our understanding of deep-sea biodiversity (No recording available)	Adriana Radulovici highlighted how data, data standards, and the sustainability of initiatives for the long term are key elements of biodiversity knowledge for effective action.	 (right) GEO BON Executive Secretary Adriana Radulovici (photo by Veronica Wrobel)
16 DEC 2022	The United Nations Decade of Ocean Science for Sustainable Development (2021-2030) at COP 15 Recording available	David Obura spoke about the need for focus on marine and coastal systems, aspects often limiting in the GBF, as well as the importance of linking other UN programmes, Sustainable Development Goals (SDGs), and international agencies together to achieve effective action for biodiversity. There is considerable knowledge and scientific advice for proactive actions to curve biodiversity loss and it is time to turn this knowledge into decisions. David also spoke about how low-income communities tend to rely heavily on nature and it is important that they can continue to rely on nature for their livelihoods.	 David Obura (photo by Veronica Wrobel)

Date	Title	Key Messages	Media
		Anya Waite presented the importance of standardized ocean observations, Essential Ocean Variables, new technologies and partnerships to advance the Global Ocean Observing System (GOOS). Linkages with Marine BON (MBON) will support the marine realm of the Global Biodiversity Observing System (GBiOS).	 (right) Anya Waite (photo by Veronica Wrobel)

GEO BON's booth

"How can I monitor biodiversity in my country?"

This was the popular question asked of GEO BON. Delegates representing governments, institutions and research groups stopped by with this concern, as well as some specific questions on how to link their initiatives with GEO BON's network. We shared advice on how to implement popular and new tools for biodiversity monitoring and many new members signed up to join GEO BON at our booth. Several GEO BON initiatives and products were featured on a touch-screen at the booth, including:

- **BON in a Box:** original video, with updated text and voice over (available on YouTube)
- **EuropaBON explained:** interview with the projects' team leaders (available on YouTube)
- **Map of Life (MOL)** and interactive material for biodiversity indicators

GEO BON's booth at COP 15. On display is a map of the worldwide distribution of our members, a panel describing the concept of GBiOS, a panel featuring the covers of the science briefs developed in partnership with Future Earth, and a touch screen (provided by Walter Jetz, Yale University) to showcase GEO BON tools and indicators (photo and designs by Veronica Wrobel)

Genetic Composition Working Group at G-BiKE booth

GEO BON's Genetic Composition Working Group were engagement experts at the G-BiKE COST booth. Truly incredible to see the engagement, plus fabulous swag and international treats.

From [@seanmhoban](#) "The incredible outreach machine of @gbike_cost fueled by @ivanpazvinas continues at #cop15 go conservation of fundamental level of biodiversity!"

Media coverage

Source	Details
Radio-Canada Découverte	Television program. This episode presents the scientific issues of the COP 15 negotiations, how to measure progress towards the goals, and where Canada is in preserving its biodiversity. Features Anne Larigauderie, David Leclère, Éric Pineault, Andrew Gonzalez, with Katie Millette and Veronica Wrobel in appearance, Jillian Campbell, Basile Van Havre, Daniel Krauss, Eddy Pérez. Originally aired on 4 December 2022 in French.
New York Times	Article entitled, "Animals are running out of space to live" featuring Walter Jetz and the species habitat index. Posted 9 December 2022 in English.
Oxford University News	Article entitled, "Global coalition of experts urge COP 15 negotiators to uphold 2030 targets." Coverage of the Act now to begin reversing biodiversity loss by 2030 petition, signed by over 3,200 researchers around the world and co-developed by David Obura. Posted 10 December 2022 in English.
Radio-Canada Les années lumière	Radio interview. Andrew Gonzalez and Anne Larigauderie discuss the grand mission of COP 15 and details of the GBF. Originally aired on 11 December 2022 in French.
CBC What on Earth	Radio interview. Katie Millette discusses the GBF and the need for a monitoring framework with meaningful indicators for success. Originally aired on 11 December 2022 in English.
CBC The Current	Radio interview. Andrew Gonzalez discusses COP 15, the need for reconciliation between people and nature, and agency and action at all scales. Originally aired on 14 December 2022 in English.
Google Earth and Earth Engine	Article entitled, "Map of Life Indicators adopted in UN Biodiversity Framework" co-authored by Walter Jetz. Posted 21 December 2022 in English.

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