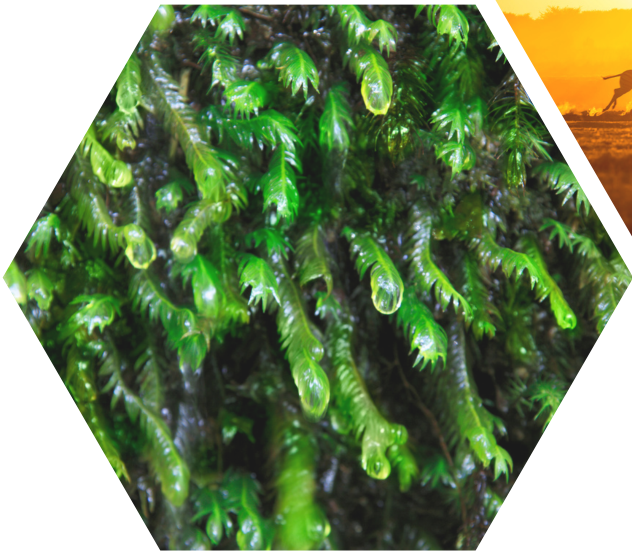
Group on Earth Observations
Biodiversity Observation Network





# GEO BON STRATEGIC PLAN 2023-2026





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# Context

Global biodiversity change, including variation within and between species and of ecosystems, is now happening faster than at any time in human history. Recent scientific assessments indicate that two-thirds of the world's ecosystems (both wild and managed) and the benefits they provide to society are now significantly degraded (IPBES 2019). Realizing the vision of living in harmony with nature by 2050 as prescribed by the Kunming-Montreal Global Biodiversity Framework (GBF) of the UN Convention on Biological Diversity (CBD) requires that we monitor and predict the pace of biodiversity change from the smallest to the largest scales in order to define appropriate action for biodiversity conservation.

At this time, the extent of this biodiversity change is outpacing our capacity to monitor and predict how and where biodiversity is changing across vast areas of the globe. Furthermore, the existing biodiversity monitoring capacity, in the form of structured and actively funded monitoring networks, is unequally distributed across the globe. As a result we have an uneven and patchy picture of biodiversity change across countries, taxa and environments.

This shortfall in our understanding of biodiversity change is not due to a lack of technology.

We can now observe the changing state of nature with an array of methods and instruments that can be deployed from the ground, the air, in space, and in the water. This technology and the data it produces must now be used to create knowledge about how biodiversity is changing, how it will change in the future, and what we can do to reverse unsustainable trends.

The Group on Earth Observations Biodiversity Observation Network (GEO BON) enables monitoring of biodiversity and its trends. As a community of practice, GEO BON offers open tools and methods designed to transform our understanding of biodiversity change. The tools translate the data derived from observations to Essential Biodiversity Variables (EBVs) that can be used to capture the many dimensions of biodiversity and generate indicators that convey progress towards the international goals and targets for biodiversity.

GEO BON's experts also build models to detect trends in biodiversity and attribute the causes of this change to various drivers, especially the anthropogenic drivers of biodiversity loss and recovery. These models can also be used to forecast the future of biodiversity under different policy options and scenarios.

> *The consequences of failing to sensibly and effectively manage the environment are profound and far-reaching.*
>
> **Maria Cecilia Londono**
> CO-CHAIR GEO BON

# GEO BON is the flagship of GEO

**GEO BON is a flagship network of GEO, an intergovernmental partnership working to improve the use of Earth observations for policy- and decision-making. With more than 2,800 members in 141 countries, GEO BON is internationally recognized as a key provider of knowledge to national and international organizations, in particular to the Secretariat and Parties to the CBD, Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), and its Member states.**

Over the last 15 years, GEO BON has made significant contributions to knowledge:

1. Established and developed Biodiversity Observation Networks (BONs) and guidance for enabling BONs.
2. Established the concept of Essential Biodiversity Variables (EBVs), as well as the associated Ecosystem Services (EESVs) and the methods for measuring them.
3. Designed and shared a suite of biodiversity indicators to support the measurement of the changing state of nature.
4. Contributed to mainstreaming the EBVs and the need for biodiversity monitoring at the science-policy interface through our engagement with the CBD and IPBES processes.

With the establishment of its community of practice, BONs, and Essential Variables, GEO BON is now entering a new phase, focused on the implementation of our knowledge products. This new phase coincides with the implementation of the new Kunming-Montreal Global Biodiversity Framework by the CBD Parties, a major international effort to which GEO BON has contributed valuable scientific input.

The strategy presented here aligns with that effort and has been crafted in response to the global biodiversity crisis and the great need for knowledge of where and how biodiversity is changing now and in the future to guide action to stem the loss of nature.

This strategic plan defines four focus areas for impact and innovation that GEO BON will focus on in the coming years. These focus areas will support the achievement of GEO BON's new strategic goal – the design, coordination and implementation of a Global Biodiversity Observing System (GBiOS) that brings together the dimensions of knowledge GEO BON has contributed to date.

GEO BON will coordinate the flow of information that uses Essential Variables to monitor trends and enrich the models used for proactive planning and the conservation of biodiversity worldwide. Assembling GBiOS will require renewed and expanded engagement with a broad community of partners and stakeholders involved in biodiversity monitoring and conservation in countries around the world.

# Vision, mission and core values

## Vision

A globally coordinated biodiversity observation and monitoring network providing data and tools to decision-makers, scientists, and the public in all sectors and supporting conservation, management and sustainable use of the world's biodiversity and its contributions to people from local to global levels.

## Mission

GEO BON and its partners support the monitoring of biodiversity change through the coordination and collaboration among biodiversity observation networks, the generation of Essential Biodiversity and Ecosystem Service Variables, and the development of indicators, forecasts and various information services, making them readily available to all users.

## Values

GEO BON adheres to and promotes a set of guiding principles for its members and maintains a code of conduct for all interactions.

| | |
|---|---|
| **Excellence** | Provide high-level expertise in biodiversity science and monitoring to support research, policy and decision-making. |
| **Collaboration and shared purpose** | Support and encourage members, governments, companies and community institutions, and others to work together to advance the mission. Ensure each participatory effort can make a difference, and that participants are aware of that potential. |
| **Transparency and Openness** | Be clear and open about the processes used to gather and share biodiversity information. Learn and apply information in ways that generate new options and support open community engagement for effective biodiversity outcomes. When possible, use open software code repositories, e.g. github, and similar collaborative environments. |
| **Inclusivity** | Equitably incorporate and acknowledge diverse people, voices, ideas, and knowledge to support biodiversity monitoring and data integration and forecasts. Promote a culture of participation across nations, institutions, and people from all sectors that supports the engagement with the global community. |

GEO BON strongly supports the use of **FAIR** (Findable, Accessible, Interoperable, Reusable) and **CARE** (Collective Benefit, Authority to Control, Responsibility, Ethics) principles for scientific data management and stewardship.

# GEO BON Focus Areas

Building on its last decade of developments in biodiversity science, GEO BON will continue to expand its role as a biodiversity knowledge developer by focusing on four areas that will support the achievement of GEO BON's vision and mission as well as the establishment and functioning of GBiOS (Figure 1).

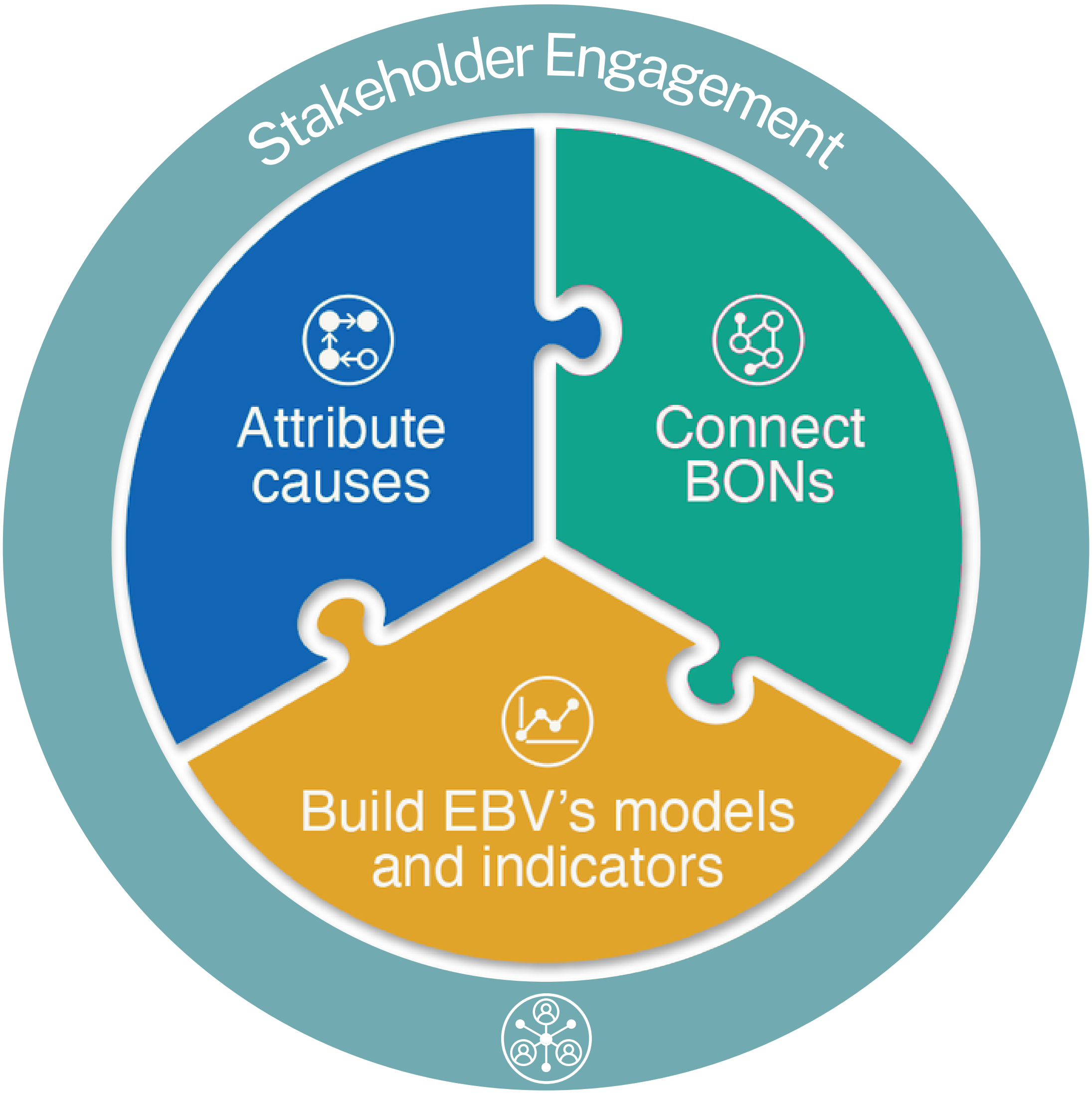


**Figure 1.** The four focus areas of GEO BON's approach to monitoring biodiversity: 1) Connecting and establishing new BONs, producing and sharing data and information within and among BONs, 2) monitoring science built on linked methods for detection and attribution of biodiversity change, 3) the integration of the outputs from monitoring science (e.g., trends and maps of change) to build EBV´s , models and inform the calculation of indicators and their use in conservation planning, prioritization, and action and 4) engagement of stakeholders from all sectors of society in the implementation of the GEO BON strategy.

# 1. Assembling the network of Biodiversity Observation Networks

### BON Network Expansion

GEO BON has established and endorsed a number of national, regional and thematic BONs. We will continue to support the establishment of new BONs and the identification of existing monitoring schemes that could be aligned and connected to the growing BON network, especially where data are missing and most needed (e.g., megadiverse countries undergoing rapid change, freshwater ecosystems under increasing stress, productive marine regions with limited information, etc.). The present monitoring capacities are highly unequally distributed across the globe resulting in a data bias towards certain countries. For example, data from just ten countries account for 82% of all available species records in GBIF (Global Biodiversity Information Facility) and OBIS (Ocean Biodiversity Information System), limiting them to Europe, USA, Australia and South Africa, while all other countries account for 18% of remaining records (Hughes et al. 2021). Other types of data such as freshwater biodiversity data, genetic data and ecosystem services data have similar geographic biases (Mora et al. 2007; Boakes et al. 2010; Miraldo et al. 2016; Oliver et al. 2021; Monchamp et al. 2023).

### Coordinated monitoring

The data collected across BONs capture how different dimensions of biodiversity are changing over time. Biodiversity observations come from opportunistic, systematic and/or structured observations (i.e., remote sensing, observations by people or recording devices made at the same location and time, using standardised methods) typically gathered by different communities, including scientists, citizen-scientists, local communities and indigenous peoples across a network of sites revisited over time. GEO BON will continue to promote the use of standards for data collection and analysis between various monitoring schemes and contribute to linking socio-cultural values in monitoring activities.

Coordinating the monitoring action of BONs, will require linking them as a peer-to-peer network of new and existing BONs. For example, the Asia-Pacific Marine Biodiversity Observation Network was created at the intersection of Asia-Pacific and Marine BONs (MBON) having as mandate the study of marine biodiversity from pole to pole in the Pacific Ocean, across ecosystems, habitats, taxa, and thematic species groups. Integration of the marine, freshwater and terrestrial realms into global biodiversity initiatives is still a major challenge worldwide and GEO BON will ensure an inclusive focus on all realms of biodiversity during the implementation of its new strategy.

## Knowledge sharing & integration

BONs also play an important role in providing the data and information needed to achieve and assess progress towards the targets defined in national biodiversity strategies and action plans (NBSAPs) in response to the goals of the CBD. In this role, BONs provide a strong link between biodiversity monitoring, indicators of progress, model-building, policy and conservation action.

To aid this interaction, GEO BON is updating its online platform for BON development (BON-in-a-box; https://geobon.org/bon-in-a-box/) with a set of tools and a user-friendly interface to allow users to collaborate on developing new BONs or enhancing existing BONs and connecting them to other monitoring schemes. BON-in-a-Box allows a partner to design (or adapt) a BON based on observations, data and knowledge already available and organizations already monitoring biodiversity in the region. This information is combined with models that allow optimization of monitoring site selection for different taxa as a network across a geographic extent and improve the accuracy of biodiversity indicators. The objective of the platform is to help the user to structure monitoring to reduce uncertainty about trends in EBVs and EESVs and the causes responsible for those trends.

# 2. Developing a framework for detection and attribution of biodiversity change

The data gathered through biodiversity monitoring are essential inputs into the science of detecting change in different dimensions of biodiversity, from genes to ecosystems. Trends in the gains and losses of different dimensions of biodiversity are apparent but poorly estimated for most regions and not systematically attributed to their causes.

## Detection & attribution framework

GEO BON is developing guidelines for the detection and attribution of biodiversity change akin to those used by climate scientists to detect anthropogenic climate change and attribute this to extreme weather events (Myers et al. 2021; Gonzalez et al. 2023a). Detection and attribution quantifies the impacts of different forms of anthropogenic drivers in the presence of natural variability in biodiversity. These could range from estimates of the role climate change is playing in driving shifts in species' distributions, to the effect of anthropogenic-induced habitat loss and fragmentation on extinction risk, or the ecosystem benefits of wetland restoration, among others. The attribution of biodiversity change and the solutions that should be delivered also depend on how society perceives and values biodiversity, therefore GEO BON will also focus on the interaction of social values and perceptions as key and essential elements to guide action.

## Integrated monitoring network

A detection and attribution framework envisaged by GEO BON includes an integrated network of BONs and other monitoring schemes operating at multiple scales (Gonzalez et al. 2023b, a). This integration implies that different types of data are made available for different biodiversity dimensions, that those variables are used to produce essential variables along with information about anthropogenic drivers allowing the assessment (detection and attribution) of trends in EBV or EESV-based indicators. It also includes the need to use inference analysis to guide new observations to reduce uncertainty so that new biodiversity models and projections of future trends reduce their uncertainty to better guide policy, planning and conservation action (Figure 2).

## Support conservation action

Knowledge from a detection and attribution framework is needed to plan and prioritise interventions designed to mitigate the effects of drivers on biodiversity. Scenario modeling can support the assessment of long-term outcomes for biodiversity under different policies for conservation action and the outcomes of transformative policies in particular sectors of the economy and society (Leclère et al. 2020, Mori et al. 2021).

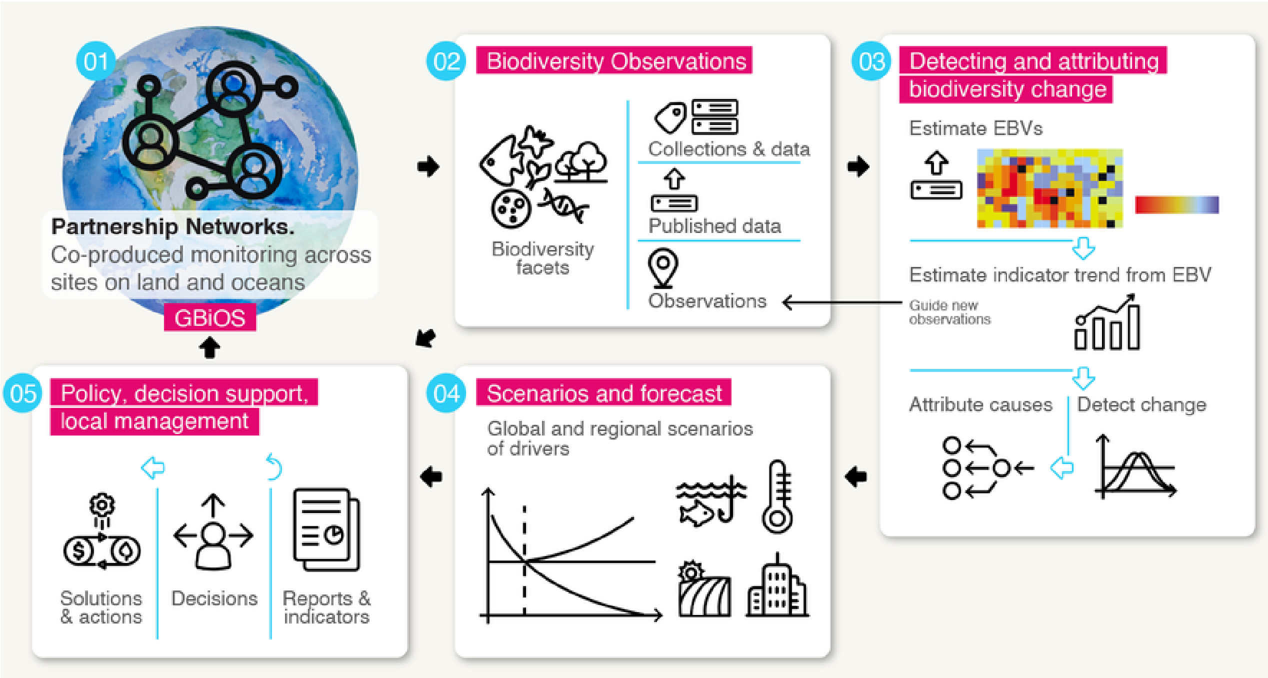


**Figure 2.** A detection and attribution framework envisaged by GEO BON

## 5 steps to detection & attribution of biodiversity change

**1** GBiOS is a comprehensive and integrated network of BONs and other monitoring schemes operating at local, national, and regional scales. Any given BON or monitoring scheme engages in any of the four key steps of the framework:

**2** Historical and contemporary biodiversity observations derived from digital collections, the literature, and from direct or inferred observations collected through remote sensing and in-situ approaches are made available for different biodiversity dimensions;

**3** These raw observations are translated into essential variables along with information about anthropogenic drivers to begin a detection and attribution workflow that assesses trends in EBV or EESV-based indicators across the focal area. These inferences guide new observations to reduce uncertainty;

**4** Biodiversity models informed by the previous step make projections of future trends under different socio-economic scenarios and pathways, including different perceptions and values; these support

**5** Policy and guide conservation action and planning to attain national targets. This harmonized process allows for aggregation of information across all types of monitoring schemes to global inferences made by GBiOS.

# 3. Linking data to models and indicators with essential variables

The purpose of monitoring biodiversity is to gather information about how its different dimensions are changing over time and space. GEO BON has developed a set of Essential Biodiversity Variables (EBVs) and associated Essential Ecosystem Service Variables (EESVs), that standardize what to measure. These are key feedstock to a wide range of biodiversity indicators of relevance to the CBD and to other Multilateral Environmental Agreements (see Geijzendorffer et al. 2015).

## Essential Biodiversity Variables

EBVs are defined as a minimum set of variables that capture the major dimensions of biodiversity change, providing a framework for standardized biodiversity metrics as an intermediate layer between raw observation data and derived indicators. EESVs are those critical to representing the interactions between people and nature, particularly related to how nature contributes to human well-being through multiple ecosystem services. General descriptions of essential variables are available (Pereira et al. 2013, Schmeller et al. 2017, Balvanera et al. 2022) and several GEO BON working groups have produced peer-reviewed publications detailing how to measure and estimate EBVs for different dimensions of biodiversity (Table 1).

EBV data is made available on the EBV Data Portal (https://portal.geobon.org/home), a web-based repository that serves as a central hub for storing, sharing and accessing EBV-related data. It also includes tools and resources for visualizing and analyzing the data. Users have the ability to access datasets with various spatial, temporal and taxonomic coverage to map biodiversity status and trends. New datasets are being added as they become available.

## New data collection technologies

As an ongoing process, GEO BON provides updates on the latest methods for estimating EBVs using new technologies for data collection such as satellite remote sensing (SRS), crowdsourcing, participatory science and social media platforms, and molecular methods (e.g., DNA barcoding, population genomic sequencing, metabarcoding, from organisms or environmental DNA). EBVs are constrained by the availability of data and the challenges of existing geographic and taxonomic biases in the data repositories. These new technologies are currently underutilized by the biodiversity community; for instance, the recent advances in sensor technology, processing, and biodiversity science would enable the use of SRS for new measurements, new indicators, new products, and new insights. SRS is global, periodic, and complementary to the local, irregular acquisition pattern typical of so many in-situ observations. Mainstreaming the use of SRS for biodiversity understanding and monitoring has the potential to be a high impact area.

### Biological & social dimensions

GEO BON will focus not only on monitoring change in biodiversity dimensions but also the contributions and benefits ecosystems provide to people, and in integrating perceptions and values to guide action for conservation. Monitoring biological and social dimensions is essential for developing the indicators required for monitoring GBF, several targets of the Sustainable Development Goals (SDGs), and the UN SEEA (System of Environmental Economic Accounting) process that many countries are adopting.

### Models of biodiversity change

A key area of innovation for GEO BON will be the development of models of biodiversity change. These include global and national models explaining and projecting broad scale shifts in the distribution and turnover of species and ecosystem functions in response to human drivers (e.g. Mori et al. 2021, Newbold 2018, Newbold et al. 2016, Urban et al. 2016). Global models providing forecasts of biodiversity change under different economic and climate change scenarios are in development and are needed to guide conservation action (Leclère et al. 2020). Causal models are also essential to the detection and attribution framework used to guide observations to support strong inference about the causes of biodiversity change as measured by linked essential variables and associated indicators (Stevenson et al. 2021). For example, changes in measures of biodiversity (EBVs) can be connected to changes in ecosystem processes and services, and hence linked to derived benefits to people (EESVs). Monitoring the links among these variables and providing data products showing their links (e.g., Mori et al. 2021) as well as biodiversity-services-benefits will direct actions intended to meet the quantitative targets linking the state of nature in Goal A and the nature contributions to people captured by Goal B of the CBD's new framework.

The development and expansion of EBV and EESV products and services will remain an area of intense activity and impact for GEO BON (Skidmore et al. 2021, Balvanera et al. 2022). The development of models filling data gaps will guide the delivery of better data products.

| Essential Variable class | Description | Reference | Relevance to policy |
|---|---|---|---|
| Genetic composition | A suite of within species genetic variation metrics, including genetic diversity, genetic differentiation, inbreeding, and effective population size. | Hoban et al. 2022 | Goal A, targets 1-5 of the Kunming-Montreal Global Biodiversity Framework, Sustainable Development Goals 13-15. |
| Species populations | Data workflows to harmonize the heterogenous, multi-source data sets across space, time, taxa and different sampling methods for species distributions and abundance worldwide. | Kissling et al. 2018a | Goal A, targets 1-6 of the Kunming-Montreal Global Biodiversity Framework, Sustainable Development Goals 13-15. |
| | A space-time-species-gram that addresses the distribution or abundance of multiple species to enable monitoring of single or several spatial and taxonomic units across spatial scales. | Jetz et al. 2019 | Goal A, targets 1-6 of the Kunming-Montreal Global Biodiversity Framework, Sustainable Development Goals 13-15. |
| Species traits | Intra-specific trait variation capable of allowing the monitoring of how organisms respond to global change. | Kissling et al. 2018b | Goal A, targets 4-6, 8, 9 of the Kunming-Montreal Global Biodiversity Framework, Sustainable Development Goals 13-15. |
| Community composition | Consistent multitaxa surveys and metagenomics at select locations (under preliminary development). | Pereira et al. 2013 | Goal A, targets 1-4, 6, 8 of the Kunming-Montreal Global Biodiversity Framework, Sustainable Development Goals 13-15. |
| Ecosystem structure | Remote sensing of cover (or biomass) by height (or depth) globally or regionally (under preliminary development). | Pereira et al. 2013 | Goals A, B, targets 1-4, 6, 8 of the Kunming-Montreal Global Biodiversity Framework, Sustainable Development Goals 13-15. |
| Ecosystem function | Nutrient output/input ratios measured at select locations. Combine with remote sensing to model regionally (under preliminary development). | Pereira et al. 2013 | Goals A, B, targets 1-12 of the Kunming-Montreal Global Biodiversity Framework, Sustainable Development Goals 13-15. |
| Ecosystem services | First proposed set of Essential Ecosystem Service Variables (EESVs) to understand links between nature and people comprised of ecological supply, anthropogenic contribution, demand, use, instrumental and relational values. | Balvanera et al. 2022 | Goal B and targets 2, 5, 9-13 of the Kunming-Montreal Global Biodiversity Framework, support future IPBES assessments to track progress towards the Sustainable Development Goals (12-15). |

**Table 1.** The classes of Essential Variables developed by GEO BON, disseminated through peer-reviewed publications, and their relevance to international policy. Several Essential Variables have been formally described while others are under development.

# 4. Stakeholder engagement

GEO BON is entering a phase of deepening engagement with stakeholders to drive knowledge-to-action outcomes. Part of this need stems from a growing concern that scientific evidence is not making its way into practice as effectively and quickly as it should. Moreover, great value is placed on the importance of transparency and trust in the methods used to assess and convey biodiversity change under different policies.

### Knowledge to Action Hubs

With this in mind, GEO BON will establish Knowledge to Action Hubs (K2A Hubs) dedicated to the co-design and development of knowledge products (EBV and ESSV datasets, indicators, models etc.) with our partners (see section on Partnerships). A Knowledge to Action Hub (K2A Hub) is a group of GEO BON members and partners that links the knowledge user community with GEO BON's knowledge production teams.

### Iterative & cyclical

A K2A Hub uses an iterative and cyclical method for formal collaboration, learning and innovation designed to foster the development of knowledge needed by partners. The hubs will implement the "knowledge-to-action" framework (Graham et al. 2006) that begins by identifying the knowledge need and gap. The work of a K2A Hub involves three stages:

1. knowledge generation (first-generation knowledge produced by members)
2. knowledge synthesis (second-generation knowledge)
3. creation of tools and/or knowledge products (third-generation knowledge)

These knowledge types then enter a cycle where they are adapted, assessed, implemented, monitored, evaluated and their use sustained. Over time the hub may continue refining this knowledge or switch to a new knowledge need.

### Assembly of expertise

These K2A Hubs will assemble expertise from across the biodiversity community, including the existing set of GEO BON's Working Groups and Task Forces, as well as partners, in response to specific needs from the user community. The initial K2A Hubs will focus on indicators of biodiversity change, modeling scenarios of biodiversity change, detection and attribution framework, and BON development and enhancement.

# Goal and outcomes

## GEO BON Strategic Goal: A Global Biodiversity Observing System (GBiOS)

GEO BON's main strategic goal for the next five years is the establishment of a **Global Biodiversity Observing System (GBiOS)** that will monitor how, where, and why biodiversity is changing on land and in the water.

A GBiOS is a *comprehensive and integrated network* of BONs and other monitoring schemes operating at *local, national, and regional scales* that are interconnected to enable a global picture of where, why and how fast *biodiversity change* occurs. This is essential for informing and *guiding conservation action* on the ground to protect nature and the benefits it provides to humankind (Figure 4).

| **GEO BON** | **GBiOS** |
|---|---|
| GEO BON is an international network of networks based on volunteers who contribute their expertise to build knowledge products and services on raw biodiversity observations. Such products include the suite of EBVs, EESVs and indicators used to document biodiversity change at various spatial and temporal scales, and services such as the advice on designing and implementing monitoring networks. | GBiOS is a system of linked BONs and monitoring schemes that include dedicated infrastructure and human resources to collect, store, analyze and interpret biodiversity observations to predict biodiversity trends under different scenarios to directly support national sustainable development and conservation policy and better guide action towards the 2050 UN vision of 'living in harmony with nature'. The knowledge needed to build GBiOS will be provided by GEO BON and its partners. |

GBiOS can be assembled by leveraging existing capacity and data in addition to linking national and regional biodiversity monitoring networks along with strategic investment in monitoring to fill priority spatial, temporal or taxonomic gaps. There are thousands of monitoring schemes worldwide that are meeting regional and local needs but there is little coordination among them thereby limiting their full potential to provide a more complete and accurate view of biodiversity change (Moussy et al. 2022). In addition, GEO BON encompasses a series of national, regional, and thematic BONs that cover aquatic and terrestrial ecosystems (Table 2 but see Supplementary Table 1 in Gonzalez et al. 2023b). These existing BONs and monitoring schemes are the infrastructural starting point for GBiOS.

| |
|---|
| **Thematic** |
| MBON (Marine Biodiversity Observation Network) |
| FW BON (Freshwater Biodiversity Observation Network) |
| Soil BON |
| Omic BON |
| **Regional** |
| Arctic BON |
| Asia-Pacific BON |
| EuropaBON |
| **National** |
| China BON |
| Colombia BON |
| French BON |

**Table 2.** List of existing BONs endorsed by GEO BON through a formal process

The next phase of GEO BON is to establish the technical and human capacity to facilitate coordination and collaboration among the world's monitoring schemes so that information is exchanged, collated and analysed in a more standardized fashion to produce integrated knowledge updates about the changing state of biodiversity at national, regional and global levels. Expanding the coverage and interlinkages of BONs is an important part of that process.

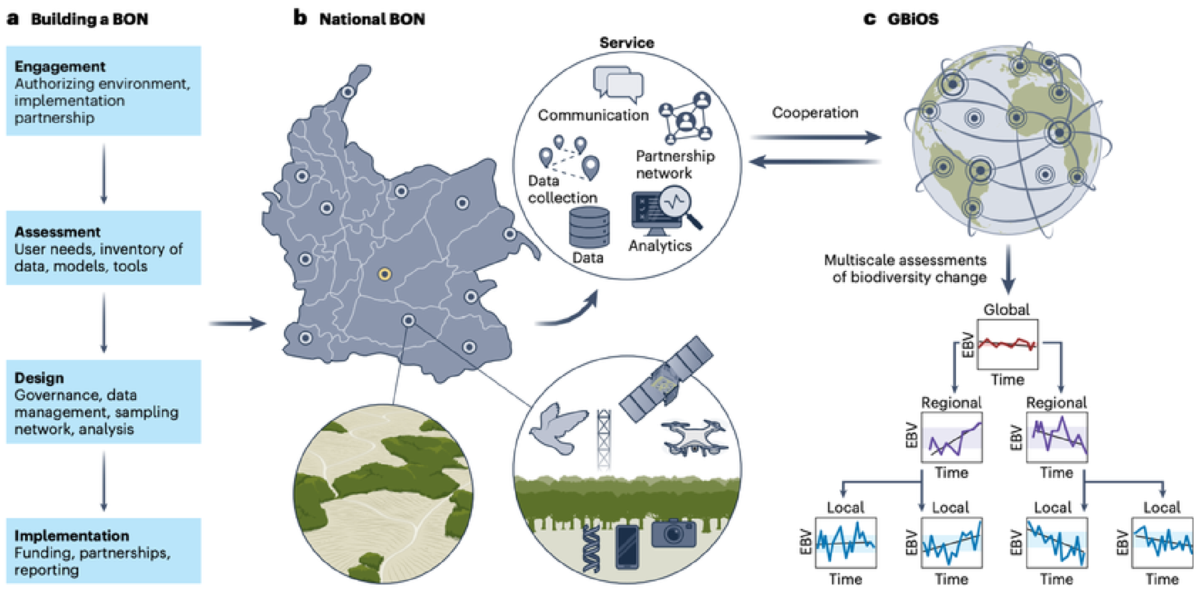


**Figure 4:** A GBiOS as a global network of interconnected national and regional BONs to assess biodiversity trends worldwide (taken from Gonzalez et al 2023b). An overview of GBiOS and its services offered to those communities and stakeholders using biodiversity monitoring information and knowledge. GEO BON's working groups and Knowledge-to-Action hubs will work together to contribute the knowledge needed to build GBiOS.

To execute this strategic plan, GEO BON has identified the following outcomes to be achieved by 2026. These outcomes link to the four focus areas and the strategic goal.

1. A prototype GBiOS will be assembled as a network of observations, data providers, and other partners to guide further development. GEO BON's two knowledge platforms, namely BON-in-a-Box and the EBV Data Portal, will support this process. A dedicated K2A Hub will support BON development and enhancement.

2. The Detection and Attribution framework will be built via a dedicated K2A Hub, tasked with the creation of products, models and methods to formalize and standardize the detection and attribution of biodiversity change to anthropogenic drivers.

3. A pipeline for data-to-indicators workflows will be built via a K2A Hub designed to respond to the need of CBD Parties for national reporting based on headline, component and complementary indicators in GBF, and will be available to use by different stakeholders through BON-in-a-Box.

4. Provide projections of the future of global biodiversity informed by monitoring under different social and economic scenarios including the formation of standards for model intercomparison.

5. All GEO BON members and other partners will be invited to engage in this work via regular meetings and conferences. A special focus will be given to the inclusion of communities that traditionally may have been overlooked in biodiversity monitoring schemes (citizen scientists, Indigenous peoples and local communities, women and youth). We will also foster engagement via GEO BON's online platforms that are intended to scale up coordinated biodiversity monitoring efforts across national and regional BONs.

# Enhancing Partnerships

GEO BON was established in 2008 and was soon recognized as a flagship network of GEO. For the past 15 years, GEO BON has been working with GEO member countries and international organizations to advance the efficient and effective collection, management, sharing, and analysis of data on the status and trends of the world's biodiversity. Through a growing network of experts, GEO BON built its role of supporting international bodies conducting biodiversity assessments, including species and ecosystems.

In the next phase, GEO BON will enhance its partnerships to grow its contribution to the process of transformative change needed to reach the global biodiversity goals and targets.

The involvement of individuals and local communities in biodiversity monitoring leads to greater knowledge, greater trust, and greater engagement in conservation actions (Kühl et al. 2020). GEO BON is currently upgrading its online platform for BON development (BON-in-a-Box) to become a monitoring knowledge platform that will allow users at all scales to report, share, and benefit from their biodiversity monitoring activities. Establishment of networks that are inclusive of a diverse range of stakeholders across societal sectors enables sharing of knowledge about biodiversity change. Engaging and sharing this knowledge is a primary strategic goal of GEO BON.

Many government agencies and commercial enterprises are developing biodiversity monitoring strategies to support their own nature-positive agendas and to satisfy regulations and/or commitments to regional and international conventions (e.g., UN CBD, UNFCCC, UNCCD, European Directives). Thus, there is a growing need for a harmonized set of biodiversity data and indicators, with best practices grounded on robust knowledge.

This next GEO BON phase will see increased engagement with partners in the private and non-profit sector as they take on board best practices and recognized standards in biodiversity monitoring and indicator use. GEO BON will continue working with the scientific community, international organizations, UN agencies and various levels of governments to provide the knowledge and services needed for biodiversity monitoring.

GEO BON has long-standing partnerships with intergovernmental and non-governmental organizations (UN CBD, IPBES, UN SEEA). These partnerships are critical to the uptake of GEO BON's methods, products and platforms. We will increase our engagement with various stakeholders that are expressing a need for biodiversity monitoring methods, data and indicators across organizations in a broad range of sectors of the society.

As a GEO flagship, GEO BON will enhance and create new partnerships and collaboration with other GEO flagships, activities and initiatives in order to accomplish the GEO Work Programme 2023-2025 and post-2025 activities.

GEO BON's Secretariat and K2A Hubs will foster interacting partnerships across multiple levels of government (national, sub-national, local), the research community, the Earth observation community, businesses, industry and local communities. These multilateral partnerships will be necessary to ensure the realization of GEO BON's mission and foster the mainstreaming of biodiversity knowledge especially in the context of realizing the goals and targets of the Global Biodiversity Framework and the Sustainable Development Goals.

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