



# Global Biodiversity Observing System – GBIOS Workshop BIOSPACE25

Alice Hughes & Andy Gonzalez



# Agenda



3:00 - 4:30 PM: Presentations and discussion

Coffee Break – 30 mins

5:00 - 6:30 PM: Break out groups



Dr. Andrew Gonzalez  
Prof. McGill U, Quebec Centre for Biodiversity Science



Dr. Andrés Mármol-Guijarro  
Post Doc, German Centre for Integrative  
Biodiversity Research (iDiv)



Dr. Alice Hughes  
School of Biological Sciences,  
University of Hong Kong



Dr. Yelena Finegold,  
Forestry Officer, FAO



Dr. Gary Geller  
Senior Expert for Biodiversity and Ecosystems NASA Jet  
Propulsion Laboratory

## Speakers



# Global Biodiversity Observing System GBIOS

**Andrew Gonzalez**  
Co-chair GEO BON  
Liber Ero Chair, McGill University



United Nations



**ipcc**

INTERGOVERNMENTAL PANEL ON  
climate change



**GLOBAL OBSERVING  
SYSTEMS**



United Nations



Science and Policy  
for People and Nature



**GLOBAL BIODIVERSITY  
OBSERVING SYSTEM**

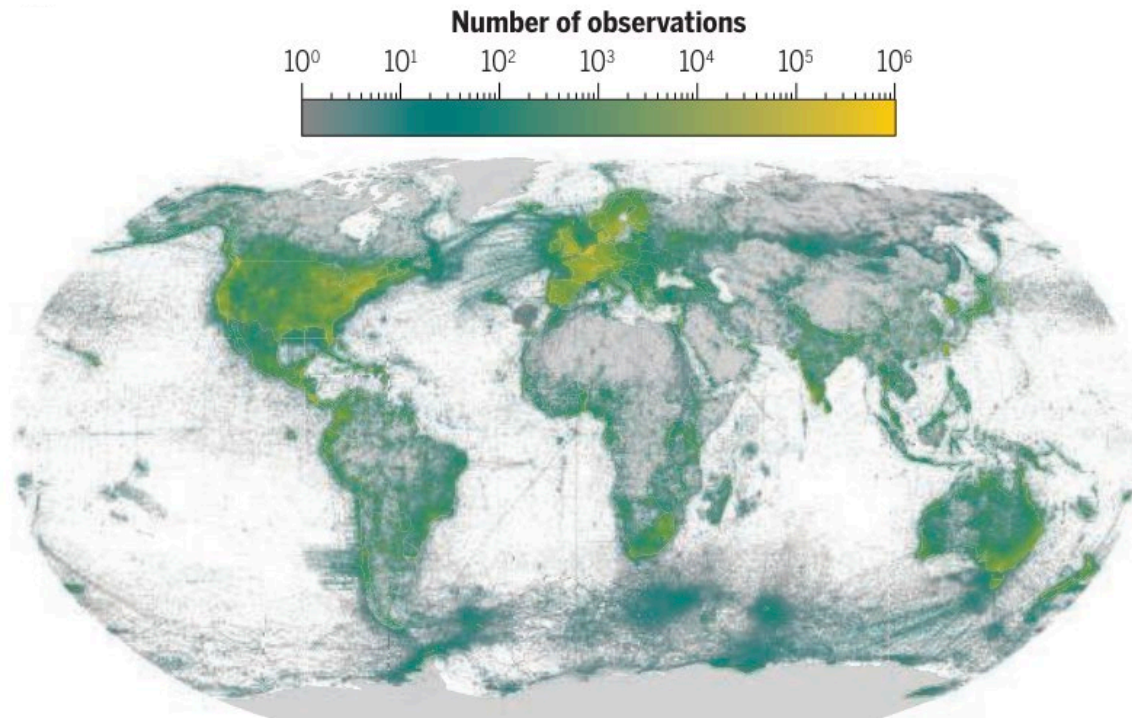
Cite as: A. Gonzalez, M. C. Londoño,  
*Science* 10.1126/science.adg1506 (2022).

## Monitor biodiversity for action

**Andrew Gonzalez and Maria Cecilia Londoño**

Andrew Gonzalez is a co-chair of GEO BON and a professor in the Department of Biology at McGill University, Montreal, Canada. [andrew.gonzalez@mcgill.ca](mailto:andrew.gonzalez@mcgill.ca)

Maria Cecilia Londoño is a co-chair of GEO BON and a researcher at the Alexander von Humboldt Biological Resources Research Institute in Bogota, Colombia. [mlondono@humboldt.org.co](mailto:mlondono@humboldt.org.co)



- Data gaps & inequities among nations
- Data sovereignty
- Accessible workflows for indicators
- Monitoring for planning and action
- Multilateral collaboration

### POLICY FORUM

#### BIODIVERSITY

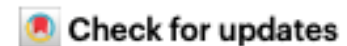
## Biodiversity monitoring for a just planetary future

Data that influence policy and major investment decisions risk entrenching social and political inequities

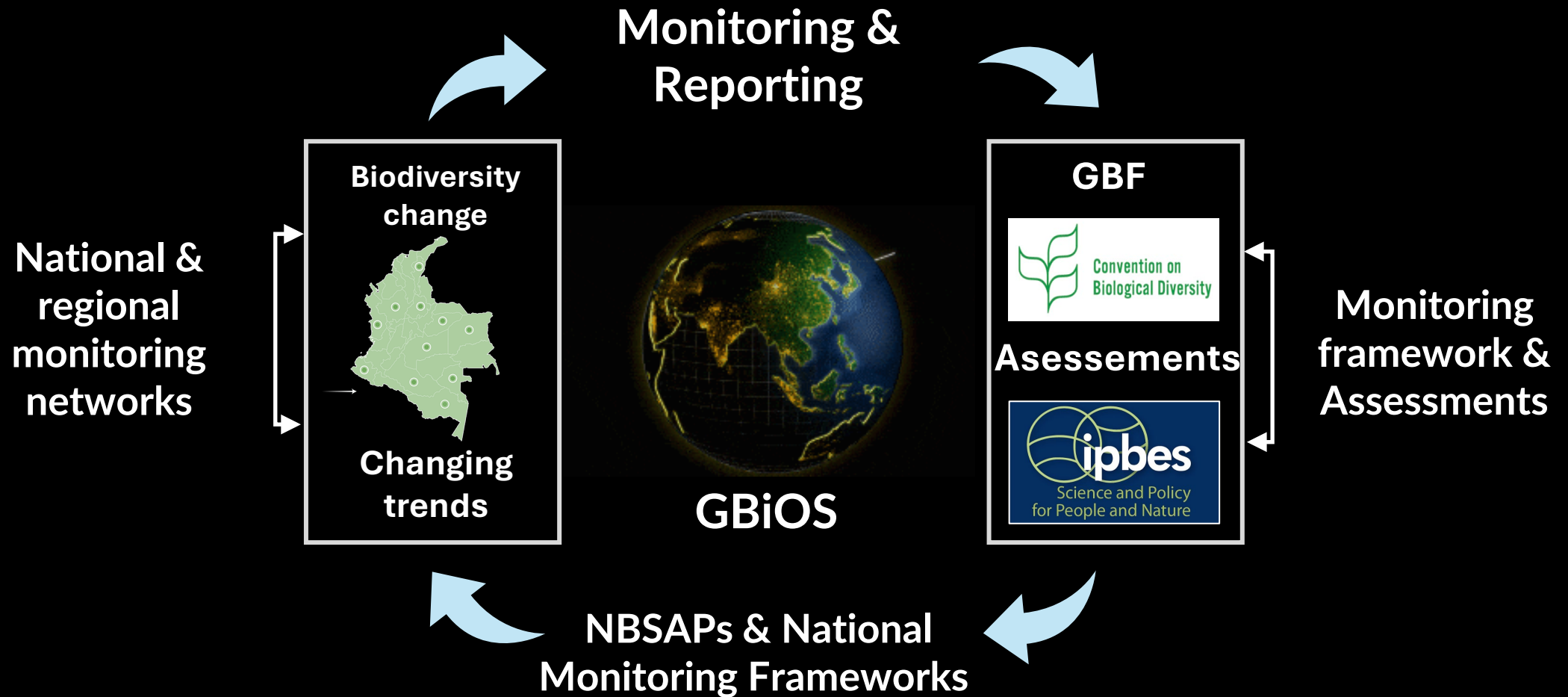
Chapman et al. 2024 *Science*

# A global biodiversity observing system to unite monitoring and guide action

**Andrew Gonzalez, Petteri Vihervaara, Patricia Balvanera, Amanda E. Bates, Elisa Bayraktarov, Peter J. Bellingham, Andreas Bruder, Jillian Campbell, Michael D. Catchen, Jeannine Cavender-Bares, Jonathan Chase, Nicholas Coops, Mark J. Costello, Maria Dornelas, Grégoire Dubois, Emmett J. Duffy, Hilde Eggermont, Nestor Fernandez, Simon Ferrier, Gary N. Geller, Michael Gill, Dominique Gravel, Carlos A. Guerra, Robert Guralnick, Michael Harfoot, Tim Hirsch, Sean Hoban, Alice C. Hughes, Margaret E. Hunter, Forest Isbell, Walter Jetz, Norbert Juergens, W. Daniel Kissling, Cornelia B. Krug, Yvan Le Bras, Brian Leung, Maria Cecilia Londoño-Murcia, Jean-Michel Lord, Michel Loreau, Amy Luers, Keping Ma, Anna J. MacDonald, Melodie McGeoch, Katie L. Millette, Zsolt Molnar, Akira S. Mori, Frank E. Muller-Karger, Hiroyuki Muraoka, Laetitia Navarro, Tim Newbold, Aidin Niamir, David Obura, Mary O'Connor, Marc Paganini, Henrique Pereira, Timothée Poisot, Laura J. Pollock, Andy Purvis, Adriana Radulovici, Duccio Rocchini, Michael Schaepman, Gabriela Schaepman-Strub, Dirk S. Schmeller, Ute Schmiedel, Fabian D. Schneider, Mangal Man Shakya, Andrew Skidmore, Andrew L. Skowno, Yayoi Takeuchi, Mao-Ning Tuanmu, Eren Turak, Woody Turner, Mark C. Urban, Nicolás Urbina-Cardona, Ruben Valbuena, Basile van Havre & Elaine Wright**

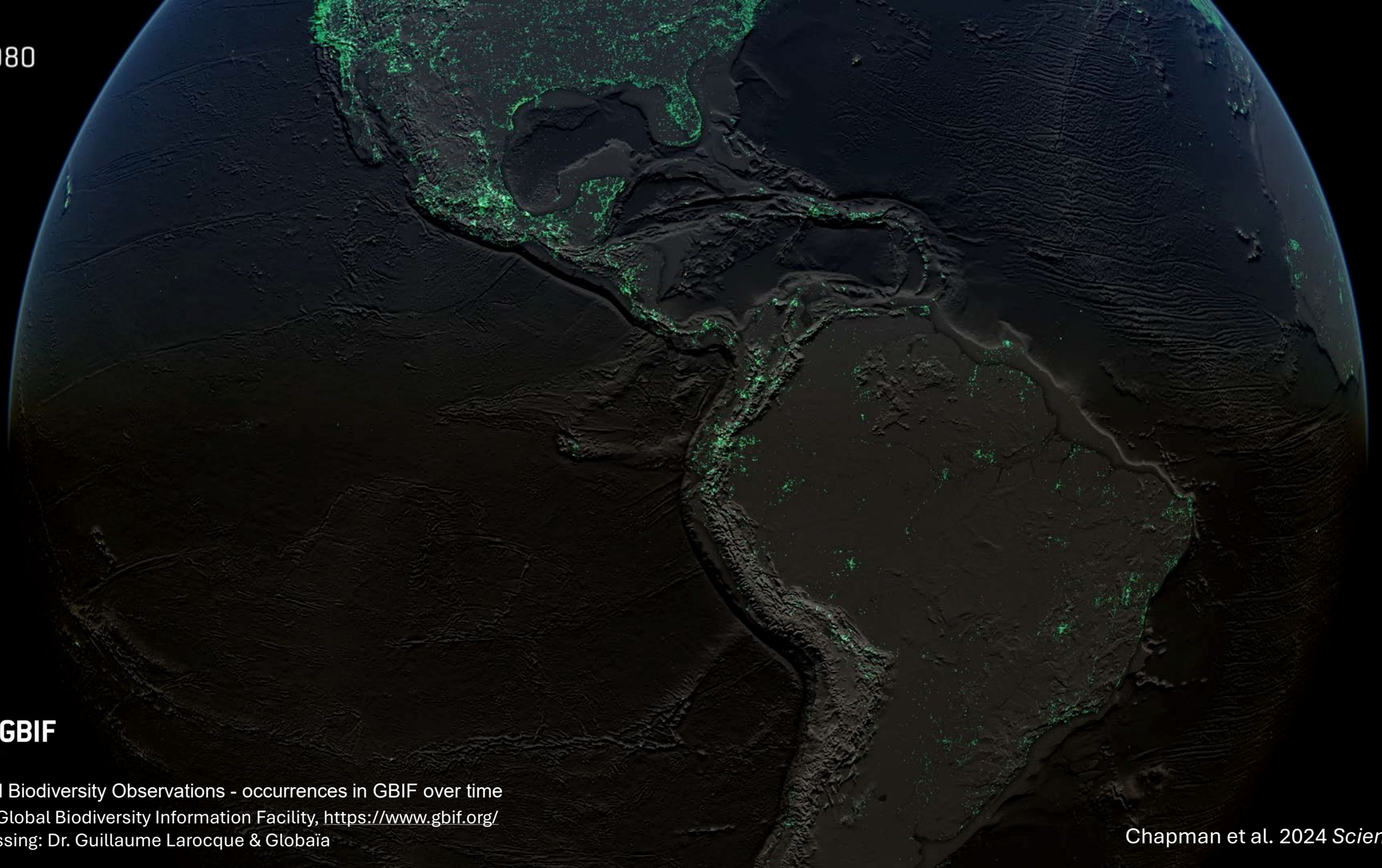


# Biodiversity observations guiding policy and action



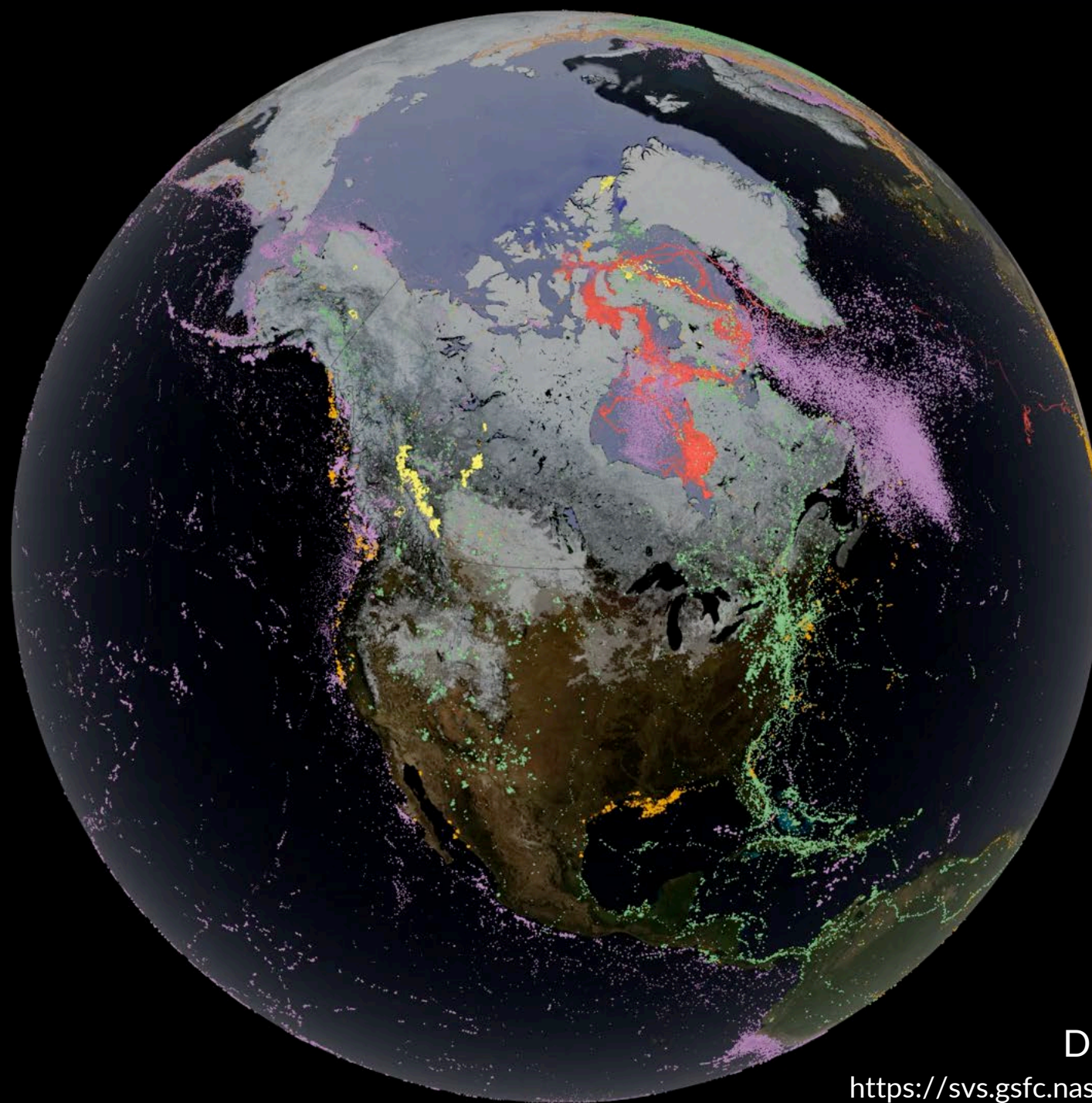
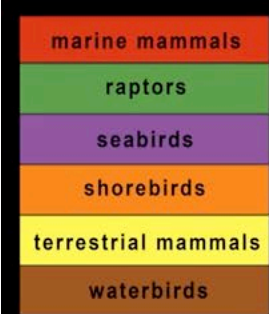


1980



Global Biodiversity Observations - occurrences in GBIF over time  
Data: Global Biodiversity Information Facility, <https://www.gbif.org/>  
Processing: Dr. Guillaume Larocque & Globaia

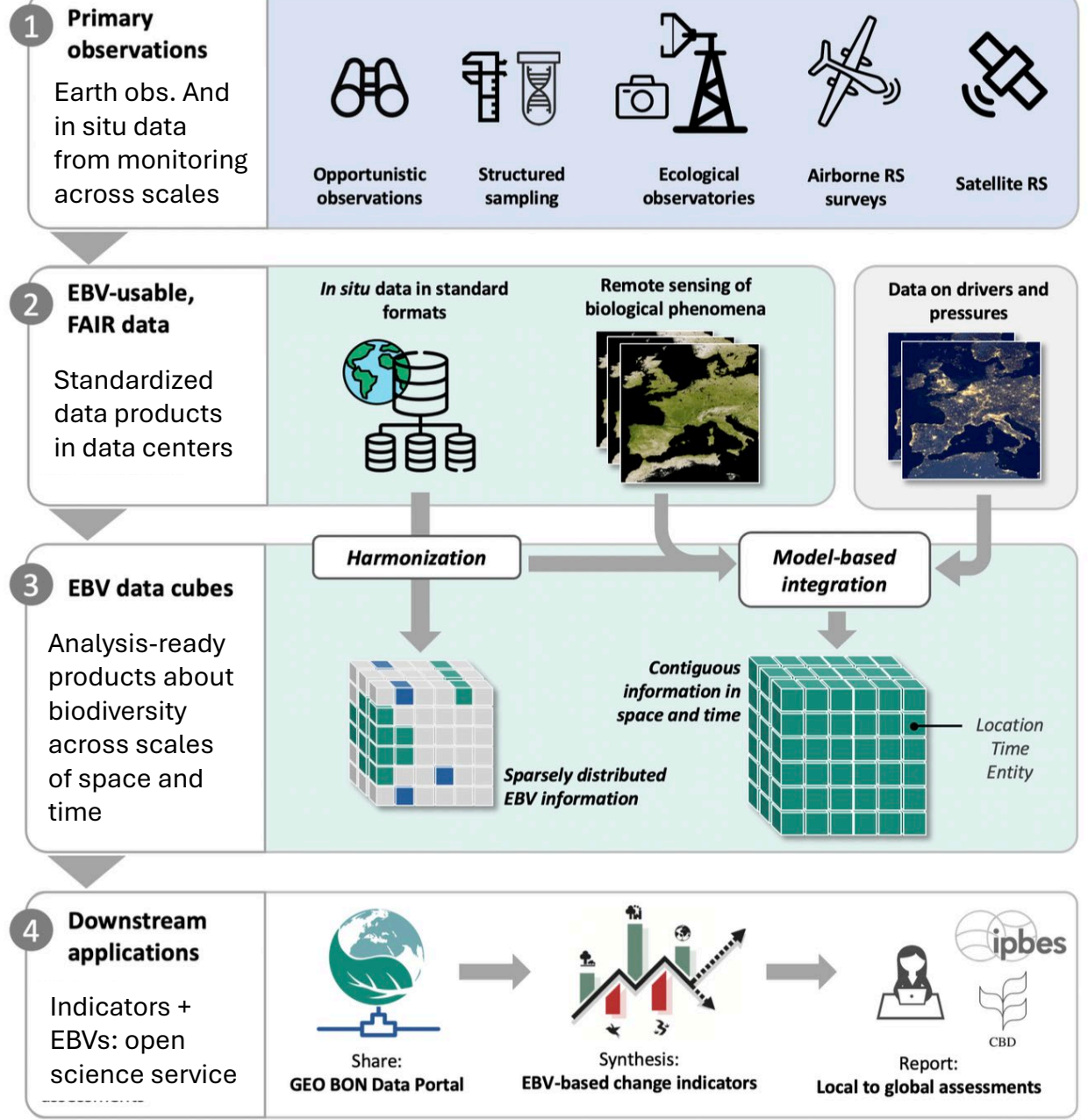
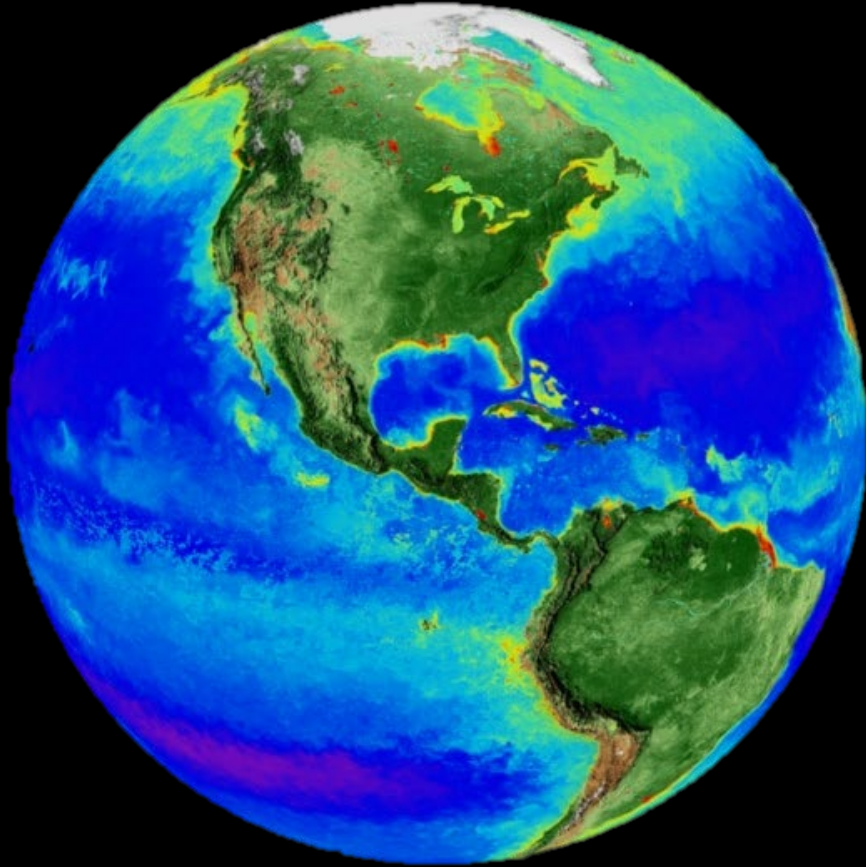
Chapman et al. 2024 *Science*

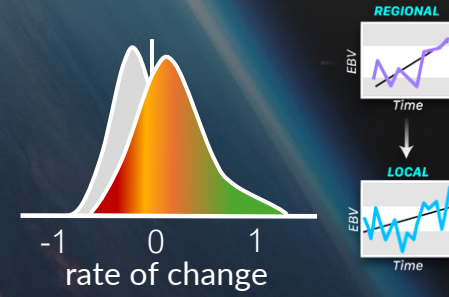
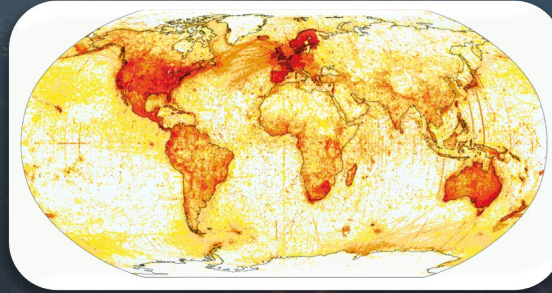


Jan 01

Davidson et al. 2020 *Science*  
<https://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4877>

## From observations to indicators





Earth Observations by BONs across the globe

International access to processed observations

EBV datasets, forecasting, EW & advisory products



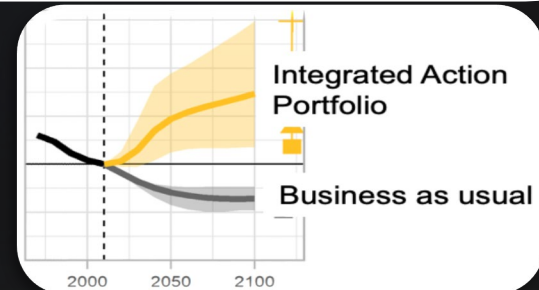
# A Global Biodiversity Observing System



Effective policy and action

Delivery of indicators for reporting

Global biodiversity models & scenarios





20. Invites other **Governments to enhance international cooperation**, including by providing adequate, timely and predictable financial resources, capacity-building and development, technical and scientific cooperation and technology transfer, to address the technical and financial challenges faced by developing country Parties **in the implementation of the monitoring framework;**

21. [Requests the Global Environment Facility to provide adequate, timely and predictable **financial resources for the development and implementation of national monitoring systems** in a transparent manner and following a consultative process...]

23. Requests the SBSTTA, at a meeting held before the 17<sup>th</sup> COP, to review the needs of Parties in the implementation of the monitoring framework and consider how to **address any technical or capacity gaps, including through strengthening national biodiversity observing systems and connecting national systems at the regional and global level;**

# Building BON

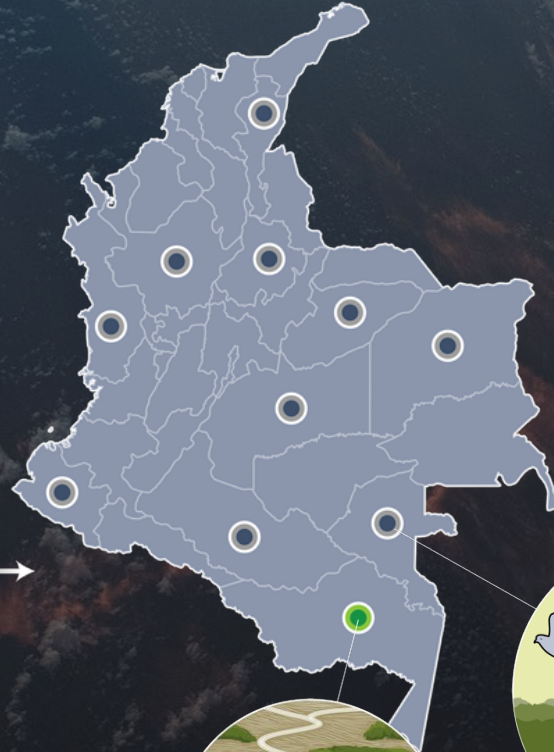
**Engagement**  
Authorizing environment, implementation partnership

**Assessment**  
User needs, inventory of data, models, tools

**Design**  
Governance, data management, sampling network, analysis

**Implementation**  
Funding, partnerships, reporting

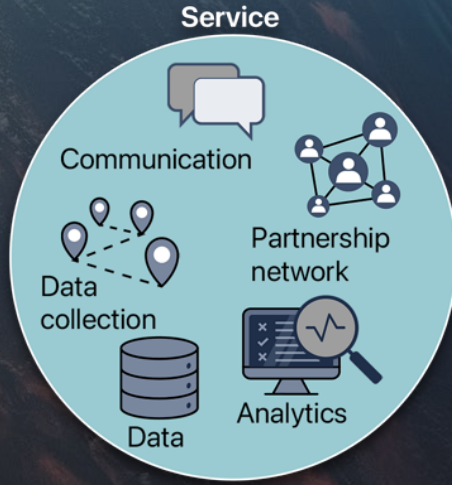
# National BON



EBVs



# GEO BON

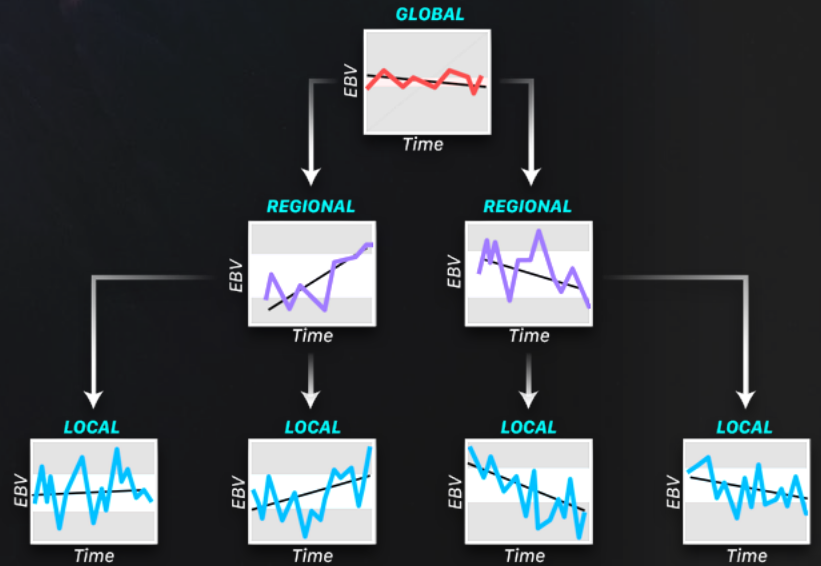


Cooperation

# GBIOS



Multiscale assessments of biodiversity change



# Assembling National, Regional and Thematic BONs

A significant starting point for the GBiOS network: National, regional, and thematic networks.



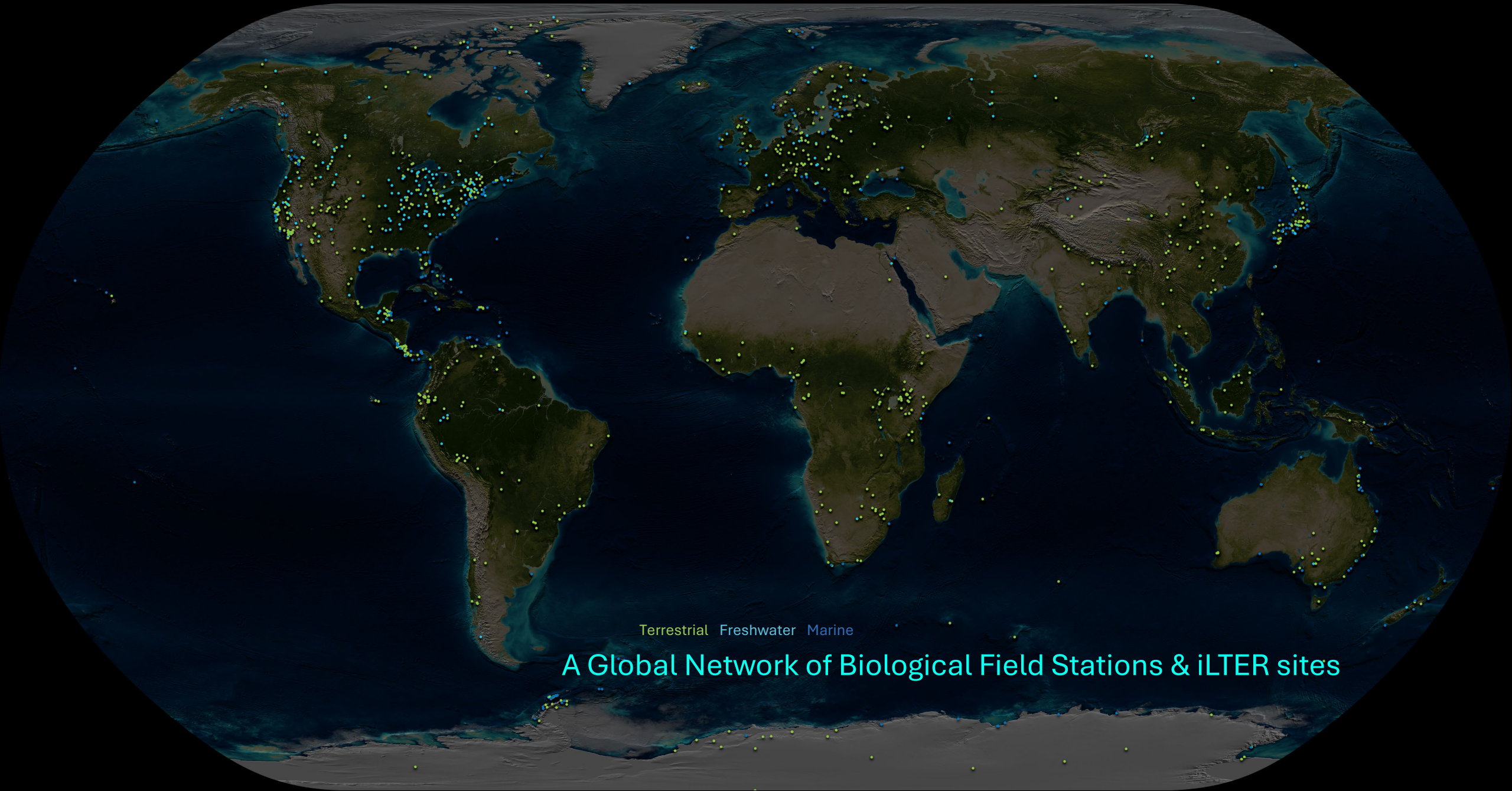
MBON

Soil BON

FWBON  
Freshwater Biodiversity Observation Network

EUROPABON



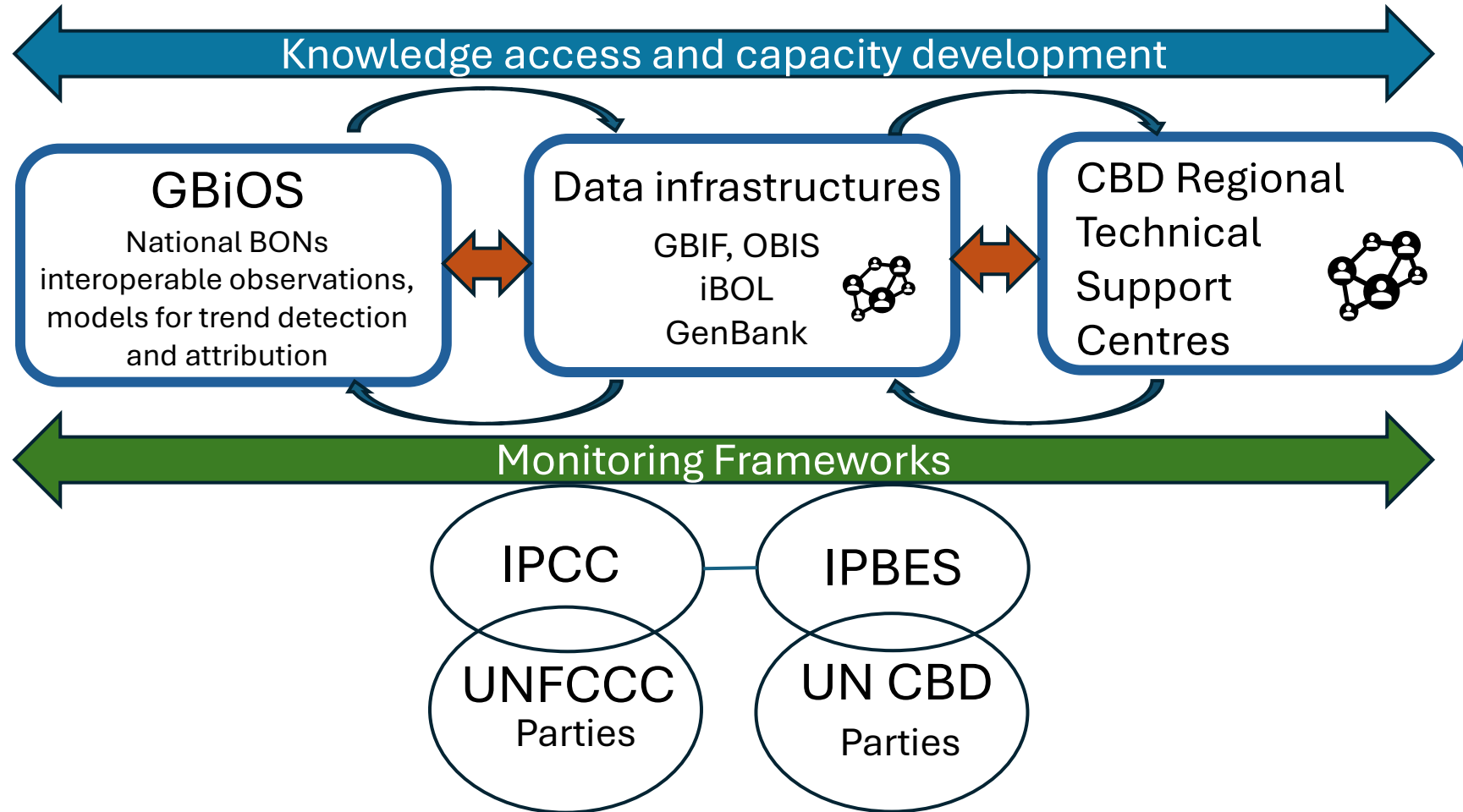


Terrestrial Freshwater Marine

## A Global Network of Biological Field Stations & iLTER sites



# Linking Global Biodiversity Monitoring, Data infrastructures & Knowledge Support Services



# GBiOS – a few next steps

## **IPBES Assessment on Monitoring Biodiversity & ES:**

**Will** assess the 1) data and systems available and needed to calculate the indicators of the monitoring framework GBF; 2) assess the current capacity, capability and resources to collect and analyse data at the national and global scales

## **Cooperation:**

In decision 15/8, COP established a technical and scientific cooperation mechanism comprising a **network of regional support centres**.

## **Co-sponsorship and governance:**

One option could be for GBiOS to follow the solution taken by the Global Climate Observation System that is **co-sponsored by several intergovernmental organizations** (WMO, ISC, UN Env.).

## **Funding:**

GEF-9: A UN Trust multi-partner fund like the **Systematic Observations Financing Facility (SOFF)** supporting LDC and SIDS to fill the monitoring gap: funding for technical, technological and institutional capacity for observations.

<https://un-soff.org/>



Thank you

# Coffee Break

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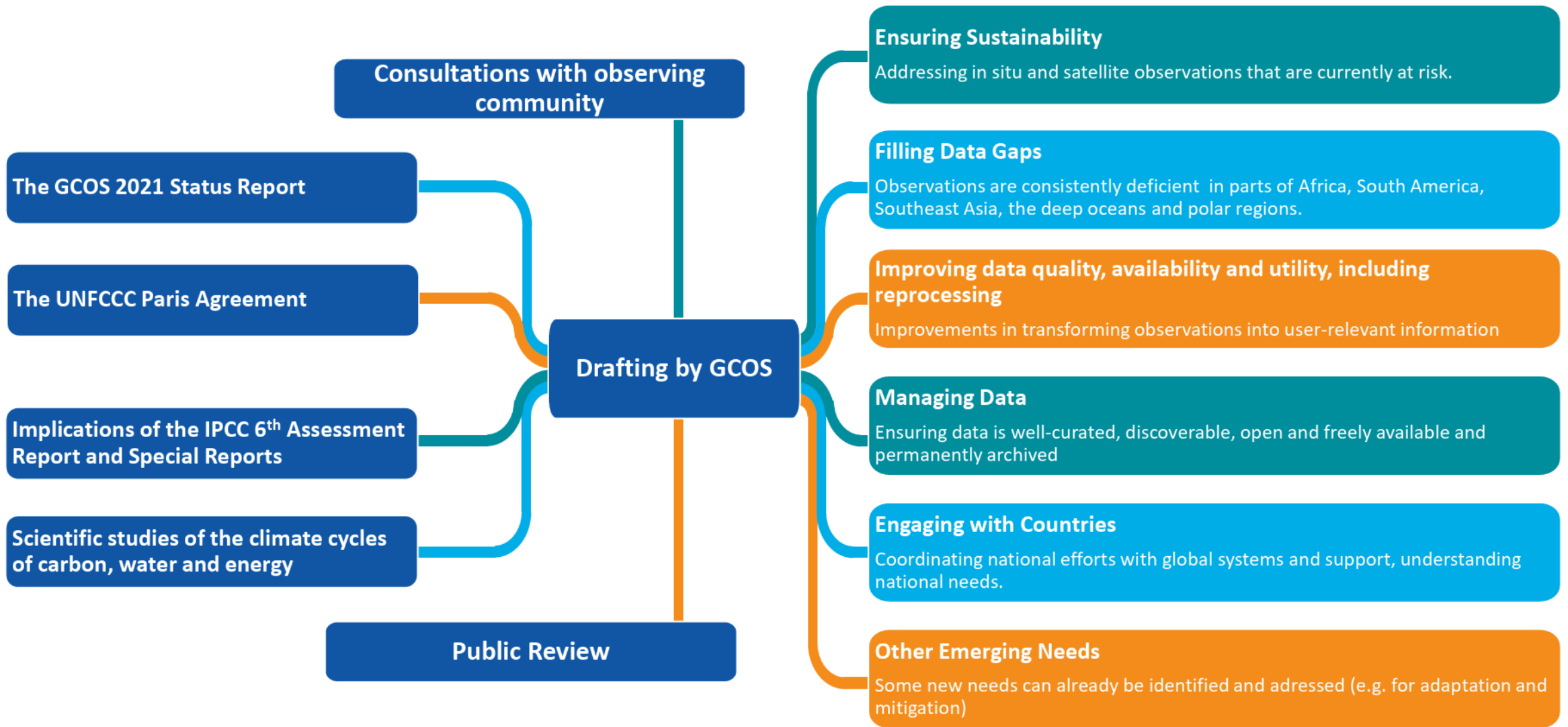
We need to develop an implementation plan for GBiOS: what are the pillars of this plan?

The GBiOS implementation plan would identify the major practical actions that should be undertaken in the next 5-10 years.

The GCOS plan identifies six major themes that should be addressed, and within each theme, several actions are identified and described.

I like them because they are very similar to our own. Here are 7 that make sense to me.

# Global Climate Observing System – Implementation Plan Process



Main Inputs



Broad Engagement



Themes for Action

# GBIOS - Towards an Implementation Plan

1. Filling data gaps (**Alice**)
2. Ensuring sustainability (**Andy**)
3. Engaging with countries (**Andres**)
4. Managing data for use (EBVs to indicators) (**Jory Griffiths**)
5. Global Biodiversity Data Centres (**Steven Ramage**)
6. Improving data quality, availability, and utility, including reprocessing (**Yelena**)
7. Coordinating observing infrastructures (**Gary**)

# Guiding questions for break out groups

**Nominate a note-taker and presenter (for reporting back in plenary)**

- What are the main aims and objectives?
- Who/which organizations need to be engaged? Authorizing environment
- What are the major barriers/challenges that need to be overcome?
- What are the existing opportunities (possible solutions) for mobilizing human capacity, technical interoperability etc.?



# To Google slides



Andy



Alice



Gary



Steven



Yelena

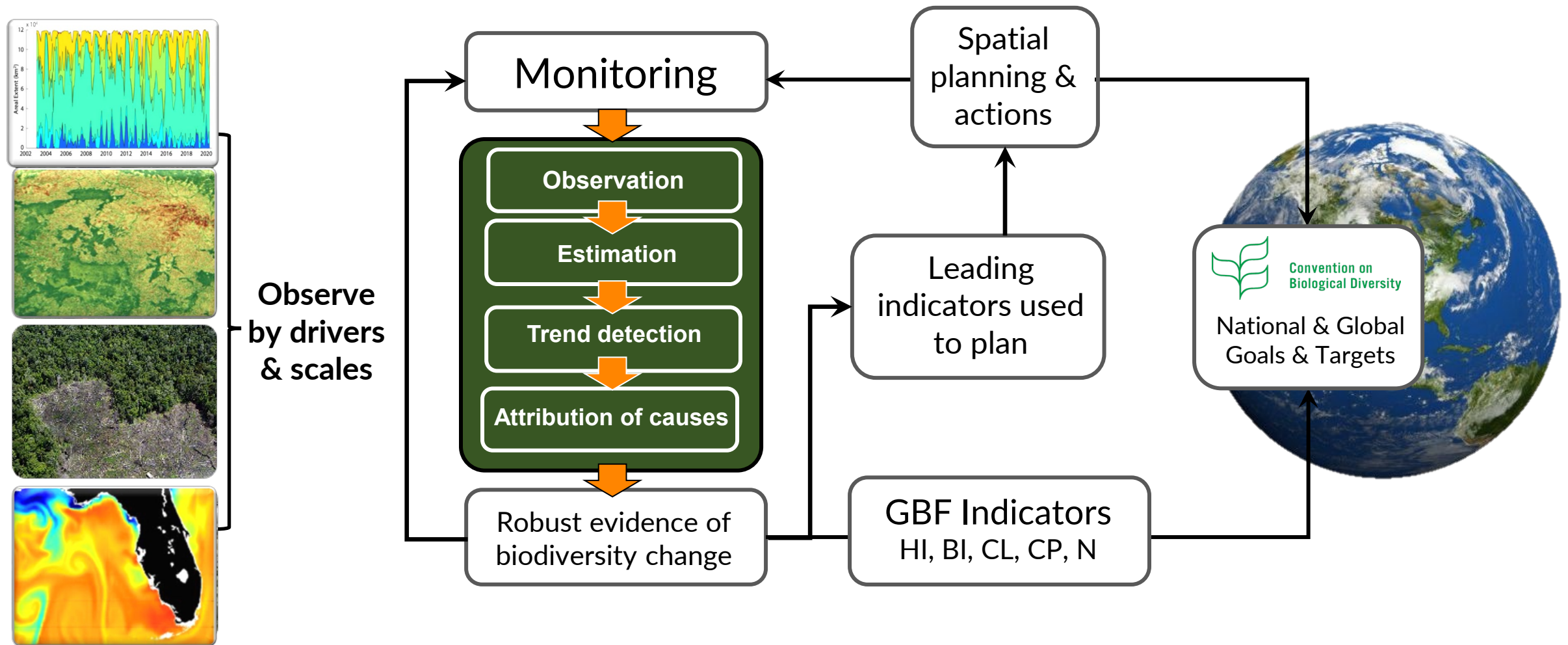


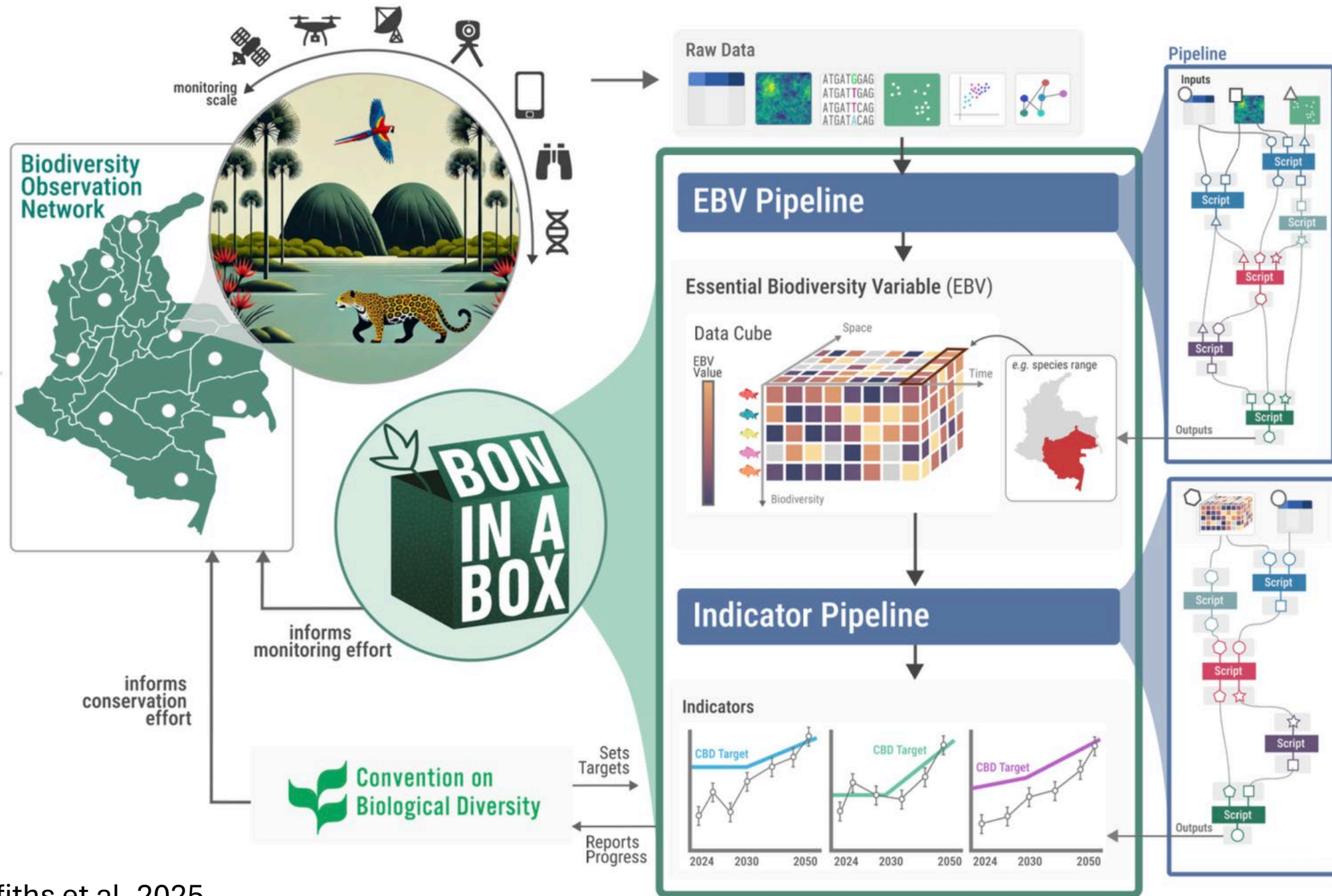
Jory



Andres

# Monitoring biodiversity to support planning and action





# Questions

1. National and regional monitoring systems are the building block of GBiOS (BONs) – how can we link and coordinate them effectively to form a worldwide network of sites that is representative of current and expected trend change?
2. Can we improve understanding of Essential Biodiversity Variables and Essential Ecosystem Service Variables and their role in monitoring and indicators?
3. What data analysis systems are needed to monitor trend detection and attribution across a range of scales of space and time?
4. Can GBiOS support a global biodiversity modelling and forecasting service? Can workflows in platforms like BON-in-a-Box integrate remotely sensed and ground collected data to provide emergent understanding of trends?
5. How might we position GBiOS as a complement to existing global observing systems? Can we calculate the benefits (value) and avoided costs to society of this system?

- 1. Filling data gaps:** This theme points to gaps that have been identified in the existing observing system. Current observations fulfil many requirements and provide the basis for many useful datasets and EBV products.
- 2. Ensuring sustainability:** Sustained funding is essential to ensure the continuity and the expansion needed for many in situ observations of EBVs. While some observations have sustained long-term funding, many are supported through short-term funding, with a typical lifetime of a few years, leaving the development of long-term records extremely vulnerable.
- 3. Engaging with countries:** GBiOS links national monitoring efforts into the global system, providing information on observing needs, promoting needs for support and access to information. Ultimately the benefits of biodiversity observations need to be widely understood and the contributions of national observations to global datasets enhanced.
- 4. Managing data for use (EBVs to indicators):** Workflows must be preserved and made available in perpetuity. Every EBV needs to have one or more recognized global data repositories that are well-curated, provide free and open access to data, and workflows (e.g. BON in a Box). This service is sustainable with clear guidance for users.
- 5. Global Biodiversity Data Centres** would follow defined principles such as the TRUST, FAIR and CARE Principles. Data rescue from hard copy or archaic digital formats allows data series to be extended in the past and needs to be adequately planned and funded with the results openly and freely available. This theme aims to organize data rescue, data sharing, data curation and data provision.
- 6. Improving data quality, availability, and utility, including reprocessing:** This theme aims to organize more efficiently data rescue, data sharing, data curation and data provision.
- 7. Coordinating observing infrastructures:** national, regional and international networks of sensors, satellites, bioacoustics, camera traps, eDNA etc.
- 8. Emerging issues:** Stakeholder needs are evolving, and the actions in this theme address some of these needs (e.g. GBF indicators, private sector needs, models and scenarios for planning). We need to assess how and if these can be addressed by GBiOS.

**Break out group exercise 1):**

We break out into 7 groups to address each of these themes. The groups spend 45 mins brainstorming these. They then come back into plenary to report on key findings.

**Break out group exercise 2)** In theory, the benefits of biodiversity observations far exceed their cost. While no complete and comprehensive cost-benefit analysis of the global biodiversity observing system has been conducted, analysis of its component parts is needed to reveal the benefits. All break-out groups would tackle this same question and hopefully describe a methodology for doing the cost-benefit calculations.