

EC-ESA Joint Earth System Science Initiative



22-24 November 2023 ESA-ESRIN, Frascati, Italy

BIODIVERSITY WORKSHOP

Session Summaries



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Objectives of the Biodiversity Workshop





- To take note of Biodiversity policies, initiatives, observation and science networks globally and in the EU.
- To enhance awareness of biodiversity projects (with EO components) within ESA and the EC.
- To advance the development of an EO Science Agenda for Biodiversity.
 - to discuss how to advance the use of satellite observations in biodiversity science and monitoring
 - to review the major science questions and policy priorities where EO systems play a crucial role
 - to address knowledge and observation gaps in biodiversity.
 - to review the recent advances in the use of Earth Observation in biodiversity science and monitoring, and identify gaps in data, methodologies and technologies where further R&D efforts should be made.
 - to define the key research priorities that will drive our collective efforts in the coming years.
- to improve the collaboration between ESA-EC funded projects on biodiversity.
 - to improve the collaboration between ESA and EC funded projects on biodiversity
 - to propose new and more effective ways of cooperation, including knowledge sharing and calls for collaborative development.

Programme of the Biodiversity Workshop





DAY 1 – Wednesday 22 November

14:20 - 16:00 Session 1: Biodiversity Policies and Initiatives - Part 1

16:20 – 18:00 **Session 2**: Biodiversity Policies and Initiatives - Part 2

DAY 2 – Thursday 23 November

09:00 – 11:00 Session 3: ESA – EC Biodiversity Projects - Part 1

11:30 – 13:20 **Session 4**: ESA – EC Biodiversity Projects - Part 2

14:20 - 16:00 Session 5: Biodiversity EO Science Agenda - Part 1

16:20 – 18:00 Session 6: Biodiversity EO Science Agenda - Part 2

DAY 3 – Friday 24 November

09:00 – 10:30 **Session 7**: ESA – EC Biodiversity Projects – Connecting the dots.

10:30 – 11:00 **Session 8**: Biodiversity Sessions wrap-up

Biodiversity WorkshopSessions 1-2: Biodiversity Policies and Initiatives





Session 1: Biodiversity Pol	icies and Initiatives - Part 1
Wednesday 22 Nov 11.20	Chairs Petteri Vihervaara (SVKF) and Marc Paganini (FSA

Wednesday 22 Nov 14:20. Chairs: Petteri Vihervaara (SYKE) and Marc Paganini (ESA)	
ESA Welcome (M. Paganini, ESA ESRIN)	5'
EC Welcome (Gilles Doignon & Bastian Bertzky, EC DG-RTD)	5′®
Workshop Objectives and Programme (M. Paganini, ESA ESRIN)	10'
CBD Kunming-Montreal GBF& monitoring framework (Jillian Campbell, CBD secretariat)	12' ®
EU Biodiversity Strategy for 2030 and Nature Restoration Law (Anne Teller, DG ENV)	12' ®
Support of EO to the EU Habitats Directive (Bruno Combal, DG ENV)	12' ®
EC Knowledge Centre on Piediversity - KCPD (Gregoire Dubois & Camine Liquette DC IPC)	12' ®
EC Knowledge Centre on Biodiversity – KCBD (Gregoire Dubois, & Camino Liquette, DG JRC)	
BioAGORA, Science Service for Biodiversity (Kati Vierikko, SYKE)	12'®
Biodiversa+, European Biodiversity Partnership (Petteri Vihervaara, SYKE)	12'

Biodiversity Workshop Sessions 1-2: Biodiversity Policies and Initiatives





Session 2: Biodiversity Policies and Initiatives – Part 2

Wednesday 22 Nov 16:20. Chairs: Susanne Thulin (Brockmann Geomatics) and Marc Paganini (ESA)

EUROPABON (Bruno Smets, VITO)	12'
The European Biodiversity Monitoring Coordination Centre (Camino Liquette, DG JRC)	12' ®
Knowledge Centre on EO (KCEO) Biodiversity Dive (Mark Dowell, DG JRC)	12' ®
EEA activities on Habitat Mapping, progress and challenges (Jan Eric Petersen, EEA)	12' ®
GEOBON and GBiOS (Andrew Gonzalez, Mc Gill University)	12' ®
FutureEarth Biodiscovery (Cornelia Krug, UZH)	12'
CEOS and Biodiversity (Gary Geller, NASA / JPL)	12' ®

Biodiversity WorkshopSessions 1-2: Biodiversity Policies and Initiatives





KEY MESSAGES

- GBF 2030 GOALS A and B are directly informed by EO-Biodiversity
- Global and EU policy makers make strong call for EO solutions in their monitoring and reporting
- Plurality of gobal/EU initiatives makes it difficult to prioritize our EO contribution

RECOMMENDATIONS

- Conduct in-depth analysis of targets and indicators to be supported by EO solutions
- EO community is to be well connected to the CDB ATEG on GBF monitoring framework (headline indicators)
- At global level, GEOBON is best suited to guide EO support and channel to CDB
- Explore opportunities to be involved in IPBES assessments
- Both EC and ESA are officially engaged to support GEO in developing Global Ecosystem Extent Atlas
- At EU level, KCBD and BMCC are the key initiatives to connect with (23 RS-EBV examples)
- Needs for capacity building at national scale (Biodiversa+)

Biodiversity WorkshopSession 3-4: ESA / EC Biodiversity Projects





Session 3: ESA / EC Biodiversity Projects – Part 1

Thursday 23 Nov 9:00 Chairs: Nikolina Mileva (ESA) and Marc Paganini (ESA)

EC GUARDEN (Pierre Bonnet, CIRAD)	15′
EC NATURE FIRST (Linda van Duivenbode, dotSPACE)	15′
EC NATURA CONNECT (Luigi Maiorano, Sapienza)	15'
EC AD4GD (Joan Maso, CREAF)	15'
EC FAIRiCUBE (Stefan Jetschny, NILU)	15′®
ESA PEOPLE Ecosystem accounting (Bruno Smets, VITO)	15'
EC B-Cubed (Andrew Rodrigues, GBIF)	15'
ESA EO4DIVERSITY (Roshanak Darvishzadeh , ITC)	15'

Biodiversity Workshop Session 3-4: ESA / EC Biodiversity Projects





Session 4: ESA / EC Biodiversity Projects – Part 2 Thursday 23 Nov 11:30 Chairs: Nikolina Mileva (ESA) and Marc Paganini (ESA)	1h50
EC EarthBridge (Anna Cord, TU Dresden)	15' ®
EC FREEDLES (Miina Rautiainen, Aalto University)	15'
EC OBSGESSION (Petteri Vihervaara, SYKE)	15'
EC MAMBO (Alexis Joly, INRIA)	15′®
ESA BIOMONDO (Petra Philipson, Brockmann Geomatics)	15'
ESA BiCOME (Victor Martinez Vicente, PML)	15'
EC MARCO BOLO (Pedro Junger, Ecole Normale Superieur)	15'





Session 5: Biodiversity EO Science Agenda – Part 1

(Leon Hauser, University of Zurich)

Thursday 23 Nov 14:20 Chairs: Susana Baena (WCMC), Jelle Lever (EAWAG) and Marc Paganini (ESA)

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•	Refining the ESA Science Strategy on Biodiversity and Ecosystems (Martin Herold, GFZ)	12' ®
•	Terrestrial Ecosystems EO Science Agenda - EO4DIVERSITY (Susana Baena, UNEP WCMC)	12'
•	Advancing terrestrial biodiversity monitoring with Satellite Remote Sensing (Joris Timmermans, Technical University of Delf)	12'
•	Freshwater Ecosystems EO Science Agenda – BIOMONDO (Jelle Lever, EAWAG and WSL)	12'
•	EUROPABON perspectives on EO for biodiversity monitoring and assessment (Henrique Pereira, IDIV)	12'®
•	Coastal Ecosystems EO Science Agenda – BiCOME (Victor Martinez Vicente, PML)	12'
•	Biodiversity assessment and processes with Earth Observations: trends and futures (Maria Santos, University of Zurich)	12'
•	NASA Biological Diversity and Ecological Forecasting report on Current State of Knowledge and Considerations for the next decade (Gary Geller, NASA / JPL)	12' ®
•	Quantifying impacts from space: Theory-driven approaches for biodiversity monitoring	12'®





TOPICS DISCUSSED

- Characterisation of the status and trends of biodiversity and related ecosystem services.
- Characterisation of Ecosystem integrity (including ecosystem conditions and degradation) and resilience to the main direct drivers of changes.
- Understanding of the adverse impacts of climate change on biodiversity and ecosystem functioning.
- Modelling of evolutionary changes of biodiversity and prediction of trajectories (what if scenarios).
- Pathways of transformative changes and the effects of "nature-based solutions" with respect to "no intervention scenarios".
- Prioritisation and monitoring of conservation & restoration actions (inside and outside protected areas).
- Ecological modelling
- Access to field data (e.g., GBIF repositories), collecting field data





KEY MESSAGES

- Biodiversity is a complex subject, Biodiversity is a local process with global applications
- Mismatch between what we have in terms of in-situ observations and the hotspots of biodiversity
- In-situ data can be a bottle-neck which limits the use of EO
- We need satellite remote sensing complemented with local observations, and knowledge to assist interpretation
- What are the biodiversity information we need to inform the GBF Goals and Targets
- 30% of EBVs can be informed by EO

RECOMMENDATIONS (part 1)

- KEY Science Questions to be addressed
 - Influences of evolutionary and biogeographic legacies on ecosystem functioning
 - Changing global distribution plant functional traits and trait diversity
 - Ecosystem resilience to global change (use of ecological models is key)
 - Past and present human modifications of the land and their consequences
 - Inferring below ground processed from above ground information







RECOMMENDATIONS (part 2)

- What are the needs in terms of Analytical needs / methodological development ?
 - Uncertainty budget
 - Methods that address the fundamental of biodiversity (rarity and uniqueness)
 - Further understanding of functional traits
 - Across-scale information transfer (to understand biodiversity at all scales)
 - Causal mechanisms need to be better specified and drivers of changes attributed (detection and attribution)
 - Necessity to explore synergies between sensors
 - Integration of EO workflows in Bon-in-a-box pipelines
 - Global program to prepare in-situ inputs harmonized for EO (including protocols)
 - Integrate EO observations with ecological models in preparation for biodiversity footprints
 - Digital twins to study what-if scenarios and evolutionary trajectories



Biodiversity WorkshopSession 7: ESA-EC projects: Connecting the dots





TOPICS DISCUSSED

- Enhance collaboration and ensure an effective cooperation between the different biodiversity projects within the EC and ESA
- Collaborative calls between ESA and EC projects
- How to improve the knowledge sharing between biodiversity projects in the use of Earth Observations?

KEY MESSAGES (part 1)

- Need for a collaborative effort to ensure that all the investment into satellite missions and biodiversity
 research is translated into user-friendly data products that are regularly updated, easy to use and improved
 over time?
- Many opportunities are expected from upcoming new satellites such as the Copernicus Expansion Missions.
 However, the current R&D landscape is fragmented, posing a risk that the biodiversity community may not be optimally prepared to harness the capabilities of these new satellites.



Biodiversity WorkshopSession 7: ESA-EC projects: Connecting the dots





KEY MESSAGES (part 2)

Enhance collaboration and exploit synergies (advance EO in Biodiversity)

- Coordination: long term commitment and operationalization, group projects in clusters
- Setup Biodiversity Task Force to drive science agenda
- Organize science workshops and/or hackatons (Biodiversa+ support): GEOBON, IPBES stakeholder day (Dec24)
- Research Challenges, summer schools
- Ensure transfer knowledge to global south

Virtual Lab environment to progress biodiversity science

- Connecting technologies: Bon-in-Box, OpenEO, ARIES modelling,
- Virtual research 'converged' environment acc. FAIR principles (sandbox)