EUROPABON

VIRTUAL WORKSHOP

Essential Biodiversity Variable workflows

Designing the freshwater, marine and terrestrial EBV workflows from data collection to modeling

22-24 February 2023
Workshop agenda

Day 1
Filling EBV workflow templates
Google Docs

Day 2
Refining EBV workflow templates
Google Docs

Day 3
Synthesis of EBV workflows
Miro boards

22-24 February 2023, each day 11:00 am - 1:00 pm (CET)
https://iiasa.zoom.us/j/93686086394
### Agenda day 2

#### Day 2: Refining EBV workflow templates

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<th>Time</th>
<th>Session Details</th>
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<td><strong>Plenary session (15 min)</strong></td>
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| **Break-out sessions (85 min)** separated by terrestrial, marine, freshwater: | Revisit and refine content of EBV workflow templates  
  - Specify future needs of EBV workflows  
  - Add references, citations and links  
  - Provide concrete examples for models, infrastructure & interoperability |
| **Plenary session (20 min)** | Reports from break-out sessions & final remarks |
Overview

1. Update day 1 progress

2. Focus of day 2
# Update day 1 progress

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Update day 1 progress

Completeness of the templates:
(✩) empty  (✦) some preliminary information  (✧) needs review and further details

Freshwater EBV

- Genetic diversity of selected freshwater taxa (✧ - ✧)
- Species abundances of wetland birds (✧ - ✦)
- Species distributions of freshwater fishes (✧ - ✦)
- Species distributions of amphibians and freshwater reptiles (✧ - ✦)
- Species distributions of freshwater mammals (✧ - ✦)
- Species distributions of freshwater invertebrates (✧ - ✦)
- Species distributions of freshwater macrophytes (✧ - ✦)
- Species distributions of invasive alien freshwater taxa of European concern (✧ - ✦)
- Phenology of migration of wetland birds (✧ - ✦)
- Ecological Quality Ratio (EQR) of phytoplankton in lakes (✧ - ✧)
- Ecological Quality Ratio (EQR) of freshwater macrophytes (✧ - ✦)
- Ecological Quality Ratio (EQR) of freshwater phyto-benthos (✧ - ✦)
- Ecological Quality Ratio (EQR) of benthic freshwater invertebrates (✧ - ✦)
- Ecological Quality Ratio (EQR) of freshwater fish (✧ - ✦)
- Ecological Quality Ratio (EQR) of freshwater zooplankton (✧ - ✦)
- River Connectivity/Free river flow (✧ - ✦)
- Ecosystem distribution of freshwater EUNIS Habitats (✧ - ✦)
- Structural complexity of riparian habitats (✧ - ✦)
- Harmful freshwater algal blooms (✧ - ✦)
- Freshwater primary productivity (✧ - ✦)
Update day 1 progress

Freshwater EBV
- Genetic diversity of selected freshwater taxa
- Species abundances of wetland birds
- Species distributions of freshwater fishes
- Species distributions of amphibians and freshwater reptiles
- Species distributions of freshwater mammals
- Species distributions of freshwater invertebrates
- Species distributions of freshwater macrophytes
- Phenology of migration of wetland birds
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- Ecological Quality Ratio (EQR) of freshwater fish
- Ecological Quality Ratio (EQR) of freshwater zooplankton
- River Connectivity/Free river flow
- Ecosystem distribution of freshwater EU/NS Habitats
- Structural complexity of riparian habitats
- Harmful freshwater algal blooms
- Freshwater primary productivity

Marine EBV
- Genetic diversity of selected marine taxa
- Species distributions of marine fishes
- Species abundances of marine commercial fish species and long-distance migratory fishes
- Species distributions of marine birds
- Species distributions of marine mammals
- Distributions of marine turtle species nesting grounds
- Species distributions of benthic marine invertebrates
- Species distributions of invasive alien marine taxa of European concern
- Phenology of migration of marine birds and mammals
- Functional composition of marine phytozooplankton
- Ecosystem distribution of hard corals habitats
- Ecosystem distribution of marine macroalgae canopy cover
- Ecosystem distribution of marine seagrass habitats
- Ecosystem distribution of oyster reef habitats
- Degree of seabed disturbance
- Harmful marine algal blooms
- Phenology of marine spring phytoplankton bloom
- Marine primary productivity

Terrestrial EBV
- Genetic diversity of selected terrestrial taxa
- Species distributions of terrestrial birds
- Species distributions of terrestrial mammals
- Species distributions of terrestrial migratory birds
- Species distributions of selected terrestrial mammals
- Species distributions of all terrestrial mammals
- Species distributions of terrestrial reptiles
- Species abundances of butterflies
- Species distributions of terrestrial priority invertebrates and key pollinators
- Species distributions of terrestrial plants
- Species distributions of main trees
- Species distributions of lichens (as indicators of pollination)
- Species distributions of invasive alien terrestrial taxa of European concern
- Species abundances of selected terrestrial disease vectors
- Species abundances of selected terrestrial crops
- Phenology of flowering and leaf senescence
- Phenology of migration of terrestrial birds
- Phenology of the emergence of butterflies
- Community biomasses of selected functional groups of terrestrial arthropods
- Community biomasses of soil microbes
- Community abundance and taxonomic diversity of pollinator insects
- Areal biomasses of migrating birds, bats and insects
- Functional composition of soil biota
- Vertical structure of terrestrial vegetation
- Ecosystem distribution of terrestrial EU/NS habitats
- Connectivity of terrestrial ecosystem habitat types
- Terrestrial primary productivity
- Fire disturbance per habitat type
- Ecosystem disturbance as measured by HANIPD
- Terrestrial ecosystem phenology
- Standing and falling deadwood

Completeness of the templates:
(→) empty  (+) some preliminary information  (+) needs review and further details
Completeness of EBV template

Before day 1

Freshwater

Marine

Terrestrial

After day 1

empty

some

preliminary information

needs

review and further details
Overview

1. Update day 1 progress

2. Focus of day 2
Focus of day 2

Before day 1

After day 1

All realms

Can you review (green) EBV workflow templates and add further details?

Can you complement (red & yellow) EBV workflow templates and provide specific examples of EBV workflow details, concrete references and citations, and links to online sources (URLs)?
Can you give concrete examples of how data collection and sampling, data integration and modelling could be improved to generate operational EBV workflows at a European scale?
Focus of day 2

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Can you give concrete examples of models that are needed to create a specific EBV?

**Model-based data integration of single data types**

1. Check data coverage and fit for purpose, create input files
2. Identify analysis tool (and covariates if needed)
3. Apply statistical analysis
4. Calculate uncertainty
5. Visualise results

- Data cubes (camera trap point, time in days, and year) are created for populations and species at each site.
- Bayesian-formulated dynamic occupancy model, elevation, temperature, rainfall, presence-absence and distance to border as covariates.
- A Bayesian occupancy model is fitted using Monte Carlo Markov Chain (MCMC) algorithms using JAGS (Just Another Gibbs Sampler).
- The Bayesian model estimates distributions of all parameters.
- Occupancy trend for each population at each site, or as combined occupancy trend using the Wildlife Picture Index.

**Model-based integration of multiple data types**

- **Observation model A**
  - Observation model B
  - Structured monitoring program
  - Citizen science observations

Kissling et al. 2018 [http://dx.doi.org/10.1111/brv.12359](http://dx.doi.org/10.1111/brv.12359)

Isaac et al. 2019 [https://doi.org/10.1016/j.tree.2019.08.006](https://doi.org/10.1016/j.tree.2019.08.006)
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Can you point us to concrete examples for how interoperability can be achieved for a specific EBV?

**Metadata:**
human- and machine-readable

- **Darwin Core**
  - Data and metadata standards

**Application Programming Interfaces (APIs)**

- Standardized & identical accessibility across multiple infrastructures

**Established standards for data structures**

- netCDF
- JSON

**Standardized and reproducible workflows**

1. Re-tiling
2. Normalization
3. Feature extraction
4. Rasterization

Open, fully documented and published
## Focus of day 2

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Do you know services, IT infrastructures or analysis tools that are relevant for a specific EBV?

Data storage, data infrastructure and repositories
- GBIF
- sentinelhub

Cloud-based workflows
- European Open Science Cloud
- Amazon Web Services
- Microsoft Azure
- EGI
- Jupyter

Analysis tools
- Sentinel-1 Toolbox
- R

Virtual labs, virtual research environments & web portals
- Virtual Lab
- Data
- Models
- Advanced AI

Virtual infrastructure services
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22–24 February 2023  11:00 -13:00
Summary of focus of day 2

Future needs of EBV workflows:
- Can you give concrete examples of how data collection and sampling, data integration and modelling could be improved to generate operational EBV workflows at a European scale?

Some information remains too generic and unspecific:
- Can you further refining the EBV workflow templates and provide specific examples and workflow details, concrete references and citations, or links to online sources (URLs)?

Information on models is generally quite sparse:
- Can you give concrete examples of models that are needed to create a specific EBV?

Additional experts:
- Can you provide names and details of experts that we should contact for a specific EBV?

Models:
- Can you give concrete examples of models that are needed to create a specific EBV?

Infrastructure:
- Do you know services, IT infrastructures or analysis tools that are relevant for a specific EBV?

Interoperability:
- Can you point us to concrete examples for how interoperability can be achieved for a specific EBV?

Future monitoring scheme:
- Do you have specific suggestions of how current monitoring schemes need to be expanded or newly established to provide the needed coverage for an EBV?