BIODIVERSITY BUILDING BLOCKS FOR POLICY

OCCURRENCE DENSITY

Indicator type

Data quality indicator

Explanation

This metric measures the density of occurrence records by summing the number of occurrences per square kilometre within each grid cell. For maps, the value is calculated for each spatial cell. For time-series analyses, the density is summed across all grid cells in the data cube for each time step.

- **High value**: The grid cell contains a high concentration of occurrences.
- **Low value:** The occurrence records in this grid cell are sparse.

Applicability for policy

- Allows comparison of survey effort across scales: cubes with different grid sizes can easily be compared.
- Estimating citizen science engagement: it helps evaluate the true density of citizen science records.

However, these two interpretations are closely linked and can be difficult to separate. They should therefore be interpreted with caution and ideally in combination with other indicators or expert knowledge to ensure correct interpretation.

Limitations

In case of citizen science data, this metric primarily reflects localised human search effort (like a popular walking path or a nature centre).

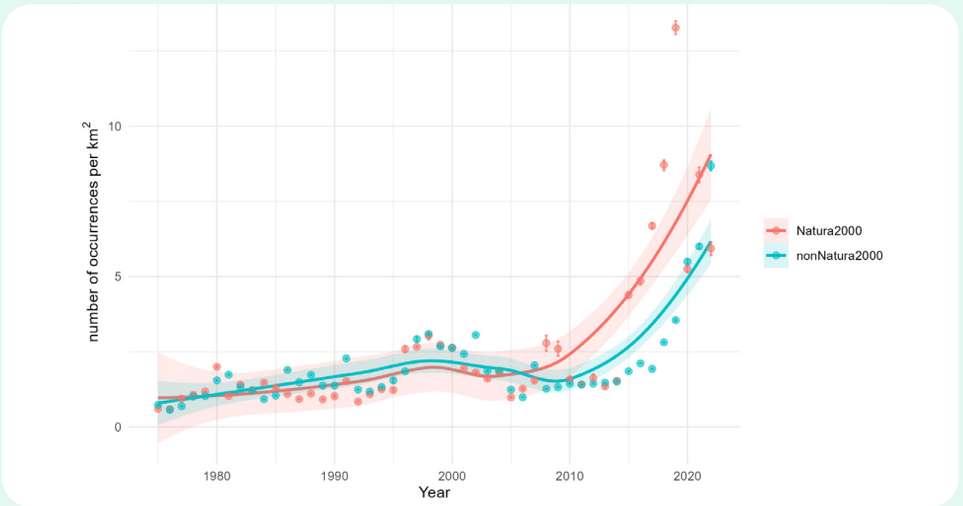


Figure 1: Calculating occurrence density allows comparisons of occurrence numbers between areas of different sizes. In this example, the density of native flowering plant occurrences recorded since 1975 is compared between Natura 2000 and non–Natura 2000 areas in Flanders. GBIF Occurrence Download https://doi.org/10.15468/dl.knsn44 Accessed from R via rgbif (https://github.com/ropensci/rgbif) on 2026-03-16.

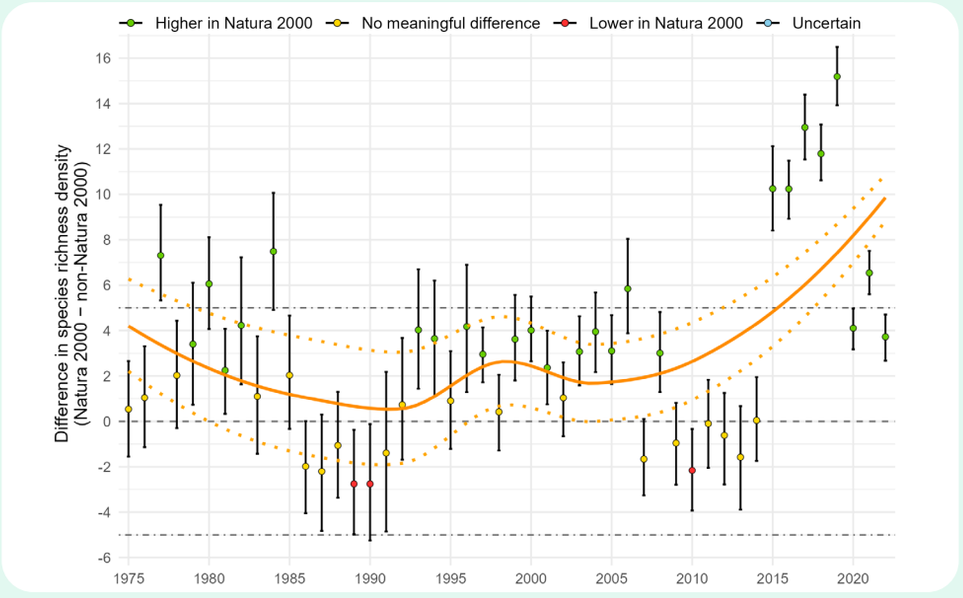
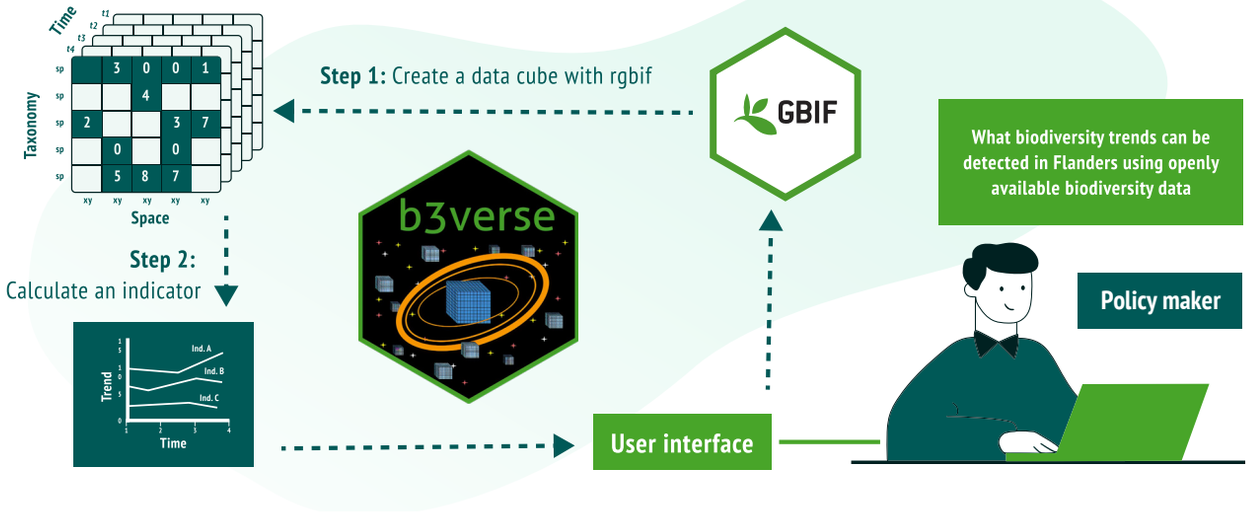
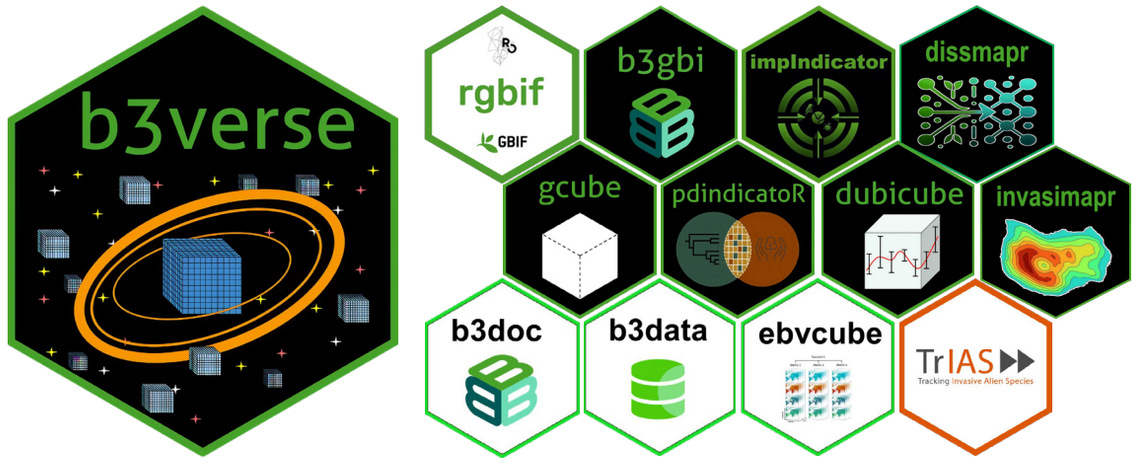


Figure 2: Difference in occurrence density between Natura 2000 and non-Natura 2000 areas. Percentile confidence intervals (95 %) were obtained by bootstrapping grid cells per year. Effect classification is done with reference 0 and threshold of 15 difference in occurrences per km². GBIF Occurrence Download https://doi.org/10.15468/dl.knsn44 Accessed from R via rgbif (https://github.com/ropensci/rgbif) on 2026-03-16.

The B-Cubed workflow supports the creation and analysis of a data cube based on GBIF data. Further documentation is available at https://docs.b-cubed.eu/. Overview of all available packages at https://b-cubed-eu.r-universe.dev/builds.





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b-cubed.eu

B-Cubed aimed to standardise access to biodiversity data, helping transform fragmented biodiversity records into timely, policy-relevant indicators. This was achieved by developing a service to create "species occurrence cubes", which then served as the basis for models and indicator of past, current and future biodiversity. To ensure its results can be reused, the project created exemplary workflows for modelling and indicator calculation, as well as a suite of guides, tutorials and hands-on training sessions. The application and usefulness of B-Cubed's algorithms and software are demonstrated through the project's four case studies.

PROJECT COORDINATOR

Dr Quentin Groom
Meise Botanic Garden
quentin.groom@plantentuinmeise.be

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