

TARGET 6 INDICATOR: RATE OF INVASIVE ALIEN SPECIES ESTABLISHMENT

Indicator type

Pressure Indicator
/ monitoring
management

Explanation

This indicator quantifies the number of new invasive alien species (IAS) that successfully establish within a country or region per year. The package `b3alien` screens occurrence records against international alien checklists to infer the establishment rate of IAS species. Furthermore, the package corrects for detection delays by applying the approach proposed by Solow and Costello, resulting in a more reliable basis for estimating IAS establishment rates.

- 🌱 An increasing rate indicates that more IAS species are introduced and established in the region.
- 🌱 A declining rate suggests that fewer IAS are being introduced, possibly due to effective prevention efforts targeting key introduction pathways.

Applicability for policy

This metric serves as the official CBD (Convention on Biological Diversity) Headline Indicator 6.1, “Rate of invasive alien species establishment”, to monitor global and national progress toward Target 6 of the Kunming-Montreal Global Biodiversity Framework. This target aims to reduce the introduction and establishment rates of known invasive species by at least 50% by 2030. Examining this indicator over longer time periods, as recommended in the CBD guidance, can provide valuable insights into the effectiveness of policies and management interventions.

Limitations

This metric is highly sensitive to changes in survey effort over space and time, and differences in detectability among taxonomic groups. Consequently, this indicator should always be assessed alongside local distribution maps and expert ecological knowledge. Measures of observation effort and spatial bias are available through the `b3alien` package and should be considered when interpreting the results.

References

Maarten Trekels, Quentin Groom (2025). `b3alien`: A Python package to assess the introduction rate of alien species in a FAIR and reproducible way [pre-print]. <https://www.biorxiv.org/content/10.1101/2025.11.17.688820v1>

Desmet P, Reyserhove L, Oldoni D, Groom Q, Adriaens T, Vanderhoeven S, Pagad S (2025). Global Register of Introduced and Invasive Species - Belgium. Version 1.15. Invasive Species Specialist Group ISSG. Checklist dataset <https://doi.org/10.15468/xoidmd> accessed via GBIF.org on 2026-06-24.

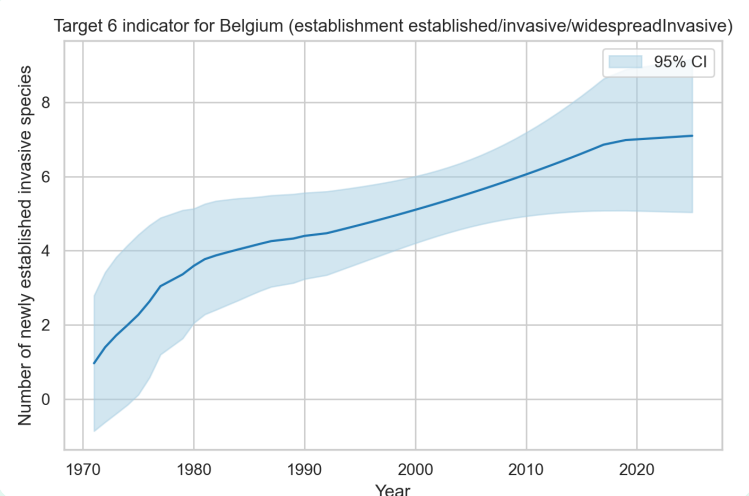


Figure 1: Number of newly established invasive species per year in Belgium since 1970, calculated using the `b3alien` package to correct for detection lags. This indicator is based on the Belgian checklist of the Global Register of Introduced and Invasive Species (GRIIS) (Desmet et al., 2025) and includes only species classified as established, invasive, or widespread invasive.

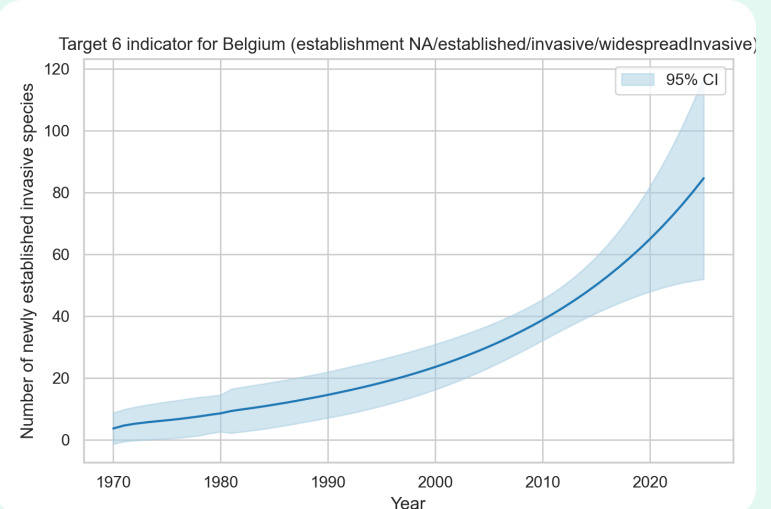
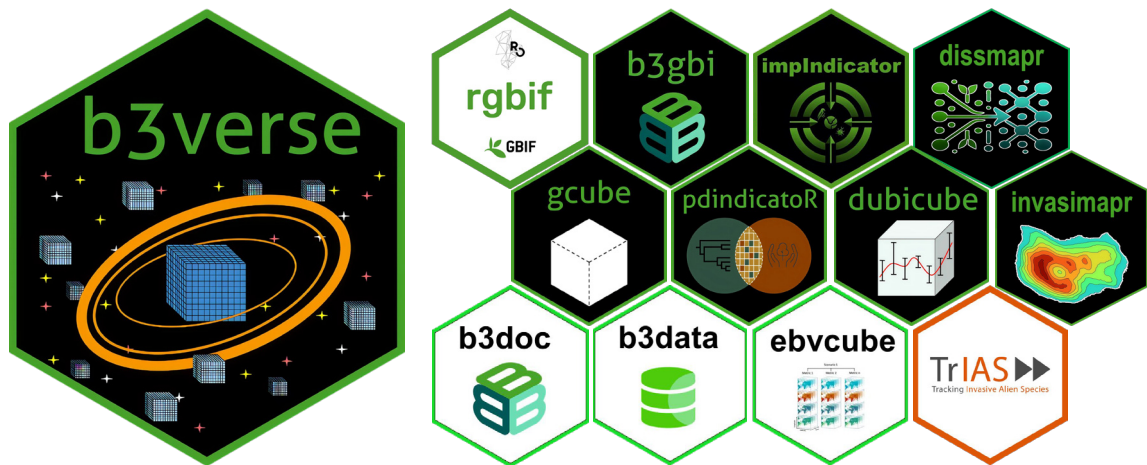
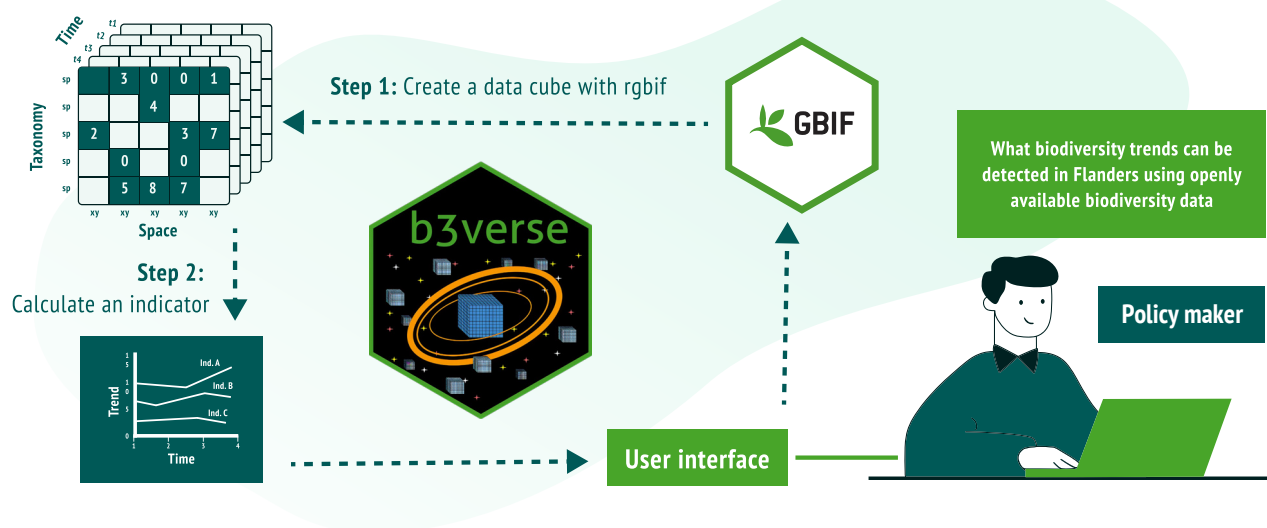


Figure 2: Number of newly established invasive species per year in Belgium since 1970, calculated using the `b3alien` package to correct for detection delays. This indicator is based on the Belgian checklist of the Global Register of Introduced and Invasive Species (GRIIS) (Desmet et al., 2025), including a filter for species classified as established, invasive, or widespread invasive, or with an undefined establishment status.

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>.



 **BIODIVERSITY
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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.

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