European Vegetation Archive
Data Request Form

To obtain data from the European Vegetation Archive (EVA), including the ReSurveyEurope Database, please first enquire the EVA database administrator Ilona Knollová (ikuzel@sci.muni.cz) whether the data that meet your needs are available. If they are, please fill in the form below and submit it to Ilona or another member of the EVA Coordinating Board (or ReSurveyEurope Board if you ask for data from the ReSurveyEurope Database).

- Applicant's name:

  Jürgen Dengler

- Applicant's institutional address:

  IUNR, ZHAW, Grüentalstr. 14, 8820 Wädenswil, Switzerland

- Applicant's e-mail:

  dr.juergen.dengler@gmail.com

- Project title:

  Impact of neophytes on plant species richness in the vegetation of Europe

- Are you asking for core EVA data (non-repeated vegetation surveys) or for ReSurveyEurope data (repeated vegetation surveys)?

  We ask mainly for core EVA, but would be happy to receive additionally the ReSurveyEurope data (we will NOT analyse temporal changes, but just use multiple composition data from the same spot in the model)

- Brief description of the aims and methods of the study:

  Meanwhile it is well understood in which regions and habitats neophyte invasions are concentrated, also thanks to various EVA based studies (e.g. Axmanová et al. 2021). Likewise, there are many studies analysing which factors influence the spread and invasion success of neophytes, also often facilitated by EVA and sPlot (e.g. Fristoe et al. 2021; Pouteau et al. 2021). By contrast, the most decisive question, i.e. which neophytes actually have negative impact on native biodiversity is far less well studied. Only for a small fraction of neophytes local studies on their biodiversity impact have been conducted, often with inconclusive or contradictory results. For the larger fraction of all neophytes, including some very widespread ones, there is not single study on their biodiversity impact in the Web of Science.

  Recently, we conducted a study on the impact of neophytes on the vascular plant diversity of grasslands in Switzerland (Dengler et al. in prep., to be submitted in January 2023). We used c. 8,000 high-quality plots from the national biodiversity monitoring programs of the country and combined them with the Swiss indicator values (Landolt et al. 2010) to test whether plots with occurrence of a certain neophyte species have more or less total species or native species than plots under the same environmental conditions but without that neophyte. We used the five indicators moisture, nutrients, reaction, temperature and mowing tolerance and their quadratic terms, which together explained more than 50% of the plot-scale richness in 10 m2. When adding those neophytes to the model that occurred in at least five of the plots yielded for some of

these a negative and for some a positive biodiversity impact – after accounting for environmental conditions and management. Interestingly, whether a neophyte had negative, none or positive plant diversity impact was completely unrelated to its status on the "Black List" of the "invasive neophytes" (i.e. those with proclaimed negative impact).

Up to 2022, a comparable study at European scale was not feasible due to the lack of measured in-situ environmental variables in large vegetation-plot databases and to the equal lack of a system of ecological indicator values that would allow to provide good proxies of environmental variables at the European scale.

As of January 2023 the latter impediment is overcome. Midolo et al. (2023) published a European system of seven management- and disturbance related indicators. Dengler et al. (subm.) have created a consensus system of five ecological indicator values (M, N, R, T, L) for more than 14,000 vascular plant taxa to become available in January 2023. With these in total 12 indicators being available and allowing the calculation of plot-scale proxies of the most relevant environmental dimensions, we aim to apply the idea of the Swiss grassland neophyte study to a pan-European study analysing all neophytes in a consistent and comparative manner across all habitats of the continent. For that, we will take advantage of the c. 2,000,000 plots in EVA (but possibly removing those without plot size information). We then will construct a species richness model across European vegetation, using those of the 12 environmental dimensions that are significant, either with quadratic GLMs or GAMs. Further, we will account for plot size and potentially varying degrees of completeness of plot records in different phytosociological schools, for spatial and temporal autocorrelation (e.g. mixed-effect modelling) and potentially run separate models for main habitat types (e.g. EUNIS first-level habitats; Chytrý et al. 2020). Once we have such a baseline model, we will add the presence/absence and/or cover of each occurring neophyte that reaches a certain frequency threshold to test whether it is associated with decreased, unchanged or increased total/native vascular plant species richness. A question that still needs to be decided is whether the existing information on native vs. invasive ranges is sufficient to run this type of analysis for all neophytes or only for the extra-European ones.

We assume that this publication can bring, for vascular plants, the assessment of alien plant species as invasive vs. non-invasive (in a normative manner) to a new level and lead to a major improvement of national, European and global lists of "invasive species", thus allowing to concentrate combating measures against neophytes to those that actually do significant harm to native biodiversity.

Axmanová, I., Kalusová, V., Danihelka, J., Dengler, J., Pergl, J., Pyšek, P. Večera, M., Attorre, F., Biurrun, I., (…) & Chytrý, M. 2021. Neophyte invasions in European grasslands. *Journal of Vegetation Science* 32: e12994.

Chytrý, M., Tichý, L., Hennekens, S.M., Knollová, I., Janssen, J.A.M., Rodwell, J.S, Peterka, T., Marcenò, C. Landucci, F., Danihelka, J., Hájek, M., Dengler, J., (…) & Schaminée, J.H.J. 2020. EUNIS Habitat Classification: expert system, characteristic species combinations and distribution maps of European habitats. *Applied Vegetation Science* 23: 648–675.

Dengler, J., Jansen, F., Chusova, O., Hüllbusch, E., Nobis, M.P., Van Meerbeek, K., Axmanová, I., Bruun, H.H., Chytrý, M., (…) & Gillet, F. subm. Ecological Indicator Values of Europe (EIVE) 1.0. Manuscript for *Vegetation Classification and Survey*.

Fristoe, T.S., Chytrý, M., Dawson, W., Essl, F., Heleno, R., Kreft, H., Maurel, N., Pergl, J., Pyšek, P., Seebens, H., (…) Dengler, J., (…) & van Kleunen, M. 2021. Dimensions of invasiveness: links between abundance, geographic range size and habitat breadth in Europe's alien and native floras. *Proceedings of the National Academy of Sciences of the USA* 118: e2021173118.

Landolt, E., Bäumler, B., Erhardt, A., Hegg, O., Klötzli, F., Lämmler, W., Nobis, M., Rudmann-Maurer, K., Schweingruber, F.H., (…) & Wohlgemuth, T. 2010. *Flora indicativa – Ökologische Zeigerwerte und biologische Kennzeichen zur Flora der Schweiz und der Alpen*. 2nd ed. Haupt, Bern, CH: 378 pp.

Midolo, G., Herben, T., Axmanová, I., Marcenò, C., Pätsch, R., Bruelheide, H., Karger, D.N., Acic, S., Bergamini, A., Bergmeier, E., Biurrun, I., Bonari, G., Carni, A., Chiarucci. A., De Sanctis, M., Demina, O., (…),& Chytrý, M. 2023. Disturbance indicator values for European plants. *Global Ecology and Biogeography* 32: 24–34.

Pouteau, R., Thuiller, W., Hobohm, C., Brunel, C., Conn, B.J., Wayne Dawson, de Sá Dechoum, M., Dufour-Dror, J.-M., Ebel, A.L., (…) & van Kleunen, M. 2021. Climate and socio-economic factors explain differences between observed and expected naturalization patterns of European plants around the world. *Global Ecology and Biogeography* 30: 1514–1531.

- Will someone else be involved in data editing or analysis in addition to the applicant?

  Christian Ledergerber (Master student); possibly other members of Jürgen Dengler's lab (e.g. Hallie Seiler, Stefan Widmer, Regula Billeter), likely members of the core authors of the Ecological Indicator Values of Europe (EIVE; e.g. Florian Jansen, Francois Gillet, Olha Chusova, Michael Nobis, Koenraad Van Meerbeek…) and the Disturbance indicator values of Europe (e.g. Gabriele Midolo).

- Estimated time of delivery of results (e.g., manuscript submission):

  End of 2023/early 2024

- Geographic area needed (e.g., countries or range of geographic coordinates):

  All

- Do you need plots to be georeferenced? If so, what is the minimum accuracy of plot location (in metres or kilometres) needed for your project?

  Not necessarily (we will take all; possibly we will later make a subsetting)

- Vegetation types needed (syntaxa):

  All

- Other data selection criteria:

  None (at a later stage we might disregard plots without plot size information, but this is not decided yet). ReSurveyEurope –all non-manipulated plots, from manipulated plots - only manipulation corresponding to typical land uses; exclude plots where the plant community composition has been directly manipulated by sowing, planting or removing of species.

- Envisaged publications:

  One paper for an international journal

- **Data deposition.** Some journals require data used for the analysis to be stored in a public repository to ensure the repeatability of the analysis. According to EVA Rules, you are not allowed to store the original vegetation-plot data obtained from EVA. However, if you plan to publish in such a journal, you may deposit a reduced EVA-derived dataset that (1) would make it possible to repeat the analysis published in the paper and (2) does not contain any information not used in the analysis. For example, such a dataset can contain only a subset of species (e.g., only angiosperms or only neophytes), or replace species names with codes, or replace species cover values with presences/absences, or remove all the header data, or replace the exact plot coordinates by coarse grid-cell coordinates etc. If you plan to deposit reduced information from vegetation plots, please describe here what might be deposited. If the project developed so that you needed to deposit more information than specified here, you would need to ask specific permission from the Custodians of the EVA databases used in your analysis before the dataset is deposited.

  > Depending on the journal, we might need to deposit a reduced dataset, which possibly would comprise species richness, mean indicator values, neophyte presences, possibly also plot sizes and coordinates, of the plots used, but we will NOT publish the species composition of the plots, nor other header data not used in the analyses.

- **Plant trait data from the TRY consortium.** If you plan to combine your analysis of vegetation-plot data with plant trait data, you can also request a dataset of 18 gap-filled traits for a large number of plant taxa prepared by the TRY consortium. These traits include Leaf area, Specific leaf area, Leaf fresh mass, Leaf dry matter content, Leaf C, Leaf N, Leaf P, Leaf N per area, Leaf N:P ratio, Leaf delta15N, Seed mass, Seed length, Seed number per reproductive unit, Dispersal unit length, Plant height, Stem specific density, Stem conduit density, and Conduit element length. This dataset can be provided to you by the EVA manager together with the vegetation-plot data. If you use this dataset, you must inform about your project the TRY data contributors who might be potentially interested and invite them as potential co-authors, assuming they will make an intellectual contribution to your paper. The list of the TRY data contributors will be sent to you together with the gap-filled trait dataset.

  > No (remove one)

- **Specification of the co-authorship arrangements in publications based on the requested data.** Note that the EVA Rules recommend that co-authorship is offered to a representative of each database providing data that are particularly important for the project (e.g., a relatively large proportion of the final dataset used in the analyses or data from unique vegetation types or under-represented geographic areas). This database representative should be an expert in the topic of the project (not necessarily the custodian or deputy custodian), and this person should contribute to the project more than just by providing the existing data, e.g. by intellectual contribution to the concept of the paper, preparation of new data, or helping with data analysis, interpretation of the results or writing parts of the paper (see the IAVS Code of Professional Ethics: http://iavs.org/Governance/Code-of-Professional-Ethics.aspx). The project leader should enable active participation by regularly informing potential co-authors about the progress of the project from its early stage. The project leader should also make final co-authorship arrangements based on the real input of the individual contributors.

  > As a standard, we offer co-authorship to one representative of each EVA database that contributes at least 0.5% of the data in the final dataset. According to the IAVS Code of Ethics, co-authorship beyond data provision requires also active involvement in data analysis, manuscript writing and/or manuscript revision. Representatives of EVA databases that contribute less than 0.5% of the overall data, but who have a personal interest in the topic and skills they would like to contribute, are invited to fill the opt-in form. We will decide on their inclusion on a case-by-case basis.

Data Request Form

- Eligibility of the applicant to receive EVA or ReSurveyEurope data. Specify to which EVA or ReSurveyEurope database the applicant has contributed; if the applicant is not the custodian or deputy custodian of an EVA or ReSurveyEurope database, give a name of a custodian or deputy custodian who supports this data request.

Jürgen Dengler is Custodian of the NBGVD, Deputy Custodian of GrassVeg.DE and Custodian of several ReSurveyEurope datasets.	

- I agree with the terms of EVA Data Property and Governance Rules as approved on 26 May 2012 (http://euroveg.org/download/eva-rules.pdf).
- If I ask for ReSurveyEurope data, I agree with the terms of ReSurveyEurope Data Property and Governance Rules as approved on 6 April 2022 (http://euroveg.org/download/resurveyeurope-rules.pdf).
- In any result obtained based on EVA core data (non-repeated vegetation surveys), I will cite the EVA report article (Chytrý et al. 2016; https://doi.org/10.1111/avsc.12191). In any result obtained based on the ReSurveyEurope data (repeated vegetation surveys), I will cite the ReSurveyEurope report article as soon as it is published. In addition, I will cite individual source databases used in my project (if possible, in the list of References; if not possible, at least as a list of databases in the electronic supplementary material).
- If I ask for the plant trait data from TRY, I agree to invite to my project the TRY data contributors following the list received from the EVA database manager.

Wädenswil, 02.01.2023

Jürgen Dengler