



REPORT

European Vegetation Archive (EVA): an integrated database of European vegetation plots

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Keywords

Biodiversity informatics; Database; Ecoinformatics; European Vegetation Survey; International Association for Vegetation Science; Phytosociological data; Relevé; Vegetation database; Vegetation plot

Abbreviations

EVA = European Vegetation Archive; EVS = European Vegetation Survey; GIVD = Global Index of Vegetation-Plot Databases; IAVS = International Association for Vegetation Science.

Received 25 March 2015

Accepted 3 July 2015

Co-ordinating Editor: Meelis Pärtel

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Abstract

The European Vegetation Archive (EVA) is a centralized database of European vegetation plots developed by the IAVS Working Group European Vegetation Survey. It has been in development since 2012 and first made available for use in research projects in 2014. It stores copies of national and regional vegetation-plot databases on a single software platform. Data storage in EVA does not affect on-going independent development of the contributing databases, which remain the property of the data contributors. EVA uses a prototype of the database management software TURBOVEG 3 developed for joint management of multiple databases that use different species lists. This is facilitated by the SynBioSys Taxon Database, a system of taxon names and concepts used in the individual European databases and their corresponding names on a unified list of European flora. TURBOVEG 3 also includes procedures for handling data requests, selections and provisions according to the approved EVA Data Property and Governance Rules. By 30 June 2015, 61 databases from all European regions have joined EVA, contributing in total 1 027 376 vegetation plots, 82% of them with geographic coordinates, from 57 countries. EVA provides a unique data source for large-scale analyses of European vegetation diversity both for fundamental research and nature conservation applications. Updated information on EVA is available online at <http://euroveg.org/eva-database>.

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Introduction

Records of the occurrence and abundance of plant species found in vegetation plots represent a specific type of biodiversity data. Unlike records of individual species occurrence, these fine-resolution data that often cover large geographic ranges are suitable for analysing species co-occurrence patterns in local communities, classifying vegetation, defining vegetation types, exploring vegetation–environment relationships, bioindication, α - and β -diversity pattern assessment and for other purposes. In addition to their use in fundamental ecological, macroecological, biogeographical and biodiversity research, vegetation-plot data are also an invaluable source of information for nature conservation, monitoring vegetation change over time and other practical applications (Dengler et al. 2012b). For these reasons, vegetation sampling in plots has been used extensively by vegetation scientists since the late

19th century (e.g. Schröter & Kirchner 1886–1902; Warming 1895), and lately data from both historical and recent plots have been assembled in numerous national or regional databases (Dengler et al. 2011, 2012b).

The tradition and intensity of vegetation-plot sampling is much stronger in Europe than on any other continent. Of the 2.8 million vegetation plots contained in 182 databases registered in the Global Index of Vegetation-Plot Databases (GIVD) by May 2012, 66.5% were from European databases (Jansen et al. 2012b). However, the existence of multiple European databases with different formats, incompatible species lists and various access limitations has been a significant obstacle to the full use of this enormous resource for research and applications at the international scale. Therefore, the Working Group European Vegetation Survey (EVS) of the International Association for Vegetation Science (IAVS) has worked towards developing a centralized database of European vegetation

plots and mechanisms for the use of these data in international analyses of European vegetation diversity and in more general biodiversity studies.

Here we present the new, centralized database called the European Vegetation Archive (EVA), give a brief history of the underlying initiative, describe the technical procedures and data property rules involved, and provide an overview of its current content.

Brief history of the EVA initiative

The first national projects of vegetation-plot databases were started in the 1980s in France (Brisse et al. 1995), the Netherlands (Schaminée et al. 1989) and Switzerland (Wohlgemuth 1992). The establishment of several new databases in the 1990s was stimulated by the release of the database management program TURBOVEG (Hennekens 1996). This program was accepted in 1994 by the EVS as an international standard for storing vegetation-plot data and subsequently installed in several countries (Schaminée & Hennekens 1995).

By the early 2000s, many databases using TURBOVEG or other management software existed in different countries (Ewald 2001), but the major obstacle to their integration was their use of different species lists, usually following the taxonomy and nomenclature of the national floras or checklists. A related issue was the absence of a modern and complete taxonomic checklist of the European flora (Dengler et al. 2012a). Therefore, in 2002 the SynBioSys Europe team was established, involving vegetation scientists from several European countries who aimed at the development of an information system on European vegetation, integrating vegetation-plot data from different European databases (Schaminée et al. 2007). For this purpose, a working checklist of European vascular plants, bryophytes, lichens and macro-algae ('SynBioSys Taxon Database') was established, and the species lists used in several European vegetation-plot databases were linked to this checklist by regional experts (E. Bergmeier, J. Danihelka, W.B. Dickoré, N. Ermakov and R. Haveman). However, the SynBioSys Europe project failed to obtain funding, and its original plans were not realized. Nevertheless, the amount of vegetation-plot observations stored in European databases kept growing, reaching at least 1.8 million by 2009 (Schaminée et al. 2009). The visibility of information about vegetation-plot databases was significantly enhanced by the launch of the web-based database Global Index of Vegetation-Plot Databases (GIVD; Dengler et al. 2011), which contains metadata about the content of individual databases (although not actual vegetation-plot data) and is continually updated by the managers of these databases.

As a natural continuation of these developments, the European Vegetation Archive (EVA) was started in February 2012 by agreement of the owners or managers of a few key European databases, including the national databases of Austria (Willner et al. 2012), the Czech Republic (Chytrý & Rafajová 2003), Germany (Ewald et al. 2012), Italy (Landucci et al. 2012), Slovakia (Šibík 2012), the Netherlands (Schaminée et al. 2012), the UK (Rodwell 2012), the database of the German federal state Mecklenburg-Vorpommern (Jansen et al. 2012a) and the Database of Dry Grasslands in the Nordic and Baltic Region (Dengler & Rūsiņa 2012). At the annual meeting of the European Vegetation Survey in Vienna in May 2012, the EVA Data Property and Governance Rules (<http://euroveg.org/download/eva-rules.pdf>) were approved, and the EVA Coordinating Board elected. Subsequently, new databases joined the initiative. In autumn 2012, the EVA website was launched (<http://euroveg.org/eva-database>).

Managing a large database consisting of multiple databases that use different species lists and follow different data property rules required new database management software. Therefore, Stephan Hennekens developed a prototype of TURBOVEG 3, which provided the necessary tools. This was an entirely new software product rather than an update of the previous version of TURBOVEG. It was first used for the Braun-Blanquet project led by Borja Jiménez-Alfaro at Masaryk University (Brno), in which vegetation-plot data from many European databases were collected for the purpose of characterization of European vegetation alliances (Jiménez-Alfaro et al. 2014). In autumn 2013, Stephan Hennekens at Alterra (Wageningen) and Borja Jiménez-Alfaro and Ilona Knollová at Masaryk University were appointed as EVA database managers, and contributing databases were uploaded to a single platform. Continuous intensive collaboration among these three data managers led to considerable improvement of data quality and provided necessary feedback for further development and testing individual data management functions in TURBOVEG 3. In parallel, the update of the SynBioSys Taxon Database continued with the help of the EVA Taxonomic Advisory Board (Erwin Bergmeier, Luis Carlón, Jiří Danihelka, Jürgen Dengler and Florian Jansen). In spring 2014 the first version of EVA was released for use in research and applied projects.

Management of EVA data

The EVA database stores copies of individual national or regional databases or parts of these following the EVA Data Property and Governance Rules. These contributing databases continue their activities of data acquisition and quality control, and send updated versions to EVA from time to time. EVA collaborates preferentially with compre-

hensive national databases or, where these do not exist, large regional or thematic databases. Smaller regional databases are expected to be primarily integrated into national databases, with their data contributed to EVA through these. The data stored in EVA remain the property of the owners of the contributing databases. For each contributing database there is a designated custodian (optionally also a deputy custodian), who is the owner, manager or other designated representative that acts on the particular database's behalf.

Data can be stored in EVA under three access regimes selected by the custodian: (1) restricted access – data are available only to EVA data contributors, and with each use requiring the custodian's explicit consent; (2) semi-restricted access – data are available to EVA data contributors unless the custodian explicitly objects to their use for specific projects; and (3) free access – data are available to a wider community of users. Under regimes (1) and (2), the right to use the data also includes the other persons, besides the custodians, involved in the establishment and maintenance of the contributing databases. Additionally, other researchers can obtain restricted or semi-restricted data for research projects via cooperation with EVA data contributors. It is an aim of EVA to increase the amount of free access vegetation plots, but the specific arrangements regarding data access regimes depend entirely on the decisions of the custodians of each contributing database.

The EVA is managed using a functioning prototype of TURBOVEG 3. This prototype still does not include several functions needed for the full management of primary databases (these functions are available in TURBOVEG 2; Hennekens & Schaminée 2001); therefore, TURBOVEG 3 has not yet been provided to the managers of the contributing databases. Many of the contributing databases continue to be managed using TURBOVEG 2 (Hennekens & Schaminée 2001), in which these functions are available. TURBOVEG 3 is linked to the SynBioSys Taxon Database, which provides the connection of each name used in the contributing databases to a unified taxonomic concept and nomenclature. The output data format can contain both the unified and the original taxon names to give the users an opportunity for checking whether the unified names correctly reflect the concepts behind the original names. Metadata on the EVA databases are managed in cooperation with GIVD (Dengler et al. 2011).

The EVA data can be requested via standard forms available at the EVA website. Using these forms, the applicant should provide the project description and the specification of the data required. Upon receipt of a data request, an EVA database manager checks which contributing databases contain the required data and sends a request for approval to the custodians of the restricted access databases

or a notification to the custodians of the semi-restricted or free access databases. If the required permissions are given (restricted access data) or no objections are raised (semi-restricted access data) within three weeks, the data are released to the applicant. Descriptions of all projects that use the EVA data are published on the EVA website.

Current content of EVA

By 30 June 2015, EVA comprised 61 databases, including comprehensive national databases, large regional databases and thematic databases focused on certain broad vegetation types across the whole of Europe or a large part of the continent (Appendices S1 and S2). In addition to Europe in the physico-geographic sense, EVA also includes data from Cyprus, the Anatolian part of Turkey and the Macaronesian archipelagos. If a contributing database focusing primarily on Europe also includes data from adjacent regions, especially northern Africa and the Near East, these plots are also included.

As of 30 June 2015, EVA contained a total of 1 027 376 vegetation plots from 57 countries (Appendix S3). This is nearly half of the 2 131 753 presumably non-duplicated plots contained in the GIVD-registered European databases (unpubl. data based on www.givd.info, accessed 30 June 2015). The difference between the GIVD-registered and EVA data amounts is mainly because only a stratified subset of 102 327 plots from the Dutch National Vegetation Database (which contains about 600 000 plots in total) was included in EVA in order to limit the disproportion in sampling intensity between the Netherlands and the other countries. Moreover, the GIVD figure can include some duplicated plots that are not indicated as duplicates.

The geographic distribution of plots across Europe is unequal, with the highest concentration in Central and Northwest Europe and major gaps in the Nordic countries, Russia (except for Tatarstan, Bashkortostan and the Lower Volga Valley) and Belarus (Fig. 1, Appendix S3). Of the vegetation plots included in EVA, 30% provide data in restricted access regime, 66% in semi-restricted access regime and 4% in free access regime. Most plots (82%) are georeferenced with latitude/longitude coordinates, but in some regions most coordinates do not represent precise locations but either central points of grid cells (e.g. about 10 km × 10 km in size) or even larger geographic entities. The sampling year is recorded for 86% of plots, ranging from 1885 to 2014, with most plots (83% of those with recorded dates) sampled between 1971 and 2014 (Fig. 2). Plot size is indicated for 64% of the plots, and some kind of assignment to vegetation types (phytosociological syntaxa or informally defined habitat types) is available for 69% of the plots.

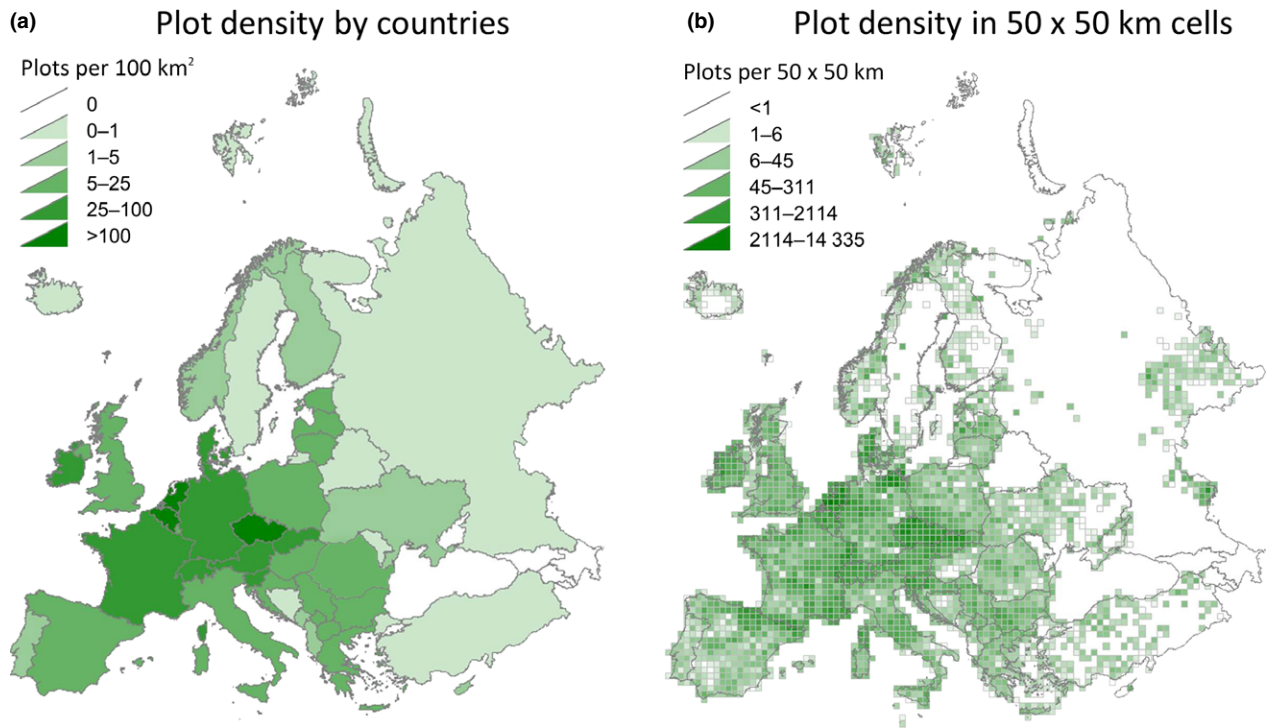


Fig. 1. Distribution of the vegetation plots included in EVA per country **(a)** and density of georeferenced plots in 50 km × 50 km grid cells **(b)**. Plot density by countries was recalculated to 100-km² units. Some differences in the content of these two figures are due to the fact that in some countries many plots are not georeferenced. Data accessed on 30 June 2015.

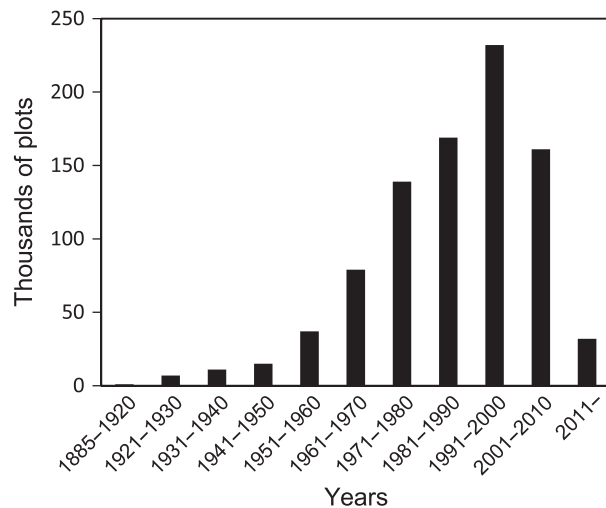


Fig. 2. Sampling dates of the vegetation plots included in EVA.

Current EVA uses and outlook

The EVA is a new data resource with huge potential to support fundamental research and applied projects at the international scale across Europe. By 30 June 2015, EVA data had been provided to 17 projects (<http://euroveg.org/eva-database-eva-projects>), most of them

focusing on international vegetation surveys and classification of selected vegetation types. Macroecological projects focusing on plant invasions across vegetation types or patterns of fine-scale species richness of selected broad vegetation types across Europe have also made use of EVA data, as have projects focusing on species distributions. Additionally, EVA has provided species data for assessment of plant indicator values. An important development in the field of European nature conservation policy was the request in 2013 from the European Environment Agency (EEA) to determine the floristic compositions of the EUNIS habitat types. Describing the compositions of these is an on-going programme of EEA, for which two major groups of European habitats have already been reviewed (forests in 2013, heathlands and scrub in 2014) by using the available vegetation-plot databases and published sources (Schaminée et al. 2013, 2014), which were simultaneously integrated into EVA. We expect that many new projects will follow.

In 2014, EVA also became the exclusive European partner of a broader international initiative, sPlot (Dengler et al. 2014), hosted by the German Centre of Integrative Biodiversity Research (iDiv). The aim of sPlot is to collect representative data sets of vegetation plots from global

biomes and link them to the data on plant traits from the TRY database (Kattge et al. 2011) for use in macroecological analyses at continental to global scales. European data can be contributed to sPlot only after their integration into EVA. Most of the custodians of the EVA databases have already agreed to join sPlot as well.

The EVA still has many gaps in geographic coverage as well as in representation of certain vegetation types. It also inevitably contains various biases inherent to sets of data assembled from multiple sources and originally collected for various purposes (Michalcová et al. 2011; Chytrý et al. 2014). However, the overall effect of these biases is relatively small in comparison with the wealth of information provided, and, moreover, the biases can partly be accounted for when selecting, analysing and interpreting the data. The great willingness shown by many database owners and managers to share their data in just the first three years of EVA's existence inspires optimism that it will continue to grow and that data gaps will shrink.

Acknowledgements

Our major thanks go to thousands of European vegetation scientists of several generations who collected the original vegetation-plot data in the field, published them or made their unpublished data available to others, and to those who spent myriad hours digitizing data and managing the contributing databases. EVA data management has been partly funded by the Czech Science Foundation (Centre of Excellence PLADIAS, 14-36079G).

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. An overview of the vegetation-plot databases included in EVA with their GIVD codes, custodians and numbers of all plots and georeferenced plots.

Appendix S2. Published references to EVA databases.

Appendix S3. Numbers and densities of vegetation plots included in EVA by countries.

Supporting information to the paper

Chytrý, M. et al. European Vegetation Archive (EVA): an integrated database of European vegetation plots. *Applied Vegetation Science*.

Appendix S1. An overview of the vegetation-plot databases included in EVA on 30 June 2015 with their GIVD codes, custodians, total numbers of plots and numbers of georeferenced plots.

GIVD code	Database name	Custodian, deputy custodian	No. of plots	No. of georeferenced plots
00-00-004	Vegetation Database of Eurasian Tundra	Risto Virtanen	1 132	1 132
00-RU-001	Vegetation Database Forest of Southern Ural	Vassiliy Martynenko	1 102	222
00-RU-003 + 00-RU-004 + 00-RU-005	Database Meadows and Steppes of Southern Ural + Database of South Ural Order <i>Gaietalia veri</i> + Database of South Ural Order <i>Arrhenatheretalia</i>	Sergey Yamalov	2 354	1 093
00-TR-001	Forest Vegetation Database of Turkey – FVDT	Ali Kavgacı	919	919
AS-TR-001	Vegetation Database of the Grassland Communities in Anatolia	Deniz Işık Gürsoy, Didem Ambarlı	3 018	2 991
AS-TR-002	Vegetation Database of Oak Communities in Turkey	Emin Uğurlu	1 181	1 181
EU-00-002	Nordic-Baltic Grassland Vegetation Database (NBGVD)	Jürgen Dengler	7 675	6 062
EU-00-004	Iberian and Macaronesian Vegetation Information System (SIVIM)	Xavier Font	3 506	3 262
EU-00-004	Iberian and Macaronesian Vegetation Information System (SIVIM) – Catalonia	Xavier Font	3 875	3 875
EU-00-004	Iberian and Macaronesian Vegetation Information System (SIVIM) – Deciduous forests	Juan Antonio Campos, Xavier Font	6 642	6 311
EU-00-004	Iberian and Macaronesian Vegetation Information System (SIVIM) – Grasslands	Maria Pilar Rodríguez-Rojo, Xavier Font	7 416	7 234
EU-00-004	Iberian and Macaronesian Vegetation Information System (SIVIM) – Sclerophyllous vegetation	Federico Fernández-González, Xavier Font	3 799	3 651
EU-00-004	Iberian and Macaronesian Vegetation Information System (SIVIM) – Shrublands	Rosario G. Gavilán, Xavier Font	3 098	2 931
EU-00-004	Iberian and Macaronesian Vegetation Information System (SIVIM) – Wetlands	Aaron Pérez Haase, Xavier Font	6 560	6 476
EU-00-011	Vegetation-Plot Database of the University of the Basque Country (BIOVEG)	Idoia Biurrun, Itziar García-Mijangos	18 441	17 921
EU-00-013	Balkan Dry Grasslands Database	Kiril Vassilev	7 683	4 030
EU-00-016	Mediterranean <i>Ammophiletea</i> database	Corrado Marcenó, Borja Jiménez-Alfaro	7 359	6 603
EU-00-017	European Coastal Vegetation Database	John Janssen	4 624	3 288
EU-00-018	The Nordic Vegetation Database	Jonathan Lenoir, Jens-Christian Svenning	7 718	7 718
EU-00-019	Balkan Vegetation Database	Kiril Vassilev, Hristo Pedashenko	9 118	6 657
EU-00-020	WetVegEurope	Flavia Landucci	12 605	12
EU-00-021	SE Europe Forest Database	Andraž Čarni	3 675	3 657
EU-00-022	European Mire Vegetation Database	Tomáš Peterka, Martin Jiroušek	10 147	9 988
EU-AL-001	Vegetation Database of Albania	Michele De Sanctis, Giuliano Fanelli	290	290
EU-AT-001	Austrian Vegetation Database	Wolfgang Willner	34 458	24 246
EU-BE-002	INBOVEG	Els De Bie	25 665	8 502
EU-BG-001	Bulgarian Vegetation Database	Iva Apostolova, Desislava Sopotlieva	5 254	1 957
EU-CH-005	Swiss Forest Vegetation Database	Thomas Wohlgemuth	14 193	14 193
EU-CZ-001	Czech National Phytosociological Database	Milan Chytrý, Dana Michalcová	104 697	102 062
EU-DE-001	VegMV	Florian Jansen, Christian Berg	53 822	49 631
EU-DE-013	VegetWeb	Jörg Ewald, Martin Kleikamp	23 078	22 303
EU-DE-014	German Vegetation Reference Database (GVRD)	Ute Jandt, Gunnar Seidler	30 840	28 794

EU-FR-003	SOPHY	Henry Brisse	209 864	155 276
EU-GB-001	UK National Vegetation Classification Database	John Rodwell	28 533	25 485
EU-GR-005	Hellenic Natura 2000 Vegetation Database (HelNatVeg)	Panayotis Dimopoulos, Ioannis Tsiripidis	5 168	4 752
EU-GR-006 + EU-GR-007	Hellenic Woodland Database + Hellenic Beech Forests Database (Hell-Beech-DB)	Ioannis Tsiripidis	3 199	636
EU-HR-001	Phytosociological Database of Non-Forest Vegetation in Croatia	Zvezdana Stančić	5 057	3 096
EU-HR-002	Croatian Vegetation Database	Željko Škvorc, Daniel Krstonošić	8 734	8 487
EU-HU-003	CoenoDat Hungarian Phytosociological Database	János Csiky, Zoltán Botta-Dukát	8 505	827
EU-IE-001	Irish Vegetation Database	Una FitzPatrick, Lynda Weekes	32 212	27 123
EU-IT-001	VegItaly	Roberto Venanzoni, Flavia Landucci	15 332	11 905
EU-IT-010	Italian National Vegetation Database (BVN/ISPRA)	Laura Casella, Pierangela Angelini	3 562	3 561
EU-IT-011	Georeferenced Vegetation Database of Sapienza University of Roma	Emiliano Agrillo, Fabio Attorre	12 780	11 880
EU-LT-001	Lithuanian Vegetation Database	Valerijus Rašomavičius, Domas Uogintas	7 821	2 206
EU-LV-001	Semi-natural Grassland Vegetation Database of Latvia	Solvita Rūsiņa	5 594	5 594
EU-MK-001	Vegetation Database of the Republic of Macedonia	Renata Čušterevska	1 417	382
EU-NL-001	Dutch National Vegetation Database	Joop Schaminée, Stephan Hennekens	102 327	93 812
EU-PL-001	Polish Vegetation Database	Zygmunt Kaçki, Grzegorz Swacha	22 229	22 229
EU-RO-007	Romanian Forest Database	Adrian Indreica, Pavel Dan Turtureanu	6 017	6 017
EU-RO-008	Romanian Grassland Database	Eszter Ruprecht, Kiril Vassilev	5 061	4 523
EU-RS-002	Vegetation Database Grassland Vegetation of Serbia	Svetlana Ačić, Zora Dajić Stevanović	5 587	5 587
EU-RS-003 + EU-RS-004	Database of Forest Vegetation in Republic of Serbia + Vegetation Database of Northern Part of Serbia (AP Vojvodina)	Mirjana Krstivojević Ćuk	4 948	1 131
EU-RU-002	Lower Volga Valley Phytosociological Database	Valentin Golub	14 853	6 294
EU-RU-003	Vegetation Database of the Volga and the Ural Rivers Basins	Tatyana Lysenko	1 516	1 189
EU-RU-011	Vegetation Database of Tatarstan	Vadim Prokhorov	7 471	2 309
EU-SI-001	Vegetation Database of Slovenia	Urban Šilc	10 986	10 986
EU-SK-001	Slovak Vegetation Database	Milan Valachovič, Jozef Šibík	36 405	34 287
EU-UA-001	Ukrainian Grassland Database	Anna Kuzemko, Yulia Vashenyak	4 043	3 963
EU-UA-005	Halophytic and coastal vegetation database of Ukraine	Tetiana Dziuba, Dmytro Dubyna	4 621	20
EU-UA-006	Vegetation Database of Ukraine and Adjacent Parts of Russia	Viktor Onyshchenko, Vitaliy Kolomiychuk	3 326	3 325
Not in GIVD	Danish Vegetation Database	Jesper Erenskjold Moeslund, Rasmus Ejrnaes	24 264	24 264

Supporting information to the paper

Chytrý, M. et al. European Vegetation Archive (EVA): an integrated database of European vegetation plots. *Applied Vegetation Science*.

Appendix S2. Published references to EVA databases.

- 00-00-004 Virtanen, R. 2012. Vegetation Database of Eurasian Tundra. *Biodiversity & Ecology* 4: 377.
- EU-00-002 Dengler, J. & Růsiņa, S. 2012. Database Dry Grasslands in the Nordic and Baltic Region. *Biodiversity & Ecology* 4: 319.
- EU-00-004 Font, X., Rodríguez-Rojo, M.P., Acedo, C., Biurrun, I., Fernández-González, F., Lence, C., Loidi, J. & Ninot, J.M. 2010. SIVIM: an on-line database of Iberian and Macaronesian vegetation. *Waldökologie, Landschaftsforschung und Naturschutz* 9: 15–22.
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- EU-00-011 Biurrun, I., García-Mijangos, I., Campos, J.A., Herrera, M. & Loidi, J. 2012. Vegetation-plot database of the University of the Basque Country (BIOVEG). *Biodiversity & Ecology* 4: 328.
- EU-00-013 Vassilev, K., Dajić Stevanović, Z., Cušterevska, R., Bergmeier, E. & Apostolova, I. 2012. Balkan Dry Grassland Database. *Biodiversity & Ecology* 4: 330.
- EU-00-016 Marcenò, C. 2010. East-Mediterranean *Ammophiletea* database. In: Dengler, J., Finckh, M. & Ewald, J. (eds.), *Vegetation Databases and Climate Change. 9th international Meeting on Vegetation Databases. Hamburg, 24–26 February 2010. Book of Abstracts*, p. 75. University of Hamburg, Hamburg, DE.
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- EU-AT-001 Willner, W., Berg, C. & Heiselmayer, P. 2012. Austrian Vegetation Database. *Biodiversity & Ecology* 4: 333.
- EU-BE-002 De Bie, E. & Paelinckx, D. 2013. INBOVEG, a treasury of vegetation relevés. In: Püssa, K., Kalamees, R. & Hallop, K. (eds.), *56th Symposium of the International Association for Vegetation Science. Vegetation Patterns and their Underlying Processes, Abstracts. 26–30 June 2013 Tartu Estonia*, p. 40. University of Tartu, Tartu, EE.
- EU-BG-001 Apostolova, I., Sopotlieva, D., Pedashenko, H., Velev, N. & Vasilev, K. 2012. Bulgarian Vegetation Database: historic background, current status and future prospects. *Biodiversity & Ecology* 4: 141–148.
- EU-CH-005 Wohlgemuth, T. 2012. Swiss Forest Vegetation Database. *Biodiversity & Ecology* 4: 340.
- EU-CZ-001 Chytrý, M. & Rafajová, M. 2003. Czech National Phytosociological Database: basic statistics of the available vegetation-plot data. *Preslia* 75: 1–15.
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- EU-DE-013 Ewald, J., May, R. & Kleikamp, M. 2012. VegetWeb – the national online-repository of vegetation plots from Germany. *Biodiversity & Ecology* 4: 173–175.
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- EU-GR-006+ Fotiadis, G., Tsiripidis, I., Bergmeier, E. & Dimopoulos, P. 2012. Hellenic Woodland Database. *Biodiversity & Ecology* 4: 389.
- EU-GR-007 Tsiripidis, I., Bergmeier, E., Fotiadis, G. & Dimopoulos, P. 2012. Hellenic Beech Forests Database (Hell-Beech-DB). *Biodiversity & Ecology* 4: 390.
- EU-HR-001 Stancic, Z. 2012. Phytosociological Database of Non-Forest Vegetation in Croatia. *Biodiversity & Ecology* 4: 391.

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Supporting information to the paper

Chytrý, M. et al. European Vegetation Archive (EVA): an integrated database of European vegetation plots. *Applied Vegetation Science*.

Appendix S3. Numbers and densities of vegetation plots included in EVA on 30 June 2015 by countries.

Country	No. of plots	No. of georeferenced plots	No. of plots /100 km ²	No. of georeferenced plots /100 km ²
Albania	511	290	1.8	1.0
Andorra	606	496	127.9	104.6
Austria	34 918	24 462	41.7	29.2
Belarus	390	0	<0.1	0.0
Belgium	32 523	13 616	106.2	44.5
Bosnia-Herzegovina	478	288	0.9	0.6
Bulgaria	14 516	10 730	13.1	9.7
Croatia	14 062	11 806	25.0	21.0
Cyprus	285	277	3.1	3.0
Czech Republic	103 055	101 234	130.9	128.5
Denmark	24 545	24 508	55.4	55.3
Estonia	3 092	2 006	6.8	4.4
Faroe Islands	18	18	1.3	1.3
Finland	3 824	3 693	1.1	1.1
France	179 996	143 479	32.9	26.2
Germany	119 869	105 142	33.6	29.5
Greece	12 871	7 786	9.7	5.9
Hungary	8 602	915	9.3	1.0
Iceland	728	554	0.7	0.5
Ireland	32 395	27 231	46.5	39.1
Italy	36 898	31 047	12.3	10.3
Kazakhstan (European part)	30	3	<0.1	<0.1
Kosovo	1 079	599	10.3	5.7
Latvia	6 222	6 219	9.7	9.6
Liechtenstein	3	0	2.0	0.0
Lithuania	8 020	2 349	12.4	3.6
Luxembourg	531	222	20.3	8.5
Macedonia	2 165	986	8.5	3.9
Malta	0	0	0.0	0.0
Moldova	21	21	0.1	0.1
Monaco	50	46	593.8	575.0
Montenegro	444	283	3.2	2.0
Netherlands	102 350	93 829	290.9	266.7
Norway	7 989	7 681	2.5	2.4
Poland	23 711	23 382	7.6	7.5
Portugal	1 723	1 520	1.9	1.7
Romania	12 309	10 936	5.2	4.6
Russia (European part)	31 491	14 622	0.8	0.4
San Marino	52	42	86.8	70.0
Serbia	17 691	8 165	22.7	10.5
Slovakia	36 725	34 235	75.0	69.9

Slovenia	13 432	13 402	65.1	64.9
Spain	54 412	48 252	10.8	9.7
Svalbard and Jan Mayen	201	197	0.3	0.3
Sweden	4 161	3 258	0.9	0.7
Switzerland	25 261	21 337	61.3	51.8
Turkey	5 629	5 582	0.7	0.7
Ukraine	17 652	6 979	3.0	1.2
United Kingdom	28 798	25 596	11.8	10.5
Outside the EVA target area				
Algeria	101	100	<0.1	<0.1
Egypt	46	44	<0.1	<0.1
Greenland	153	149	<0.1	<0.1
Israel	200	200	0.9	0.9
Lebanon	21	21	0.2	0.2
Libya	103	103	<0.1	<0.1
Mauritania	1	1	<0.1	<0.1
Morocco	169	168	<0.1	<0.1
Tunisia	248	231	0.2	0.1
