



National vegetation databases: the case of Vegltaly

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introduction & main goals of the project

In the last decade, vegetation scientists were increasingly attracted by the use of huge data sets, in order to address emerging issues such as the severe risk of species, habitats and biodiversity loss. Indeed, large vegetation-plot databases became crucial for any nature conservation programme and represent an important tool for monitoring environmental changes and improving nature conservation, according with the main aims of the international biodiversity conservation policies. *Vegltaly* (<http://www.vegitaly.it>; GIVD ID: EU-IT-001, <http://www.givd.info/ID/EU-IT-001>) is a web geo-database based on the open source project *anArchive for Botanical Data* (<http://www.anarchive.it>). Started in 2000 as a collaborative project, supported by National scientific societies (SBI - Italian Botanical Society, SISV - Italian Society for Vegetation Science), it was designed to archive, retrieve and analyze vegetation data as well as to publish them on the web. Initially developed by researchers from the Universities of Perugia, Camerino and Siena, it is coordinated by the University of Perugia and during the last 13 years a huge group of scientists already joined the project. Currently more than 20 Italian Universities and Research Institutions are involved. The resulting working group aims at bringing together all the small databases scattered across Italy in one large collaborative project. .

state of the art

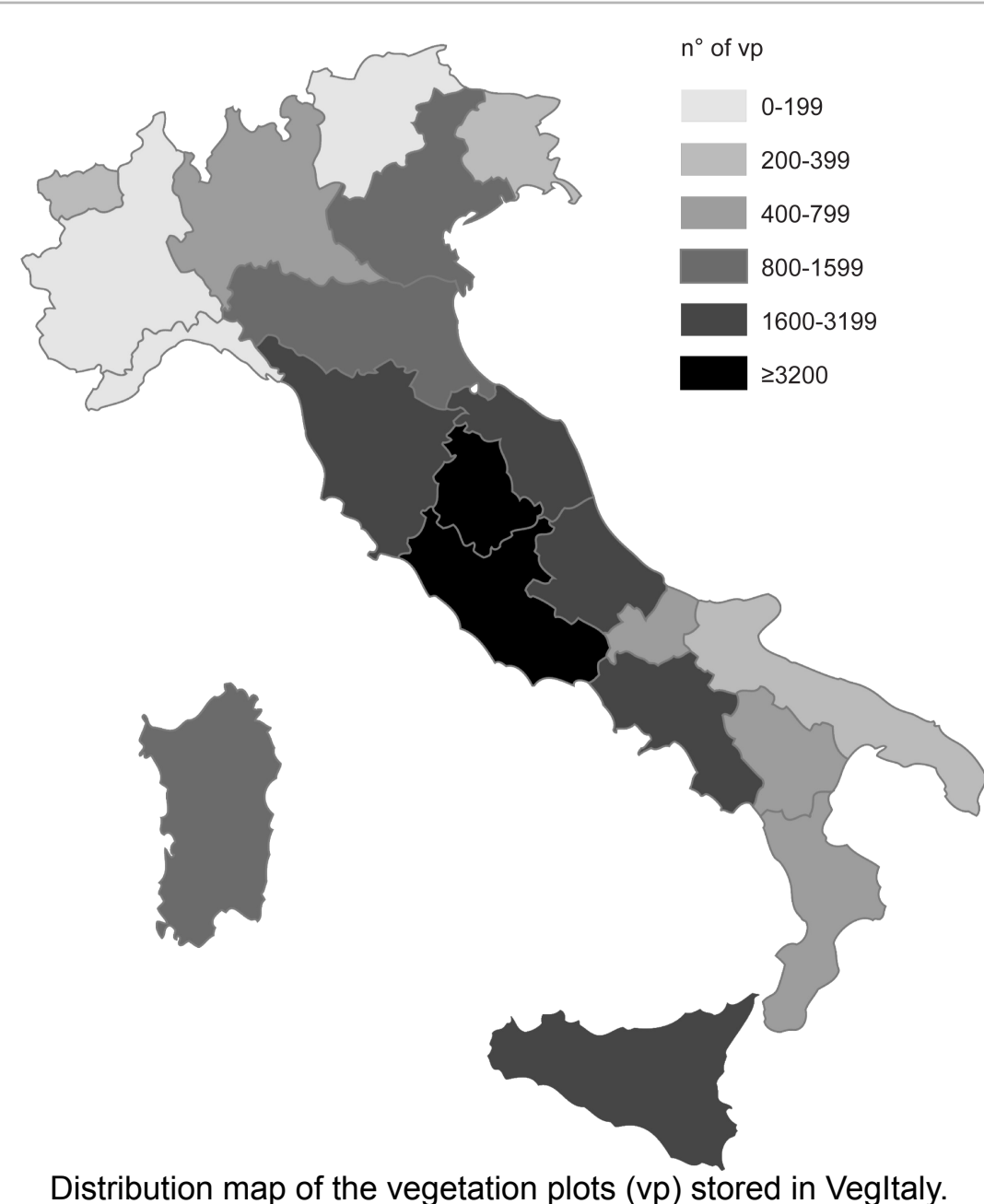
At present, more than 30,000 published or unpublished, public or private vegetation plots are stored in Vegltaly, still far from being an exhaustive sample of the whole Italian biodiversity. Some vegetation types are better represented than others (i.e. forests 34.68%, shrublands 5.68%, herbaceous vegetation 55.99%, unclassified 3.57%) and they are not homogeneously distributed across the national territory. However, the number of vegetation plots is rapidly increasing.

number and type of plots stored in Vegltaly

	n° of vp	%
Published	22,878	73.56
Unpublished	8,222	26.44
Total	31,100	

Lazio	6,134	19.72
Umbria	3,766	12.11
Toscana	3,131	10.07
Sicilia	2,742	8.82
Campania	2,722	8.75
Marche	1,881	6.05
Abruzzo	1,660	5.34
Sardegna	1,488	4.78
Veneto	1,315	4.23
Emilia Romagna	1,032	3.32
Calabria	758	2.44
Lombardia	624	2.01
Basilicata	451	1.45
Molise	434	1.40
Puglia	357	1.15
Friuli Venezia Giulia	288	0.93
Val d'Aosta	243	0.78
Piemonte	192	0.62
Liguria	164	0.53
Trentino	133	0.43
San Marino Rep.	2	0.01
n.a.	1,583	5.09
total	31,100	

	n° of vp	%
<i>Forest vegetation</i>	10,766	34.68
Climatophilous forest vegetation	10,157	32.66
Riparian and palustrine forest vegetation	579	1.86
Chestnut woods	50	0.16
<i>Shrubby vegetation</i>	1,768	5.68
Supratimberline dwarf shrubs	24	0.08
Temperate bushy/shrubby vegetation	1,064	3.42
Riparian and palustrine bushy/shrubby vegetation	280	0.90
Heathlands	10	0.03
Mediterranean scrub and chamaephytic vegetation	414	1.33
<i>Herbaceous vegetation</i>	17,412	55.99
Edges and fringes (both climatophilous and azonal)	378	1.22
Supratimberline grasslands	127	0.41
Secondary grasslands	3,274	10.53
Annual non-tyrthophilous dry grasslands	897	2.88
Pioneer annual wet vegetation	65	0.21
Temporary wetlands	238	0.77
Marshy and transitional pastures and meadows	1,277	4.11
Wet meadows (sedge dominated)	713	2.29
Helophytic vegetation	925	2.97
Spring vegetation (mainly bryophytic)	45	0.14
Bogs	217	0.70
Annual subnitrthophilous wet vegetation	166	0.53
Ruderal/synanthropic annual vegetation	490	1.58
Ruderal/synanthropic biennial/perennial vegetation	296	0.95
Mediterranean salt marshes/meadows perennial vegetation	302	0.97
Mediterranean salt marshes annual vegetation	57	0.18
Wall vegetation	1,058	3.40
Scree vegetation	90	0.29
Rupicolous non-coastal vegetation	258	0.83
Rupicolous coastal vegetation	86	0.28
Badland pioneer vegetation	738	2.37
Dune vegetation	2,603	8.37
Aquatic and amphibian vegetation	3,112	10.01
<i>Unclassified</i>	1,110	3.57
Total	31,100	



Distribution map of the vegetation plots (vp) stored in Vegltaly.

members of Vegltaly

- ☒ CNR-IBBR Bari
- ☒ Marche Floristic Research Center
- ☒ Nat. Res. "Torre Guaceto"
- ☒ "Second University" of Napoli
- ☒ University of L'Aquila
- ☒ University of Basilicata
- ☒ University of Camerino
- ☒ University of Catania
- ☒ University of Firenze
- ☒ University of Genova
- ☒ University of Isernia
- ☒ University of Napoli "Federico II"
- ☒ University of Palermo
- ☒ University of Pavia
- ☒ University of Perugia
- ☒ University of Camerino
- ☒ University of Roma "La Sapienza"
- ☒ University of Roma "Roma Tre"
- ☒ University of Salento
- ☒ University of di Sassari
- ☒ University of Siena
- ☒ University of Trieste
- ☒ University of Venezia
- ☒ Marche Polytechnic University

problems, solutions & tools

- ✓ *Vegltaly* can handle any field plot according to the definition of vegetation database suggested by GIVD; it can manage **data from different origins**, collected with different aims and stored by using different systems and programs (e.g. TURBOVEG, Microsoft ACCESS, spreadsheet software applications).
- ✓ **proper data standardization**: practical and technical solutions of this problem have been successfully tested, developing user-friendly applications for importing and managing vegetation plots in a single database structure and to facilitate data upload (**archiver**, **VegImport** and **TabImport**).
- ✓ the serious need of a shared set of **formal rules**, which allow a wide access to data and still safeguard each data provider's intellectual property, has been solved by formalizing a *Steering Committee* and approving a *Set of Rules*, officially adopted in 2013, February and improved in 2014, March.
- ✓ **data export** is possible from the web interface using queries (e.g., dominant species, localities, syntaxa, projects, etc.) and organizing data in tables containing header and species data. The currently available export formats are .txt, .csv and .ods respecting the compatibility with data analysis and statistical programs such as JUICE (Tichý 2002), SYNTAX (Podani 1995), MATEDIT (Burba et al. 2008), R Project for Statistical Computing (R Core Team 2012) and others.
- ✓ **geographic information** may be imported in metric-based UTM system, degree-based systems WGS84, ED50 and Roma40 or using the European Floristic Grid, corresponding to 1/16 of a map in scale 1:50,000 UTM-ED50 (Ehrendorfer & Hamann 1965; Niklfeld 1977).
- ✓ **bibliographic sources** are linked to LISY (www.scienzadellavegetazione.it/sisv/lisy/index.jsp), a bibliographic archive online currently including almost 3,400 bibliographic entries and more than 33,200 *syntaxa*, including synonyms.

TabImport

utility for data import from .xls, .xlsx, .odt or other format files

VegImport

utility for data import for Turboveg format files

taxonomy

Vegltaly is based on *anArchive* taxonomic Checklist (<http://www.anarchive.it>), an on-line, supervised, synonymized and referenced list of plant species names, developed to support the botanical data banking and vegetation analysis. Its main aim is to find practical solutions to face the large number of incongruent, overlapping or even conflicting taxonomic arrangements (the so called 'synonym problem', part of the more general 'names problem' in biology and linked to the '*taxon* concept problem'). The benefits deriving from such a supervised and referenced tool include the possibility to keep track of old and new species names, pointing out the latest reviewed accepted scientific name and its synonyms, and harmonizing different taxonomic points of view. The basic unit of the taxonomic Checklist is an object including the *taxon* name at specific or, when present, infraspecific level; the taxonomic frame stops at the level of family and ranks higher than genus are not treated hierarchically. Although rather simplified, this structure allows the possibility to have a flexible system and to accept any modification deriving from nomenclatural and taxonomical revisions. The taxonomic Checklist complies with the data standards proposed by the Taxonomic Databases Working Group (TDWG) and follows the guidelines of GBIF (2014), IPNI (2014), PESI (2014) and BioCAsE (2014). The complete Checklist is available online at www.anarchive.it/anArchive/specie/browser.jsp. It currently includes 23,463 valid names and synonyms for *taxa* occurring in Italy (both native and alien species) and 2,307 for *taxa* not included in the Italian flora (respectively: 2,059 and 605 genera), referred to 171 families from *Acanthaceae* to *Zygophyllaceae*. Among the *taxa* occurring in Italy, 11,797 refer to valid names and 11,666 to synonyms; among *taxa* not included in the Italian flora, 1,469 are valid names and 864 synonyms.

In: Dengler, J., Oldeland, J., Jansen, F., Chytrý, M., Ewald, J., Firnch, M., Glickler, F., Lopez-Gonzalez, G., Peet, R.K., Schaminée, J.H.J. (2012) [Eds.] Vegetation databases for the 21st century. – Biodiversity & Ecology 4: 185–190. DOI: 10.7809/b-e-00075.

Toward an Italian national vegetation database: Vegltaly

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Vegltaly: Technical features, crucial issues and some solutions

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NEW TRENDS IN BIODIVERSITY INFORMATICS

Vegltaly: The Italian collaborative project for a national vegetation database

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The anArchive taxonomic Checklist for Italian botanical data banking and vegetation analysis: theoretical basis and advantages

international context

During the last years, Vegltaly grew both in number of stored vegetation plots and in popularity and the project was often promoted in national and international congresses. It has been well acknowledged in Europe becoming a founding partner of the rising European Vegetation Archive (EVA; Chytrý et al. 2012) and a robust Southern European reference point for the creation of the European taxonomic standard list EuroSL (Dengler et al. 2012). Vegltaly members have jointly promoted the spread of national databases from Southern Europe, in conjunction with French, Spanish and Greek colleagues, through the publication of focused papers in the international journal Plant Sociology (Bonis & Bouzillé, 2012; Dimopoulos et al., 2012; Font et al., 2012 - open access).

conclusions & perspectives

Vegltaly's main aim is to contribute to data archiving and sharing, offering the possibility to manage large data sets for statistical analysis on a wide geographic scale. The convergence of several private databases into a single national one represents an important milestone for the Italian vegetation science towards the development of national-scale and long-term projects. *Vegltaly* stands as the first Italian trial at the national level, and *anArchive* taxonomic Checklist is a precious tool in order to reach a wide-scale sharing of information, respecting international standards. This integrated tool might become important for large-scale studies in vegetation science and plant ecology in Italy, as it already happened for analogous projects in other European countries (e.g. Schaminée & Westhoff 1992; Rodwell 1991–1995; Valachovič 1995–2001; Jarolímek et al. 1997; Chytrý 2007–2011), standing as a standard management system for botanical data.

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