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Facilitating access to vegetation data – Introduction to the Special Volume

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Abstract: This editorial introduces the Special Volume “Vegetation databases for the 21st century”, which is an outcome of the 9th Meeting on Vegetation Databases, held 24–26 February 2010 in Hamburg. We briefly report on the meeting with its presentations and workshops. Then we highlight the launch of the Global Index of Vegetation-Plot Databases (GIVD), an online metadatabase initiated during the conference and which currently lists 183 databases worldwide. Further, we report on plans for an electronic reference list of all European plant taxa (EuroSL) and the emerging European Vegetation Archive (EVA), which will join existing national and regional databases. Besides five regular articles, this Special Volume contains a series of Database Reports that present standardised Fact Sheets for the majority of GIVD-registered databases. The publication of the Database Reports will make these databases more visible, allowing their regular citation, and thus presenting an incentive for collaborative data use.

Keywords: biodiversity informatics; conference report; database report; ecoinformatics; editorial; Global Index of Vegetation-Plot Databases (GIVD); metadata; vegetation plot.

Abbreviations: GIVD = Global Index of Vegetation-Plot Databases.

The 9th Meeting on Vegetation Databases took place in Hamburg, Germany, 24–26 February 2010 and focussed on “Vegetation databases and climate change”. This Special Volume entitled *Vegetation databases for the 21st century* is the second major publication resulting from this conference, after a special issue of *Journal of Vegetation Science* last year (Dengler et al. 2011a). Here we present some of our impressions from the meeting, introduce the metadatabase GIVD (Global Index of Vegetation-Plot Databases), report on the developments after the conference regarding availability and use of vegetation-plot data and briefly outline the structure of the volume.

Report from the 9th Meeting on Vegetation Databases

The meeting in Hamburg was the ninth of a series of conferences organised by the Section “Vegetation Databases” of NetPhyD (Network Phytodiversity in Germany). Interested individuals can join a

mailing list by sending an e-mail to J.E. In 2010, the “Ecoinformatics” Working Group of the International Association for Vegetation Science (contact: R.K.P.) joined as co-organiser. With 142 participants from 28 countries, the meeting at the Biocentre Klein Flottbek and Botanical Garden, University of Hamburg, was the largest and most international of the series (Fig. 1; see also Ewald et al. 2010).

The conference included three invited keynote lectures (Niklaus Zimmermann, WSL, Switzerland; Michael Rutherford, SANBI, South Africa; Ingolf Kühn, UFZ, Germany) plus 25 oral and 65 poster contributions.

Young Investigator Prizes (YIPs) were awarded for the best oral and poster contributions given by presenting authors under the age of 34. In the oral category, the first prize went to Cécile Albert (Grenoble, France) (Fig. 2) for her talk on *Intraspecific functional variability: how should we use traits from large databases?* (subsequently published as Albert et al. 2011). Second and third prizes went to Christine Römermann (Frankfurt am

Main, Germany) and Jonathan Lenoir (Aarhus, Denmark). Lidewij Keser (Berne, Switzerland) received the first prize for her poster *Which traits aid in invasiveness of clonal plant species?* Second and third prizes were won by Frank Richter (Dresden, Germany) and Jona Luther-Mosebach (Hamburg, Germany).

The formal sessions of the conference were framed by interactive software workshops. The workshops before the proper conference showed ways for dealing with spatial autocorrelation in ecological data (Ingolf Kühn) and introduced the powerful free database management software BIOTA-Base (Manfred Finckh). Two additional workshops gave introductions to the use of R for multivariate analyses (Florian Jansen) and spatial analyses (Jens Oldeland) in vegetation science. Finally, there was a post-symposium workshop on the establishment of a Southeast European vegetation-plot database for dry grasslands (see Dengler et al. 2012b, Vassilev et al. 2012).



Fig. 1: Conference participants in front of the Biocentre Klein Flottbek in wintery Hamburg, February 2010 (Photo: J. Dengler).

Launch of GIVD, the Global Index of Vegetation-Plot Databases

The working group had previously established a metadata database on vegetation data from Germany and neighbouring countries, hosted by F.J. at the University of Greifswald. In Hamburg it was announced that the database had been expanded to be global in scale in order to:

1. raise awareness about the amount and quality of vegetation data,
2. allow scientists to find suitable datasets and stimulate research co-operations, and

3. provide a scientific reward for the establishment and maintenance of databases.

To achieve these aims, J.D., F.J., and F.G., under the auspices of an international Steering Committee, established an online metadata database, the Global Index of Vegetation-Plot Databases (GIVD; <http://www.givd.info>; see Dengler et al. 2011b). All the participants of the conference in Hamburg, and members of the mailing lists “Vegetation Databases” and “Ecoinformatics” were invited to register their databases. The managers of databases known to members of the Steering Committee were also personally con-

tacted. These efforts were so successful that by the end of 2010, a total of 132 databases containing more than 2.4 million independent vegetation-plots had been registered (Dengler et al. 2011b). This success has continued and by mid-2012 the content had increased to 183 databases with more than 2.8 million plots (Jansen et al. 2012). Building on earlier overviews of Ewald (2001) and Schaminée et al. (2009), GIVD has made the valuable, extensive, and rapidly-growing content of vegetation-plot databases more visible and accessible to ecologists and biodiversity informaticians worldwide.

The second aim of GIVD has also been achieved. As Jansen et al. (2012) show, the GIVD homepage is visited regularly by many scientists worldwide. This activity will probably continue to increase as more detailed and user-friendly search functions are added to the GIVD platform. Some recent upgrades are introduced in this volume (Glöckler et al. 2012, Jansen et al. 2012), and the GIVD Steering Committee remains open to suggestions for future improvements (contact: J.D., F.J., or F.G.).

The third major aim of GIVD was to help originators of vegetation-plot databases receive appropriate scientific credit. It is a major impediment for the development of big ecological databases, and the sharing of their content, that owners often have the impression that they give valuable information away, but receive very little in return. GIVD improves the situation by making datasets visible and attracting other scientists who might be



Fig. 2: Young Investigator Prize winner for the best oral presentation, Cécile H. Albert, receives her prize from the conference president Jürgen Dengler.

interested in using them for research projects. Then it is up to the database host/owner to achieve an agreement with the potential user that ensures the former's interests are taken into account, e.g. by their inclusion as co-authors of resulting publications. However, GIVD wants to go a step further, making the databases easily citable. As a first step in this direction, each GIVD-registered database receives a uniform and persistent identifier, such as AF-ZA-001 for the National Vegetation Database of South Africa. These IDs have the potential to become powerful tools like the acronyms of the *Index Herbariorum* (Thiers 2010), which have become a global standard for referencing collections of botanical specimens. Vegetation scientists could achieve something similar for the GIVD IDs, providing that authors, reviewers, and editors in this field use them and require their use whenever appropriate. The next step was the creation of Uniform Resource Identifiers (URIs) that provide a permanent link to the GIVD metadata that describe a certain vegetation-plot database (see Jansen et al. 2012). These URIs contain the GIVD ID and can now be found both on the online version of GIVD and in the Fact Sheets presented in this volume (see Glöckler et al. 2012).

The most important step, however, might be the present volume, which contains Database Reports for nearly all GIVD-registered databases. These reports are citable scientific articles with all persons that made major contributions to a specific database as co-authors. Each Database Report contains a standardised Fact Sheet that provides the most relevant metadata in an easily accessible and comparable manner. While there is still no standard to cite datasets directly and let them count in citation metrics, the Database Reports in this volume can serve as a surrogate similar to the data papers in the journal *Ecology*. We recommend that whenever data from a certain database are used, its GIVD ID is mentioned and the corresponding Database Report in this volume (or another published paper describing the database) is cited. This way, creation and maintenance of valuable datasets would receive its appropriate scientific recognition and reward.

Other recent developments in the field of vegetation-plot databases

Prior to publication of this Special Volume, a Special Issue with contributions from the meeting in Hamburg was published in *Journal of Vegetation Science* under the title *Ecoinformatics and global change* (Dengler et al. 2011a; see Fig. 3). This continues a tradition started four years earlier in this journal with a first Special Feature in the field of ecoinformatics (Bekker et al. 2007). The recent Special Issue contained 15 articles in total. The most prominent ones are certainly the presentation of GIVD (Dengler et al. 2011b) and the introduction of Veg-X as a generally applicable data exchange standard for any kind of vegetation-plot data (Wiser et al. 2011).

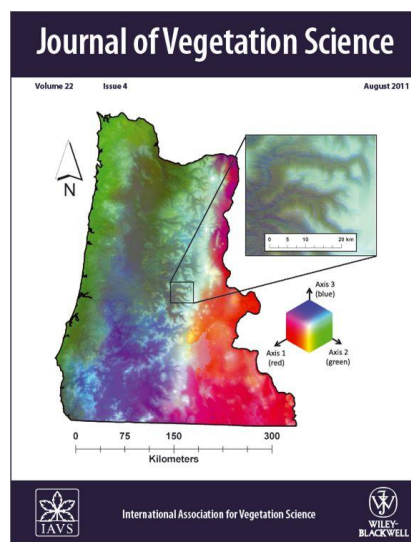


Fig. 3: Cover of the Special Issue on *Ecoinformatics and global change* (2010) (reproduced with kind permission of Wiley-Blackwell).

The second point worth mentioning is that the problems caused by inconsistent species taxonomies when merging data from multiple databases and mixed provenance (Jansen & Dengler 2010) are increasingly encountered. The key issue is that the simple assignment of synonyms does not solve the problem, which is probably the single most serious impediment for creating even larger-scale databases than those presently registered in GIVD. Therefore, building on earlier experience within Germany (Jansen & Dengler 2008), a subset of the editors of this volume started an initiative for a uni-

form electronic taxonomic reference list of European plants: EuroSL (SL = “standard list”). A first workshop was held in December 2011 in Göttingen, on whose outcomes Dengler et al. (2012a) report in this volume.

Finally, a few months prior to this publication, the creators of several GIVD-registered European databases initiated a European Vegetation Archive (EVA). This means that in the future these databases will not only be searchable on the same metadata platform, but actually be integrated in a single uniform database. Presently, 13 databases have joined the EVA initiative. The initiative has implemented Data Property and Governance Rules, established a Council and elected a Coordinating Board (the initial chair of which is M.C.). There is still a lot of work to be done, but when EVA goes live, it will be the single largest vegetation-plot database in the world, containing more than one third of all vegetation-plot data registered in GIVD.

Introduction to the contributions in the Special Volume

This Special Volume is organised in two parts: ordinary contributions and Database Reports.

There are five ordinary contributions. The first contribution is by Dengler et al. (2012a) elaborating the idea of EuroSL. In the second, Garcíá Márquez et al. (2012) propose a methodological framework to assess the spatial quality of biological databases. The remaining three articles of the first part are case studies that use vegetation-plot databases to address various research questions. Ewald (2012) shows how such a database can be used to illuminate the altitudinal distribution of species. Heinrichs et al. (2012) use a permanent-plot dataset to address long-term vegetation changes in German forests. Finally, Alvarez et al. (2012) studied the vegetation of small wetlands in East Africa and use their database to propose a preliminary classification of vegetation types.

The second part of this volume contains the Database Reports, which themselves are organised into various sections. First, there are two introductory articles: Jansen et al. (2012) give an update on the present content of GIVD, while Glöckler et al. (2012) explain how the component Fact Sheets are organised. Glöckler (2012) contains an overview of all presently registered GIVD databases with an indication

whether and where in this volume the corresponding Database Report can be found. Thereafter, 21 Long Database Reports describe in detail leading vegetation-plot databases from Africa, Europe, the Americas, and – in one case – multiple continents. These articles cover some of the most important databases worldwide, including the three biggest – the Dutch National Vegetation Database (EU-NL-001; Schaminée et al. 2012: 600,000 plots), Forest Inventory and Analysis (FIA) Database, USA (NA-US-001; Gray et al. 2012: 538,000 plots); and SOPHY (EU-FR-003; Garbolino et al. 2012: 212,000 plots) – and many that have never before been described in a citable publication. Nearly all GIVD-registered databases, whose authors did not prepare a full article, are represented by a Short Database Report ($n = 149$) instead, containing the same standardised Fact Sheets as the Long Database Reports. Both categories of reports are arranged in a geographical sequence (multicontinental – Africa – Asia – Australasia – Europe – North America – South America), which is used to colour-code the Fact Sheets (see Glöckler et al. 2012). The sequence within the continents is simply alphanumeric following the GIVD IDs.

We believe that presentation of the majority of the world's existing vegetation-plot databases in a single volume will facilitate discovery of, and access to, critical data. Evidently, the precise numbers given in the Fact Sheets will change continuously for the majority of databases which are actively managed. Therefore, each published Fact Sheet contains a hyperlink to the continuously updated online version (see Glöckler et al. 2012).

Finally, we would like to highlight that shortly after the print publication of this volume is released, the complete content of this volume will become published in a freely accessible Internet version, which can be found on the journal homepage http://www.biodiversity-plants.de/biodiversity_ecol/. As editors, we wish you an inspiring and enjoyable reading. May the print and online versions of this Special Volume become a useful resource for vegetation scientists and biodiversity informaticians.

Acknowledgements

First of all, we would like to thank the individuals and organisations involved in the conference. These include the German Federal Agency for Nature Conservation

(BfN), the Floristisch-Soziologische Arbeitsgemeinschaft e. V. (FlorSoz), and the BIOTA AFRICA project for financial support, and the team of the BEE Section of the Biocentre Klein Flottbek, particularly the conference assistant Jan Möller, who restlessly and relentlessly (like a bee!) helped with the organisation.

We are indebted to Norbert Jürgens, the Chief Editor of *Biodiversity & Ecology*, for his invitation to publish a Special Volume in this series and for safeguarding the necessary financial support for publication of such a large volume in full colour. We are grateful to all authors for their valuable contributions, which together give a comprehensive overview on vegetation databases at the beginning of the new century. The quality of the articles would not be as high as it is if not for the colleagues outside the editorial team who served as referees in the peer-review process. Here we are grateful to Juraj Balkovič, Fidèle Bognounou, M. Forbes Boyle, Mark Burkitt, Luis Cayuela, Christophe Coudun, Romeo Di Pietro, Cynthia Erb, Anton Fischer, Korbinian Freier, Rense Haveman, Radim Hédl, Stephan M. Hennekens, John Janssen, Michael Lee, Simon L. Lewis, Michael Manthey, Jan Peper, Christian Rixen, Wieger Wamelink, and Erik Welk. Finally, we would like to thank Daniel Morgenstern for enormous help with the technical editing of the contributions and Will Simonson for linguistic editing of this editorial.

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