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PALAEARCTIC GRASSLANDS

Journal of the Eurasian Dry Grassland Group

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Palaearctic Grasslands, formerly published under the names *Bulletin of the European Dry Grassland Group* (Issues 1-26) and *Bulletin of the Eurasian Dry Grassland Group* (Issues 27-36) is the journal of the Eurasian Dry Grassland Group (EDGG). It usually appears in four issues per year. *Palaearctic Grasslands* publishes news and announcements of EDGG, its projects, related organisations and its members. At the same time it serves as outlet for scientific articles and photo contributions.

Palaearctic Grasslands is sent to all EDGG members and, together with all previous issues, it is also freely available at http://www.edgg.org/publications.htm.

Scientific articles (Research Articles, Reviews, Forum Articles, Scientific Reports) should be submitted to Jürgen Dengler (juergen.dengler@uni-bayreuth.de), following the Author Guidelines published in *Palaearctic Grasslands* 37, 6–8. They are subject to editorial review, with one member of the Editorial Board serving as Scientific Editor and deciding about acceptance, necessary revisions or rejection.

All other text contributions (News, Announcements, Short Contributions, Book Reviews,…) should be submitted to Anna Kuzemko (anyameadow.ak@gmail.com) AND Idoia Biurrun (idoia.biurrun@ehu.es). Please check a current issue of *Palaearctic Grasslands* for the format and style. Deadline for submission to the next issue is **25 February 2019**

Photo contributions (photos for general illustrative purposes with captions; proposals for Photo Stories; candidate photos for the Photo Competition) should be submitted to both Photo Editors, Rocco Labadessa (rocco.labadessa@gmail.com) AND Jalil Noroozi (noroozi.jalil@gmail.com). Deadline for submissions to the next Photo Competition on "Grassland people" is **25 February 2019**.

Contributions to the sections **"Recent Publications of our Members"** and **"Forthcoming Events"** should be sent to Iwona Dembicz (iwodem@op.pl).

Photos included in submissions have always to be delivered in two forms, embedded in the document and as separate jpg (or tiff) files with sufficient resolution for printing (i.e. not less than 1 MB).

Editorial Board

On front cover page: Milking sheep by Shahsavan Nomads in northern slopes of Sabalan Mts. (NW Iran, 2200 m a.s.l.). Photo: J. Noroozi.

Editorial

Dear readers,

We are pleased to present you the first issue of *Palaearctic Grasslands* in 2019, the fourth one after the relaunch of the *EDGG Bulletin* last year. The successful collaboration of our enlarged Editorial Board has made it possible to continuously improve the quality of the journal. This improvement is visible on our impressive cover page, where we present as usual the winner of the Photo Competition.

This issue comes with two important announcements. First is the call for nominations for election to the EDGG Executive Committee 2019-2021, with the deadline on **25th February**. Second, we are happy to announce that thanks to the hard work of Didem Ambarlı, Tobias Gehrold and the webpage Editorial Team, the new EDGG homepage is now online. You can find more details about contents and organization on pages 6–8.

The second call for the EGC 2019 in Graz (Austria) and Slovenia is published on pages 11-21. Registration is now open on the EGC website (https://edgg.org/egc2019). Important dates are **1st March** for early bird registration and travel grant application, and **22nd March** for late registration and abstract submission. This year the conference includes an optional three-day post-conference excursion in Slovenia. It is important to note that the number of participants in this promising excursion is restricted to 40 people and so the local organizers will apply the principle of "first come, first served".

This issue also includes two scientific papers. We would like to highlight the Forum article by Erdős et al. on Eurasian forest-steppes, where they have complemented the key findings reported by the same authors in a synthesis paper published last year in *Applied Vegetation Science* which was highlighted by this journal for the Editor's Award for 2018.

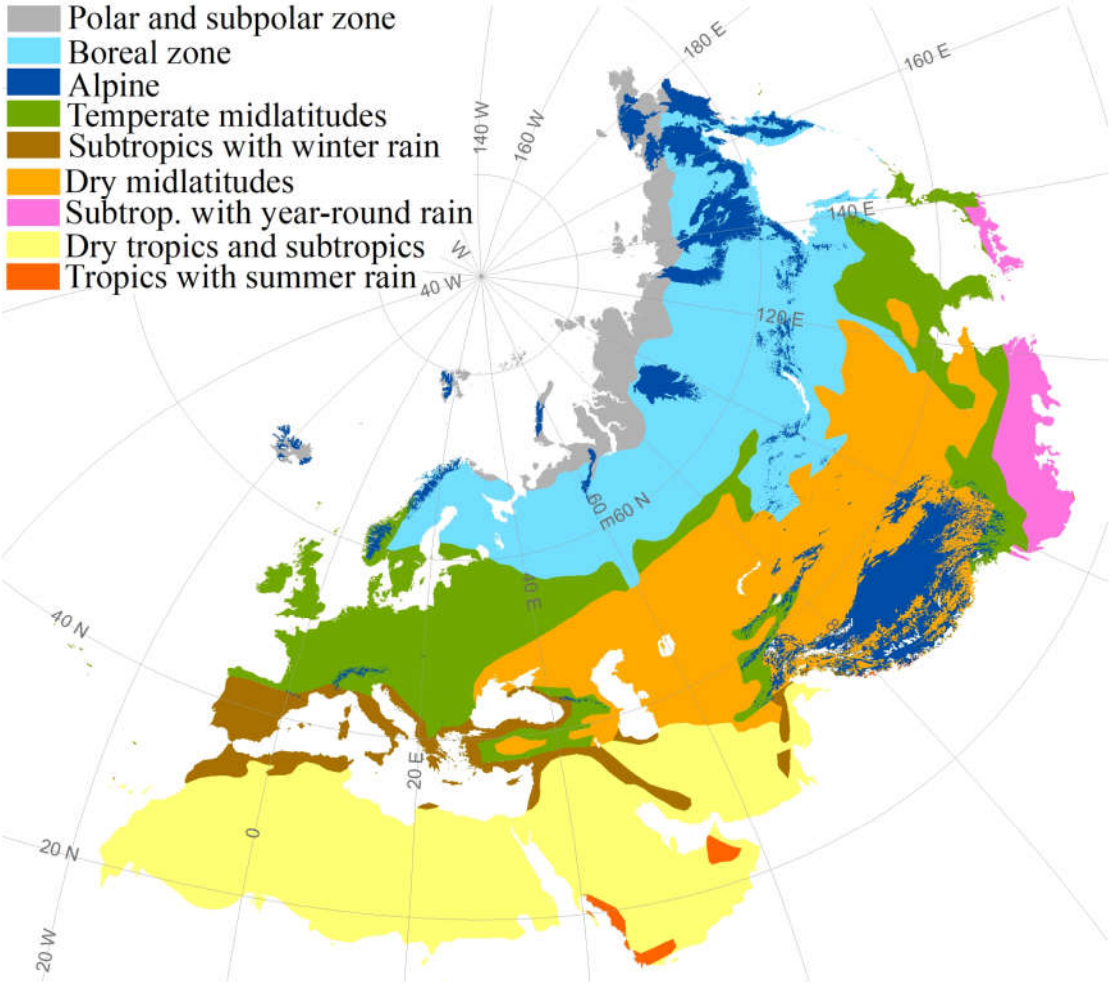
We hope that you enjoy reading this issue, and would like to thank you for your participation in EDGG activities. We would also encourage more people to become active, especially any contributions to the journal, both in the Photo section and as Scientific articles.

Idoia Biurrun, Deputy Chief Editor

idoia.biurrun@ehu.es

Frozen *Eryngium campestre* in the Velykyi Burluk-Steppe (Kharkiv Region, NE Ukraine). Photo: V. Ronkin.

Geographic scope of EDGG: the Palaearctic biogeographic realm



Delimitation of the Palaearctic biogeographic realm (according to Olson et al. 2001) and distribution of the biomes (according to Bruelheide et al. 2019; based on Schultz 2005 and Körner et al. 2017) within its borders. Map: C. Marcenò.

Not all EDGG members are aware of the thematic and geographic scope of EDGG, in particular as the name "Eurasian Dry Grassland Group", which was accepted to match our well introduced acronym EDGG, does not fully reflect either. According to our revised Bylaws of 2015 the scope of EDGG are all Palaearctic natural and semi-natural grasslands. On the one hand, we equally deal with mesic, wet, saline, rocky, coastal and alpine grasslands in addition to dry grasslands. On the other hand Palaearctic (as opposed to Eurasian) includes North Africa, but excludes South and Southeast Asia. The Palaearctic biogeographic realm is the largest of eight such realms on Earth (Olson et al. 2001), and it comprises nine out of ten biomes distinguished in a recent paper by Bruelheide et al. (2019).

References

Bruelheide, H., Dengler, J., Jiménez-Alfaro, B., Purschke, O., Hennekens, S.M., Chytrý, M., Pillar, V.D., Jansen, F., Kattge, J., (…) & Zverev, A. 2019. sPlot – a new tool for global vegetation analyses. *Journal of Vegetation Science* 30. DOI: 10.1111/jvs.12710.

Körner, C., Jetz, W., Paulsen, J., Payne, D., Rudmann-Maurer, K. & Spehn, E.M. 2017. A global inventory of mountains for bio-geographical applications. *Alpine Botany* 127: 1–15.

Olson, D.M., Dinerstein, E., Wikramanayake, E.D., Burgess, N.D., Powell, G.V.N., Underwood, E.C., D'amico, J.A., Itoua, I., Strand, H.E., (…) & Kassem, K.R. 2001. Terrestrial ecoregions of the world: a new map of life on Earth. *BioScience* 51: 933–938.

Schultz, J. 2005. *The ecozones of the world. The ecological division of the geosphere* (2nd ed.). Springer, Berlin, DE.

News

Elections for the EDGG Executive Committee 2019–2021 Call for nominations

Dear members of EDGG,

The terms of duty of the current Executive Committee are coming to an end soon. We therefore ask you to nominate EDGG members for the Executive Committee to serve in the next two years. We seek candidates who are willing to become active in the governance of our big working group, to advance it and provide service to our members during the years to come. Duties of the seven Executive Committee members include, but are not restricted to, the organisation of the Eurasian Grassland Conferences and the EDGG Field Workshops, editing and publishing *Palaearctic Grasslands*, organising EDGG Special Features in international journals, editing of our website, contact to IAVS and other organisations, advertising of EDGG and its events in various media, and fund raising. The newly elected members will decide among themselves who is going to take over which task(s). The terms of duty start from the General Assembly at the Eurasian Grassland Conference 2019 in Graz. While we appreciate the nomination of any member who is willing to dedicate time to the service of the EDGG, we particularly seek a better representation of non-European members and of zoologists in the Executive Committee

Both **self-nominations and nominations** of other EDGG members can be sent to Steven Venn (stephen.venn@helsinki.fi) until **25 February**. Prior to the elections to start in February, we will then ask all nominees to confirm that they are willing to stand in the election, and to provide a photo of themselves and a short biosketch.

The EDGG Executive Committee 2017–2019

The new EDGG homepage is online!

The EDGG homepage (https://edgg.org/home) is now online under a new server with a new content management system and many other innovations: The EDGG conferences (https://edgg.org/egc/overview) and Field Workshops (https://edgg.org/fw/overview) pages are now under the EDGG homepage. It is now possible to find detailed information about past events and registration options for current EDGG conferences and Field Workshops. In addition, events and news can be accessed from the main page which now has a much cleaner layout. All EDGG-related publications can be found under the Publications menu (https://edgg.org/publ/overview). A login system allows participants of previous events to register in future without having to repeatedly enter data. We would like to acknowledge IAVS for their financial support. Thanks are also due to Tobias Gehrold for his technical work, patience and guidance on the EDGG homepage and EGC page. Furthermore, thanks are also due to the Editorial Team for their hard work! Please send us your grassland-related events, photos and publications to keep the EDGG homepage alive. Other improvements we would like to incorporate in the future include pages devoted to EDGG-related vegetation databases and to a publication database.

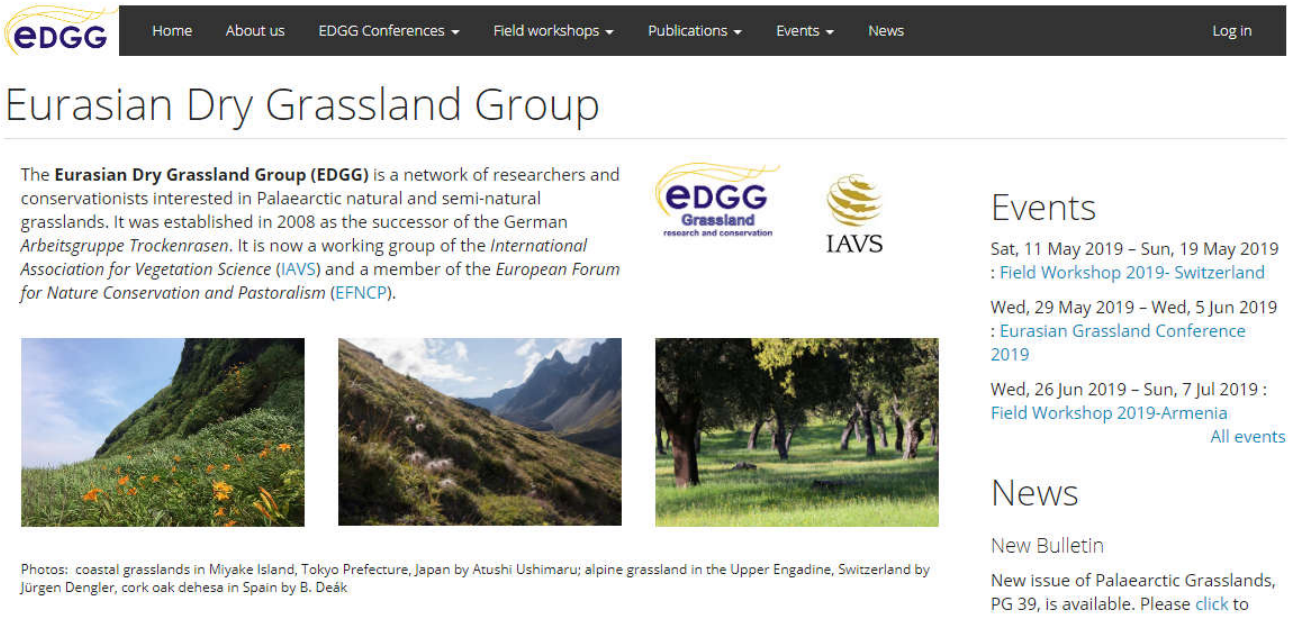


Fig. 1. Landing page of the EDGG homepage.

The homepage is the collective work of the managing editor (Didem Ambarlı), the linguistic editors (Dolores Byrne, Jim Martin, Laura Sutcliffe, Lorna Marcham, Magdalena Firganek-Fulcher, Paul Goriup, Steven Venn, Stuart Smith), the photo editors (Jalil Noroozi, Rocco Labadessa) and the editor of the events information (Iwona Dembicz). EDGG is grateful for their hard work. We are still looking for volunteers to help with editing of the homepage. We would welcome new volunteers and their inputs would be fully credited by the Editorial Team. There is no need to have background knowledge or experience. We just need enthusiastic people that can spare some time.

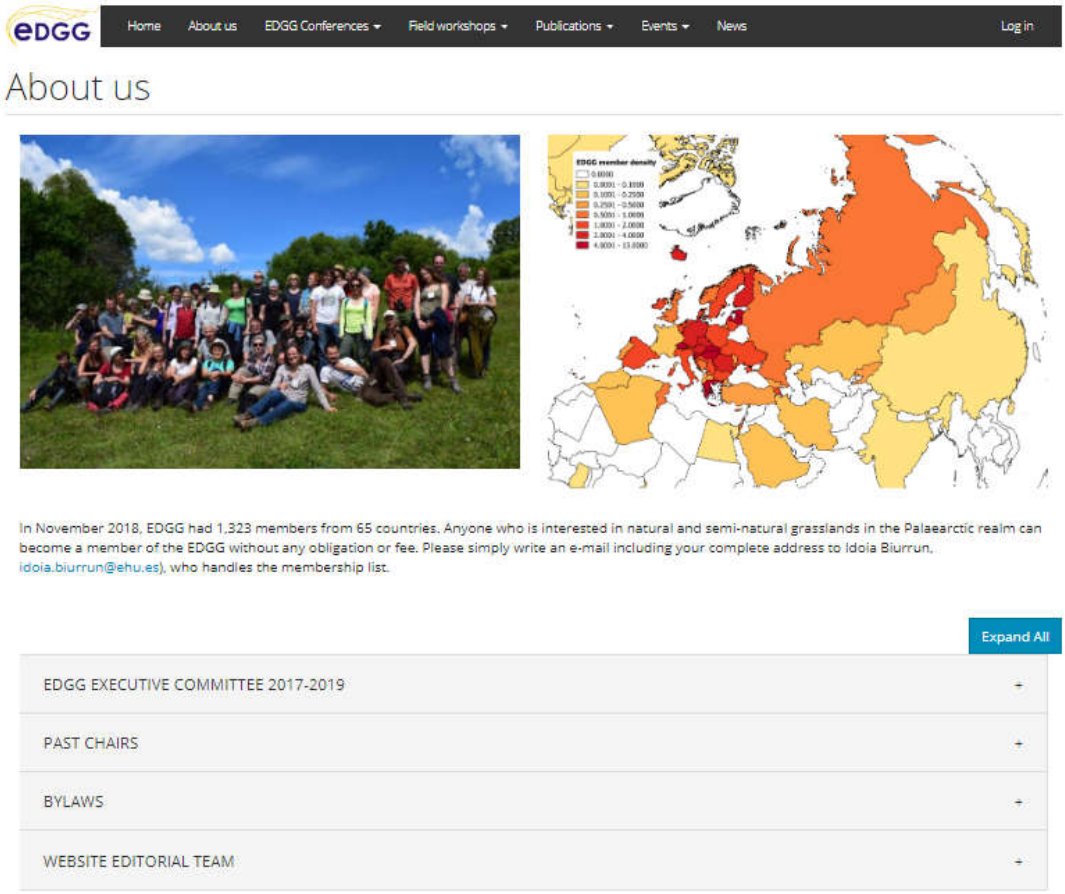


Fig. 2. An example of an accordion system: You can expand all information from the top blue button or only the information you would like to read by clicking on "+" in the new "About Us" page.

The new EDGG homepage is online after months of hard work! There were two motivations for building the new homepage: 1) to change the content management system of the homepage so that EDGG chairs can add and edit content easily and frequently and 2) to move both the EDGG homepage and subordinate EGC page to a new server so that we can clone websites of future events easily and without any cost. We are grateful to Jürgen Dengler for paying the server costs of EDGG homepage privately in previous years. We thank to Falko Göckler for his work on website administration as well as providing maintenance and server services in 2019 for free. We hope that you will find it attractive, informative and useful!

The new homepage has all the content of the old one but with a new format, updated information and nice visualizations. There are many novelties in the new homepage:

1. We opted to use a very plain format and clean style to present texts and images. We hope that you will find this version more user-friendly. On the right side of the **main page** (https://edgg.org/home), visitors can follow the latest news and events from EDGG (see Fig. 1). We would be happy to display various events in our homepage. Please send information about recent grassland-related events to Iwona Dembicz, iwodem@op.pl

2. We used different tools to present information: main menu, sub-menus, accordion links and links to various pages absent from the main menu. You do not need to scroll-down many times to find information that you are looking for. For example, in the **About Us** (https://edgg.org/about) page, we provide a general overview of EDGG membership (Fig. 2). Then we provide information about EDGG chairs, past chairs, by-laws and the website editorial team in separate sections. You can expand all or some as necessary.

3. Under the EDGG Conferences menu, you can find a general **overview** (https://edgg.org/egc/overview) of the conferences and **this year's conference page** (https://edgg.org/egc2019). This is where you can find detailed information about the event and register once the registration is open. Furthermore, you will find a page of **Past Conferences** (https://edgg.org/egc/pastEGC) with summary information, colorful photos, conference reports and books of abstracts. Another new feature is that the EDGG homepage has a login system. It allows participants of EDGG events to log in to the EDGG homepage. Once you have an account, you do not need to enter your information each time you intend to join another activity. You can delete your information anytime you wish. Of course you can still navigate all the pages without having to log in. EGC

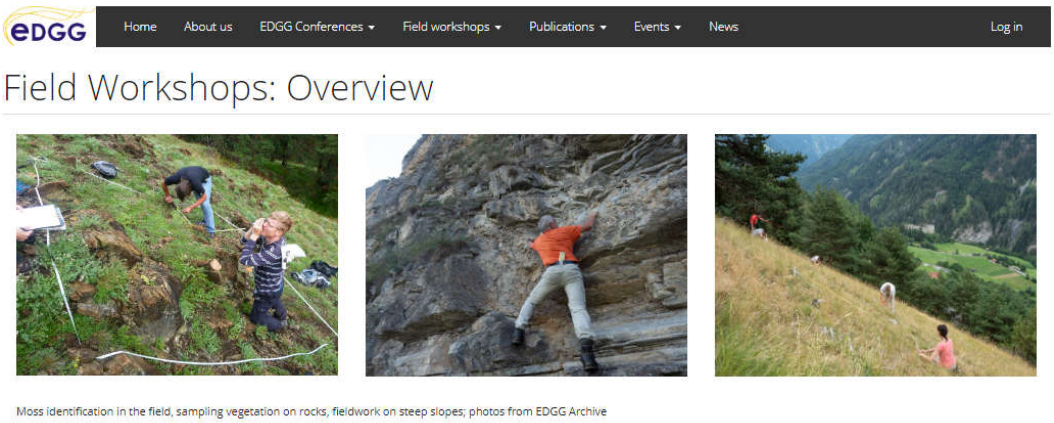


Fig. 3. Field Workshops overview page.

2018 participants will remember this system was first used for registering for EGC 2018.

4. For the first time, we have a sub-menu devoted to EDGG Field Workshops (Fig. 3). Similar to the conferences, it has pages providing an **overview** of FWs (https://edgg.org/fw/overview), devoted to both this year's FWs (e.g. **Field Workshop 2019 page**—https://edgg.org/fieldworkshop2019) as well as **Past Field Workshops** (https://edgg.org/fw/pastfw). In future, we are planning to allow registration for FWs from the website. Note: We used photos from the EDGG archive for this purpose. Please let us know if we omitted to credit any of your photos.

5. In **Publications** (https://edgg.org/publ/overview) pages, you can reach details and issues of the ***Palaearctic Grasslands*** (https://edgg.org/publ/bulletin) articles and book reviews published in the PG in the same page, **Special Features** (https://edgg.org/publ/sfeatures) of EDGG and **Publications from our members** (https://edgg.org/publ/publmembers) (Fig. 4). Please send information about your latest publications to Iwona Dembicz, iwodem@op.pl.

Other improvements we would like to incorporate in the future are as follows: 1) add pages of EDGG-related vegetation databases, 2) develop a publication database to ensure all EDGG-related publications can be searched for on the homepage plus further improvements in the content management.

Please help us keep the EDGG homepage alive: send your colourful photos with caption information to Jalil Noroozi, jalil.noroozi@univie.ac.at and Rocco Labadessa, rocco.labadessa@gmail.com. Please also send us grassland-related events. Finally, please do not hesitate to send your feedback about the homepage to Didem Ambarlı didem.ambarli@gmail.com.

Didem Ambarlı, Freising, Germany
didem.ambarli@gmail.com

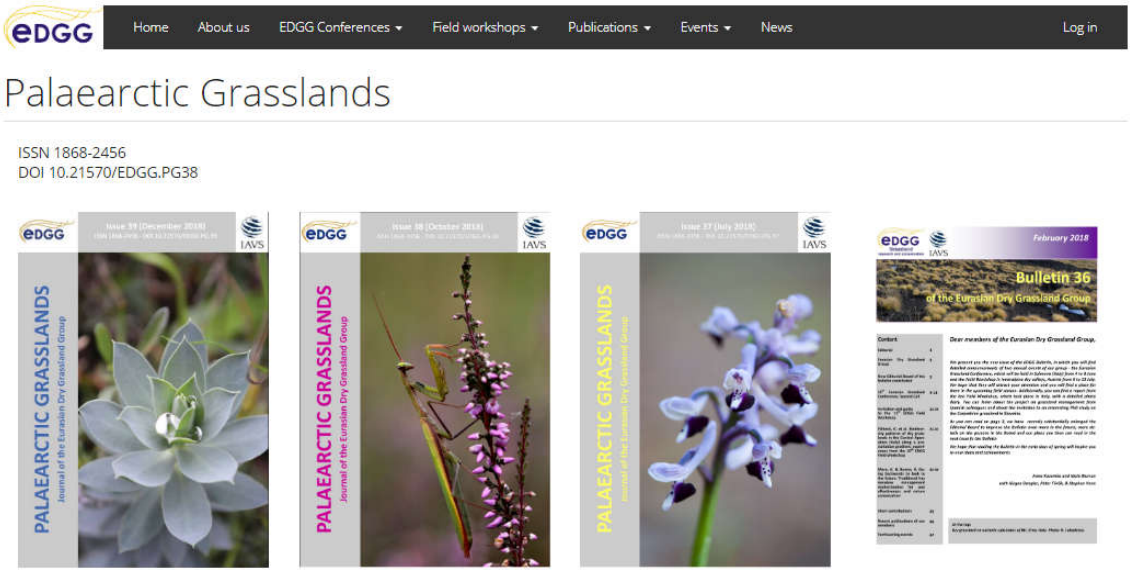


Fig. 4. *Palaearctic Grasslands* page where one can find editorial information, latest issue, past issues, bulletin articles and book reviews.

Many thanks for the charitable donations to EDGG!

EDGG is part of a non-for-profit organization, IAVS, and since its establishment in 2008 it is offering a wide variety of services to the community of grassland ecologists and conservationists without charging any membership fees. This has been made possible through the enthusiasm of many of our members and some financial support from our mother organisation IAVS. Last December we sent a call to our members to ask for the first time for your support in form of charitable donations of money to EDGG. This call was motivated by the fact that more and more often we are short of money to support our wide range of activities. Our campaign was successful and EDGG members contributed to our actions with more than 1,500 euros. We would like to express our gratitude and thanks for the support to the EDGG. We aim with the extra support to allow more scientists with limited or no financial resources to participate in our annual conferences and field workshops, or provide linguistic editing for articles prepared by non-native speakers in our publications.

IT IS NOT TOO LATE TO CONTRIBUTE!

Those of you who like to provide some volunteer financial contribution are cordially invited to make use of this opportunity. We appreciate any contribution be it small or big!

Please make your transfer to the following account:

Account holder: **IAVS**

Bank: **SNS Bank**

IBAN: **NL40 SNSB 0921 5290 23**

Currency: **EUR**

Please give the following reference: **Donation to IAVS working group EDGG**

To keep track of the donations, please additionally send a short e-mail to our treasurer, Péter Török (molinia@gmail.com) indicating when you transferred which amount of money to the account. If you wish, you can also indicate in your mail to Péter that you would like to see the money used for one of the following main purposes:

1 – Travel grants for the Eurasian Grassland Conferences

2 – Travel grants for EDGG Field Workshops

3 – Linguistic editing for articles by non-native speakers in our publications

If you do not make such an indication, the elected Executive Committee will spend the money, where it is most needed.

Many thanks for your continued support to EDGG, be it ideally, actively or financially.

Péter Török

on behalf of the EDGG Executive Committee

***Potentilla arenaria*. Photo: J. Dengler.**

Photo Story and Photo Competition

In this issue we are pleased to announce the fourth call for the sections "Photo Story" and "Photo Competition", devoted to the beauty of Palaearctic grasslands.

Photo Story is an open space where members can submit their own photo collection on a certain grassland-related topic of their choice. High-quality photos should be provided together with their captions (at least species names or landscape description), a brief text and possibly other graphical elements (like a map or a drawing). The selection of photos should fit for 1-4 pages and the proponents should already propose a preliminary layout (in PDF or MS Word format), which will be finally typeset by Editors. As an example, you may take a look at the Photo Story at pages 32-35.

Photo Competition is a call for grassland enthusiasts, who can challenge each other on a predefined grassland theme.

The theme of next EDGG Photo Competition is "**Grassland close-up"**, focused on the surprising beauty and complexity of the smaller grassland details.

You are invited to send up to three high-quality photographs within the competition theme (full size JPEG or TIFF images, at least 300 dpi) together with captions giving information on the subject (species name, date, place name) and, possibly, technical details (camera, lens, aperture and exposure time). The selection will be made by a jury of at least five members from the Editorial Board of the journal. The three best shots will be awarded with full space in the next issue, but we reserve the right to use further submitted photos for illustrative purposes in other parts of the issue.

If you feel you can contribute with your shots, **don't be shy**! Everyone can join the competition without the need of being a professional photographer!

If you want to contribute to Photo Story or Photo Competition, or if you simply want your photographs published in the journal, please submit your photos together with required information to Rocco (rocco.labadessa@gmail.com) and Jalil (noroozi.jalil@gmail.com).

DOI: 10.21570/EDGG.PG.40.11-21

EDGG Event

EGC 2019
16th Eurasian Grassland Conference
in Graz, Austria and Maribor, Slovenia

29 May – 05 June 2019

Species-rich grasslands in the Palaearctic – a treasure without economic value?

Second call

Registration is open at: https://edgg.org/egc2019

Grazing milk cows on a species rich *Cynosurion* pasture near Neumarkt/Steiermark, Austria. Photo: M. Janišová.

Semi-natural grasslands in the Palaearctic biogeographical realm are exceptionally species rich; they are a treasure of nature. However, their values are often neglected in man's thinking from the perspectives of management of natural resources and policy measures – and even in assessment of their economic value.

The **aim** of the 16th annual Eurasian Grassland Conference is to show the possibilities of how central European semi-natural grasslands can fulfill important ecosystem functions and together still generate income for their owners.

In addition, it aims to promote networking and collaboration between those interested in all aspects of semi-natural and natural grassland research and conservation. The conference is intended to bring together the latest research and link this to practical management and policy, thereby contributing to the sustainability of semi-natural grasslands and their animal and plant resources.

The conference will include the following sessions:

1. Do species rich grasslands still have economic value? Examples from farming and conservation practice

This topic is targeted specifically to people with practical experience or interest in generating economic value from species rich grasslands, for example producing and dealing with hayseed or high-quality milk or meat products. We hope we can establish a forum, that can bring together people with clever ideas that could help to promote them or could test them in other Eurasian regions.

2. Grassland conservation

This session welcomes all contributions to active conservation, conservation planning or grassland management, estimating threats to different taxonomical or syntaxonomical groups or to restoration of species rich grasslands.

3. Ethnobotanical contributions to grassland management practises

This is an experiment, influenced by our keynote speaker Zsolt Molnár. His ethnobotanical studies (together with his working group) generated a lot of knowledge about special management practices of traditional grassland farmers. It is rather obvious that such knowledge got lost during the industrialisation process of European agronomy of the last 50 years. At least some of these practiscs can help to find new, more sustainable techniques to manage species rich grasslands.

4. Biodiversity of Palaearctic grasslands

This session will cover all aspects of grassland classification and contributions to biodiversity of all taxonomical groups concerning grasslands.

Natura 2000 Biogeographical Process workshop

Additional to the sessions, we are planning a Natura 2000 Biogeographical Process (N2KBP) workshop (afternoon of the 29th May) facilitated by Theo van Sluis and his co-workers, similar to the EGC 2018 in Sulmona. The workshop will hold an introduction to the current state of the N2KBP and financial support programs. Depending on the special knowledge and interests of the participants, teams will be established to discuss topics like

- what values are obtained from grassland and steppes?
- what are traditional management methods that are still being practised and how have they developed/ altered over time?
- which management is practised in novel LIFE programs in various countries, and what are best practices and lessons learned?
- what adjustments to EU grassland-related policies are necessary?
- International experiences.

The purpose of this workshop is to formulate concrete actions with regard to development of tools, priority support actions and knowledge sharing on existing tools and means available.

Special issue

A special issue of an ISI listed journal related to the conference is planned, to which all contributors to the conference will be invited to submit papers.

Mid-conference excursion / Technical workshops

This year's mid-conference excursion, a good tradition of the EGCs, will lead to the market community Neumarkt/ Steiermark, 120 km north-west of Graz, visiting farmers generating their income by utilizing species rich grasslands. Considering how short of time the conference is, because it is a stressful time for grassland people, we decided, after long internal discussions, to offer three optional workshops parallel to the excursion (see the programme below). There will be the possibility to attend at least two of them.

There will be

- a workshop for scientific writing (guided by Jürgen Dengler),
- a bryophyte determining (guided by Christian Berg), and
- a lichen determining (guided by Peter Bilovitz) workshop.

We invite you to register and submit abstracts for talks and poster via the website www.edgg.org/conference 2019.html

Registration deadline: 22 March 2019

The registration fee provides full participation in the conference including registration and conference materials, admission to the conference, coffee breaks on the 30 May and 1 June, grassland party, mid conference excursion or one or two of the workshop(s) on 31th May.

Important dates

Early Bird registration deadline –**1 March**

Travel grant application deadline – **1 March**

Late registration deadline – **22 March**

Abstract submission deadline – **22 March**

Post-conference excursion application – **22 March**

Travel grant allocation – **12 April**

Acceptance of abstracts and type of presentation – **12 April**

Preliminary programme

29 May	**Workshop, registration**
12.00 – 17.00	Natura 2000 Workshop
18.00 – 21.00	Registration, welcome reception in the greenhouses of the botanical garden of the University of Graz
30 May	**Talks and Posters Sessions I and II**
08.00 – 09.00	Registration
09.15 – 09.45	Opening ceremony
09.45 – 10.45	Keynote lecture by Zsolt Molnár
11.00 – 21.00	Talks and posters
31 May	**Mid-conference excursion or optionally workshops; evening: grassland party**
08.00 – 09.00	Keynote lecture by Matej Vidrih
09.15 – 18.00	Mid-conference excursion to Neumarkt
09.15 – 14.00	Workshop Scientific writing (Jürgen Dengler)
09.15 – 14.00	Workshop determining mosses (Christian Berg)
14.15 – 18.00	Workshop determining lichens (Peter Bilovitz)
18.30 – 22.00	Grassland party in the greenhouses of the Botanical Garden
01 June	**Talks and Poster Sessions III and IV**
08.00 – 09.00	Keynote lecture by Wolfgang Willner
09.15 – 20.00	Talks and posters
20.00 – 21.00	EDGG General Assembly
21.00 – 22.30	Evening mixer in the greenhouses of the Botanical Garden
02 – 05 June	**Post-conference excursion to Slovenia (optional, max. 40 persons)**
02 June, 7.00	Departure from Graz (Holteigasse 6, greenhouses of the Botanical garden) to Slovenia
05 June, 12.00	Arrival at the Graz airport

Fees and Registration

We invite you to register and submit abstracts for talks and poster via the website www.edgg.org/conference 2019.html
Registration deadline: 22 March 2019

	Early Bird registration until 1 March	**Late Registration until 22 March**
Students IAVS members*	**150 €**	**180 €**
Students (including PhD students), not IAVS members*	**170 €**	**200 €**
Other IAVS members*	**200 €**	**230 €**
Non-students and non-IAVS members	**220 €**	**250 €**

**please submit evidence of IAVS membership and/or your enrolment at a University by emailing confirmation of matriculation to* martin.magnes@uni-graz.at

The basic registration fee does **NOT include** the following, which can be booked separately:

- Participation in the Natura 2000 workshop (29 May, 12.00 – 17.00) - **30 €**
- Post-conference excursion to Slovenia (2 – 5 June) - **320 €**

Cancellation and repayment for symposium (hall sessions):

- 100% for cancellation until 7 May
- 80% for cancellation until 17 May
- no refund for cancellation after 17 May

Cancellation and repayment for post-conference excursion to Slovenia:

- no refund for cancellation after 25 March

Payments should be made by bank transfer by 1 March at the latest for early bird registration and by 22 March for late registration. You will be provided with the bank details during the registration process and on your online invoice (after successful login).

We are not able to accept payment of the registration fee at the conference: this must be paid in advance by bank transfer.

Financial support

Thanks to the EDGG's mother organization IAVS, we can support a number of participants with travel grants. Travel grants will be awarded according to the IAVS criteria, based on income level and country of origin. They will preferentially be given to early-career and other financially constrained scientists. The support usually covers only part of the participant's costs, according to the number of successful applications. To qualify for a travel grant, active participation at the conference (oral presentation or poster) is required. After the conference, grantees are asked to provide a short report of the event as well as some photos that can be used in the *Palaearctic Grasslands.*

Travel grants can be applied for during registration until 22 March, including a short motivation letter. Applicants for IAVS travel grants must be IAVS members for the year 2019. Information about travel grants will be given at the latest by 12 April.

Field excursions

Austria and the northern part of Slovenia belong to the cool-temperate nemoral zone while the south west,

Map 1. Venue of the Conference (Graz), destination of the mid-conference excursion (Neumarkt/Steiermark) and the main destinations of the post-conference excursion to Slovenia (1: Goričko Landscape Park, 2: Haloze region, 3: Slovenian Dinaric region).

Hay meadow in Pöllau near Neumarkt/Steiermark (a), cattle track in Pöllau (b), pastures in Pöllau (c, d). Photos: M. Janišová.

coastal region of Slovenia borders the warm temperate subtropical (Submediterranean) zone with precipitation slightly higher in the winter than in the summer months. At the end of May and the beginning of June, in all the places we will visit the temperatures are pleasant but you have to expect rain showers.

Map 1 shows the conference venue (Graz), and the destinations of the mid-conference and the post-conference excursion.

Practical advice

Rainwear is recommended for the excursions. Be aware that ticks occur in areas we will visit. There is a risk of tick-borne encephalitis and Lyme disease throughout both countries. Travellers should avoid tick bites by wearing long sleeves and pants, preferably tucked in. Use insect repellent on exposed skin, socks or outer clothing. You should check your skin regularly for ticks and remove them as early as possible. There are also tick-borne encephalitis vaccines. Consult a physician as soon as possible if you would prefer a vaccination.

Mid-conference excursion

This excursion will lead us to the surroundings of Neumarkt/Steiermark. The Neumarkter anticline is situated between two mountain systems of different geology – in the west the Grebenzen (1892 m a.s.l., palaeolithic limestone) and in the east the Seetaler Alpen with the Zirbitzkogel (2396 m a.s.l., mainly gneiss). In the glaciation period, a branch of the Mur glacier pushed its way down from the northern main valley and covered the area with moraine material. The natural vegetation is dominated by spruce forests, fir and beech are restricted to climatically humid conditions.

In this region there is a tradition of feeding milk cows mainly by grazing and hay, complete without silage. In former times the milk was required for hard cheese production, now this special milk is traded with the brand name “hay milk”. We will visit some of these farms, most of them applying only or mainly solid manure. In these grasslands, most of them belonging to the *Arrhenatherion elatioris, Cynosurion cristati* or the *Phyteumato-Trisetion* alliances, we could determine up to 60 plant species (average 32.8)

Dry *Arrhenatherion* grasslands in the Goričko region (a), wet *Molinion* meadows with *Iris sibirica*, Goričko (b). Photos: S. Škornik. Traditional hay making in Selo village (c), the Romanesque Rotunda, a small circular sanctuary in the village of Selo (d). Photos: N. Pipenbaher.

on 10 m^2 plots. The meadows are mowed twice per year and often grazed in autumn after the second cut. We will also see some of the season-round pastures, that are not as species rich as the meadows but show also around 30 plant species.

Post-conference excursion to Slovenia

IMPORTANT: Unfortunately, the number of participants for the post conference tour is restricted to forty (40). Thus, the local organizers are pushed to apply the principle of "first come, first served". It means that the first 40 who register themselves for the post conference tour will be served. The rest will be included in a waiting list. After application for the post-conference-excursion you will get an invoice and payment conditions per mail.

A three-day post-conference excursion will take place in Slovenia (**2–5 June**). Slovenia has very interesting position at the intersection of four major European geographical units, the Alps, the Dinaric Alps, the Mediterranean and the Pannonian plain. On the first day, we will visit the **Goričko Landscape Park**, which forms one part of the Trilateral Park extending across Austria, Hungary and Slovenia. Goričko is a well-preserved example of typical and traditional Central European agricultural landscape with a mosaic of fields, grasslands, orchards, vineyards, hedges and forest. Geological substrates are mainly tertiary sediments, which form a gently sloping, hilly landscape of sandy-acid soils with a rich surface network of fresh water. Goričko is also a Natura 2000 area and aims to preserve traditional and extensive small-scale farming. We will visit several sites in the area with different types of extensively used semi-natural grasslands, four of them included in the EU Habitat Directive. Plant communities include the classes *Festuco-Brometea* (*Bromion erecti*), *Molinio-Arrhenatheretea* (*Molinion caeruleae*, *Filipendulo-Petasition*, *Arrhenatherion elatioris*) and *Nardetea strictae* (*Violion caninae*). Rare and interesting plants include the wet meadow species *Hemerocallis lilioasphodelus, Achillea ptarmica*, *Iris sibirica*, *Gentiana pneumonanthe* and *Succisa pratensis*, and the dry grassland species *Dianthus deltoides, D. armeria*, *Moenchia mantica*, *Muscari comosum*, *Verbascum phoeniceum*, etc. In addition to the high nature value habitats the area is also known by religious diversity (Protestants, Catholics, Calvinists, Baptists, Pentecostal) and unique cultural treasures. Participants will have the opportunity to visit the Romanesque Rotunda, a small circular sanctuary in the village of Selo. According to the legend, the church first belonged to the Templars. It is estimated that it was built sometime during the first half of the 13th century (1205–1235).

Orchids-rich *Bromion* meadows (*Onobrychido viciifoliae-Brometum*) in Haloze region (a, b), sheep grazing on steep slopes in Haloze (c), *Himantoglossum adriaticum* (d) and *Anacamptis pyramidalis* (e). Photos: S. Škornik.

The second day will be devoted to the **Haloze region**, which has the highest density of "orchids-rich meadows" (*Bromion erecti*, ass. *Onobrychido viciifoliae-Brometum*) in Slovenia (approx. 25% of non-forest land). It is the land of the low Tertiary hills with highly diverse relief. The altitudes reach up to 600 m a.s.l. The agricultural management practices are strongly determined by the steep slopes, ranging from 6 to 30 degrees. In the past, Haloze used to be known particularly for its excellent wine growing regions. A large part of the western Haloze area is covered by deciduous forest (*Carpino-Fagetea*). Rare plants include numerous species of orchids, such as *Ophrys sphegodes*, *O. holosericea* and *O. apifera*, *Himantoglossum adriaticum*, *Anacamptis pyramidalis*, *Dactylorhiza sambucina, Gymnadenia conopsea, Orchis ustulata,* etc. We will also visit wooded (dry) grasslands along the Drava River. This very unique habitat type developed on limestone gravel deposits and represents the remains of an ancient cultural landscape.

The third day will take us to the **Slovenian Northern Adriatic karst zone,** which represents the northeasternmost branch of the Dinaric mountain range, extending along the Eastern Adriatic. The climate is transitional between Mediterranean and continental pre-Alpine, with cool, rainy winters and long, hot, dry summers. The natural vegetation is mixed deciduous thermophilous woodlands. In some places the Karst plateau is still an open landscape, with a large extent of extensively used dry grasslands. These steppe-like grasslands belong to the order *Scorzoneretalia villosae* (class *Festuco-Brometea*). We will see semi-dry meadows (*Scorzonerion villosae*), which are found on deeper soil, with more humus and moisture, and karst pastures (*Saturejion subspicatae*) that occur on shallow rocky soils where vegetation is much more sclerophilous and basiphilous. Karst pastures are considered as one of the most species-rich plant communities in this part of Europe. Before the dry season, around 150-200 different plant species that occur within this plant community are flowering, including many rare and interesting species such as *Narcissus radiiflorus, Fritillaria tenella,* gentians like *Gentiana tergestina* and *G. utriculosa* and other attractive species, like *Pulsatilla montana, Polygala nicaeensis, Asphodelus albus, Paeonia officinalis, Lilium carniolicum, L. bulbiferum* and three species of the genus *Iris*: *I. illyrica, I. sibirica* subsp. *errerhiza* and *I. graminea.* On this excursion we will also be able to admire some typical karst features (phenomena) like rock shelters, natural stone bridges, etc. Participants will have the opportunity to visit the famous 15th-century frescoes of "Dance Macabre" in Hrastovlje's Romanesque Church of the Holy Trinity. The church is worth visiting also for its architecture and setting.

Limestone cliffs of the edge of the Karst plateau. Photo: M. Kaligarič.

***Asphodelus albus* with *Narcissus radiiflorus* (left) and *Paeonia officinalis* (right). Photos: N. Pipenbaher.**

***Stipa eriocaulis* dominated karst grassland. Photo: M. Kaligarič.**

Sub-Mediterranean Illyrian grassland, association *Danthonio-Scorzoneretum*. Photo: I. Paušič.

The oldest vine in the world. Photo: www.visitmaribor.si.

View from Belvedere Hotel & Resort. Photo: http://www.belvedere.si/sl.

Accommodation will be in two places. The first one will be in the second-largest city of Slovenia, Maribor (NE, Drava) (2-3 June). The city has the oldest vine in the world. The second accommodation will be in the Istrian coast of the Adriatic Sea at the hotel Belvedere (3-5 June) near the city of Izola.

Keynote Lectures

The 16th EGC is pleased to welcome three keynote speakers.

Maintenance of species-rich grasslands by traditional farmers: diversity, practice, knowledge, subsidies and future.

Zsolt Molnár & Dániel Babai, Hungarian Academy of Sciences

In his keynote, Zsolt will summarize field experiences and management recommendations related to species-rich mountain hay meadows in the Eastern Carpathians. Some of these advanced and well proved techniques are suitable also for maintaining species rich grasslands in other parts of Eurasia.

Zsolt Molnár, botanist, ethnoecologist, head of the „Traditional Ecological Knowledge" Research Group at the MTA Centre for Ecological Research in Hungary, member of the IPBES Indigenous and Local Knowledge Task Force and a Coordinating Lead Author in the IPBES Global Assessment.

His main research focus is traditional, indigenous and local ecological knowledge of herders and farmers in Hungary, Romania, Serbia, Mongolia and Iran.

One of his key research methods is knowledge co-production with locals in order to avoid and decrease conflicts with conservation and foster traditional land management, e.g. by improving conservation and agri-environmental practices and policies.

Semi-dry grasslands of Central and Eastern Europe - syntaxonomic and biogeographical aspects.

Wolfgang Willner, VINCA and University of Vienna, Department of Botany and Biodiversity Research

The semi-dry grasslands of Central and Eastern Europe, including the so-called meadow steppes, belong to the most species-rich vegetation types of the northern hemisphere and form an important part of the forest-steppe zone. In my talk, I will present results of a syntaxonomic revision, based on a large supra-national dataset. Moreover, I will discuss the biogeographical setting of semi-dry grasslands in the context of recent paleobotanical and phylogeographic findings. There is growing evidence that the European semi-dry grasslands represent an ancient species pool of forest-steppe vegetation which has existed continuously for several glacial circles.

Sustainable pasture management in Slovenia: balancing productivity and biodiversity.

Matej Vidrih, University of Ljubljana, Department of Agronomy

Grazing can be the most intensive utilization of grasslands and has, therefore, often a poor reputation in nature conservation. In fact, grazing is the most original and the oldest use and has strongly shaped the Eurasian semi-natural grasslands.

Matej Vidrih (PhD 2006, University of Ljubljana) is assistant professor in the Department of Agronomy at the Biotechnical Faculty.

His main object of research is pasture management and forage production. He gives also lectures on this topic.

His research is oriented towards management of marginal grasslands in less favoured areas with the mean of grazing management. He also focuses and develops mitigation measures on livestock-carnivore conflicts. His latest research orientation is toward soil-plant-animal interactions on karst pastures.

Wolfgang Willner is managing director of the private research institute VINCA (Vienna Institute for Nature Conservation and Analyses) and lecturer (PD) at the University of Vienna (Dep. of Botany and Biodiversity Research). His research has mainly been focused on Central European vegetation, with special emphasis on forests (PhD thesis: Phytosociological revision of the beech forests of southern Central Europe) and dry grasslands. He also contributed to the methodology of vegetation classification. In a recent project, he investigated the syntaxonomy and biogeography of steppe grasslands in Central and Eastern Europe. He is a chief editor of *Phytocoenologia* and member of the steering committee of the IAVS working group for phytosociological nomenclature. Moreover, he has been engaged in numerous applied projects for nature conservation, including mapping and monitoring of EU habitat types. Besides 59 publications in international peer-reviewed journals he is editor (and author of many chapters) of "Die Wälder und Gebüsche Österreichs" (2007).

Workshops

Effective writing for international peer-reviewed journals (31 May, 8.30 – 14.00), min 5 participants, led by Jürgen Dengler

For many researchers from more traditional scientific cultures, writing manuscripts for peer-reviewed international journals remains challenging. In this workshop you will learn that writing successful manuscripts (in the sense that they are accepted in the intended journal and get many citations) has nothing to do with witchcraft, but a lot with techniques – which can be acquired.

The workshop will familiarize you with the IMRaD (Introduction, Methods, Results and Discussion) structure of standard research papers and showcase the key aspects that make up good Introduction, Methods, Results and Discussion sections. You will learn how to optimize the presentation of results through a wise combination of figures, tables, appendices and text. We will deal with formal aspects of citing and listing references. You will also learn how to write an effective Abstract and how cleverly selected titles and keywords can contribute to the success of your article. As the majority of participants likely will not have English as their mother tongue, we will also briefly address the appropriate style when writing a scientific article in English.

If time allows, there is the option to provide some insights into the peer-review process, the meanings of bibliometric indices or how to find appropriate journals for manuscripts. The course will consist of lectures, interactive and practical parts. The program is flexible and can be adjusted spontaneously to the needs and wishes of participants. In addition to the three-hour class, the lecturer is also available for individual coaching of participants in the afternoon on the basis of concrete writing problems and manuscript drafts they bring with them. If you are interested in this, please indicate this with your registration, including a short summary of the problem you have/support you wish.

Jürgen Dengler is Professor of Vegetation Ecology at the Zurich University of Applied Sciences (ZHAW) in Switzerland and co-founder of EDGG. He is chief editor of *Phytocoenologia*, Deputy Chief Editor of *Palaearctic Grasslands*, member of the editorial boards of *Applied Vegetation Science* and *Tuexenia* and has led the guest editor teams of about 20 Special Issues/Special Features in various international journals (*Agriculture, Ecosystems & Environment; Journal of Vegetation Science; Biodiversity and Conservation*…). He authored more than 250 scientific publications, including 78 papers in the Web of Science, and has extensive experience in teaching the art of scientific writing.

Introduction to Bryophytes, (31 May, 8.30 – 14.00), min 10 participants, led by Christian Berg

Christian Berg (2008 habilitation in habitat and landscape ecology) is the head of the Botanical Garden and Senior Scientist at the Institute of Biology of the University of Graz.
He is author of more than 100 scientific papers and monographs, mostly in the areas of vegetation science, vegetation and flora change, conservation, red lists, mapping of bryophytes and vascular plants, neophytes, plant physiology and molecular ecology.

Introduction to Lichens (31 May, 14.15-18.00), min 10 participants, led by Peter Bilovitz

Peter Bilovitz is lecturer at the Institute of Biology of the University of Graz. Besides numerous publications about the lichen flora of the Balkan peninsula he is co-author of "The lichens of the Alps - an annotated checklist", published in 2018.

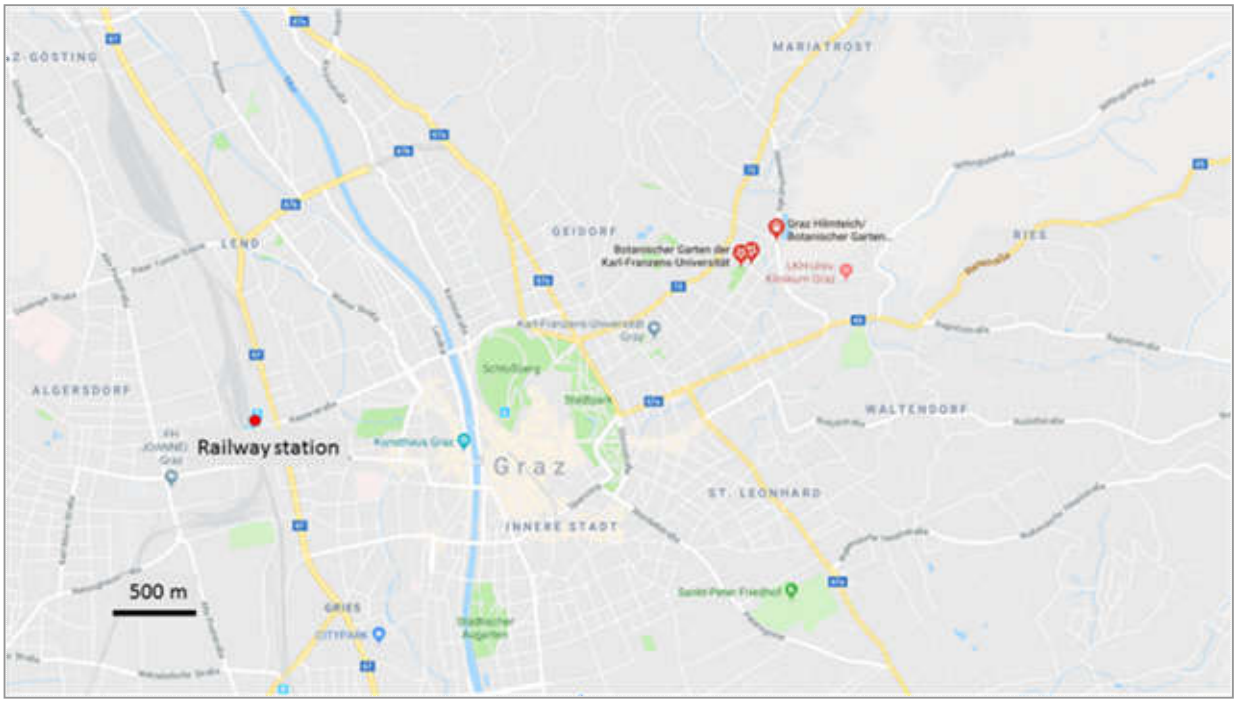
Venue and Accommodation

Conference Venue

The conference will be held in the Botanical Garden (Map 2) of the Institute of Biology, Department of Plant Sciences of the Karl-Franzens-University of Graz. There are two main entrances: Schubertstraße 51 and Holteigasse 6. The area can easily be reached by tram or bus (stations: "Graz Botanischer Garten" with bus number 63 Graz Hilmteich/ Botanischer Garten with tram number 1, both starting at Graz railway station. You can reach Graz centre from the Graz airport by bus (nr. 630) or railway. The reception is planned in the foyer of the greenhouses.

Graz, the second largest city of Austria (after Vienna) counts at about 280,000 inhabitants and is the capital of the province Styria. The six universities (the oldest is the Karl-Franzens-University, founded in 1585) have more than 60,000 students. It is a very beautiful town with a well-preserved medieval city centre (https://www.graztourismus.at/en). You can get a fantastic view from the top of the Schlossberg hill.

The Graz tourism agency (GrazTourismus, af@graztourismus.at, www.graztourismus.at) reserved a contingent of nice hotels for our conference, from less expensive to high level, all in the centre of Graz. You can use the link up to the 17 April:



Map 2. Venue location (Botanical Garden of the Karl-Franzens-University).

https://www.graztourismus.at/kongress/en/16th-eurasian-grassland-conference_kongressformular-10257

Travelling

In case you will come by plane, often the best connection to Graz is via Vienna airport, even Graz airport is also a destination of many airlines. There is a good connection between Vienna and Graz with railway (www.oebb.at) or by buses (www.flixbus.at). You will get better prices when you book at least one week in advance.

Visas

In case you need an invitation, please contact Martin Magnes (martin.magnes@uni-graz.at), and If you plan to participate in the post-conference excursion to Slovenia, please contact Nataša Pipenbaher (natasa.pipenbaher@um.si).

Botanical Garden with the greenhouses from south west. Photo: C. Berg.

Co-organizers

The University of Graz (https://www.uni-graz.at/)

The University of Maribor (https://www.um.si/en/Pages/default.aspx)

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Forum Article

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Where forests meet grasslands: Forest-steppes in Eurasia

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Abstract: Despite the ecological, economic and conservation importance of forest-steppes, a continental scale synthesis of this complex ecosystem has been lacking. In a recent review, we compiled scattered knowledge about Eurasian forest-steppes in a new synthesis, proposed a new forest-steppe definition, reviewed how the biogeographic position of this ecosystem is perceived by different authors from different regions, delineated the main regions based on criteria of flora, physiognomy (i.e., vegetation structure), relief, and climate, and explored the conservation importance of forest-steppes. Here we complement some of the key findings of the review and illustrate some topics with further specific examples.

Keywords: complexity; forest-steppe; heterogeneity; meadow steppe; vegetation mosaic; wooded-steppe.

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Linguistic Editor: Paul Goriup

Introduction

Forest-steppes are among the most complex ecosystems in the temperate zone, and have outstanding ecological, economic and conservation importance (Erdős et al. 2018a). At the same time, forest-steppes belong to the most threatened ecosystems due to habitat loss and insufficient protection (Chibilyov 2002; Hoekstra et al. 2005). While reviews and syntheses on forest-steppes have been available at national (e.g. Molnár et al. 2012) and regional scales (e.g. Berg 1958), overviews over broad areas have been lacking. To fill this gap, a recent synthesis (Erdős et al. 2018a) has collected scattered knowledge about the entire area covered by forest-steppes in Eurasia, gave an up-to-date definition of forest-steppes, examined the different views on this ecosystem, described major biogeographic patterns, identified the main forest-steppe regions, and explored the conservation importance of forest-steppes. In this paper we complement some of the key findings of Erdős et al. (2018a) with important additional information and add specific examples to the main topics.

A definition of forest-steppes

The first task in our review was to provide a forest-steppe definition. We evaluated criteria that have often been used in defining forest-steppes, and concluded that an up-to-date definition should be based on physiognomic features (a mosaic of arboreal and herbaceous components) and the underlying factors (the most important of which is climate). Thus, we define forest-steppes as natural or near-natural vegetation complexes of arboreal and herbaceous

components (typically distributed in a mosaic pattern) in the temperate zone (excluding the Mediterranean), where the co-existence of forest and grassland is enabled primarily by the semi-humid to semi-arid climate, complemented by complex interactions of biotic (e.g. grazing, land use) and abiotic (e.g. soil, topography) factors operating at multiple scales (Erdős et al. 2018a). The arboreal cover (with a minimum height of 2 m) is 10%–70% across the entire landscape mosaic. The vascular vegetation cover within the grassland is at least 10%.

In the temperate zone, humid environments generally support forests, whereas grasslands have developed in arid environments (Dengler et al. 2014). In areas with a transitional (i.e. semi-humid to semi-arid) climate neither forests nor grasslands have a decisive advantage over the other. Thus, both have a more or less equal chance to develop, and local factors (e.g. microclimate, soil properties, grazing) determine competition outcomes (Walter & Breckle 1989; Lavrenko & Karamysheva 1993; Borhidi 2002).

Forest-steppe autonomy

The recognition of forest-steppes as a separate biome or zone in its own right continues to be a subject of scientific controversy. Forest-steppes are perceived differently by researchers, depending on the scale of the investigation, the exact study question, and the main interest of the researcher. Textbooks that describe global vegetation patterns and provide only a brief introduction to main vegetation zones may not mention forest-steppes at all (e.g. Lomolino et al. 2010). Most global and continental (or quasi-continental) scale descriptions of vegetation zones regard forest-steppes as the northern part of the steppe zone (e.g. Müller 1981; Lavrenko & Karamysheva 1993; Archibold 1995; Schultz 2005; Smelansky & Tishkov 2012; Pfadenhauer & Klötzli 2014; Wesche et al. 2016). In the well known and widely used global classification system of Walter (1979), forest-steppe is considered a zonoecotone, i.e. a transitional area between the forests and the steppes. The above categorizations have two important consequences. First, the main emphasis is usually on the grassland component, with the importance of forest patches being underestimated. Second, forest-steppe is typically considered a mere transitional zone rather than a separate zone (or biome) in its own right.

On the other hand, there are some overviews on global (Pielou 1979), continental (Berg 1958; Tishkov 2002), or national scales (Rachkovskaya & Bragina 2012) that treat forest-steppes as forming a separate zone of their own. As biome definitions rest on climate and vegetation physiognomy (e.g. Lomolino et al. 2010; Cox et al. 2016), it follows that forest-steppes satisfy the criteria to be considered a biome (see our definition above and in Erdős et al. 2018a).

Forest-steppe biogeography and main regions

In our review (Erdős et al. 2018a), based on criteria of flora, physiognomy, relief, and climate, we delineated the following eight main forest-steppe regions (Fig. 1): (1) Southeast Europe, (2) East Europe, (3) North Caucasus and Crimea, (4) West Siberia and north Kazakhstan, (5) Inner Asia, (6) Far East, (7) Middle East, and (8) Central Asia and southwestern Inner Asia. In addition, we provisionally treated parts of the Eastern Tibetan Plateau as a forest-steppe region, where the main driver behind the forest and the steppe vegetation is probably a combination of low temperature and low precipitation.

Boundaries between the regions were sometimes hard to locate as they are gradual and rather blurred. The classification of the transitional areas to one or the other region may be debated in some cases. Also, it has to be emphasized that we tried to integrate the views of several authors, which was extremely difficult, given that we could not find two publications with the same delineation of the forest-steppe zone and its main regions. Thus our delineations should by no means be considered a final scheme, and may need further clarifications.

During our work, we encountered several areas the inclusion of which among the forest-steppes is intensively debated. For example, the Carpathian Basin is regarded as lying on the border of the closed-canopy deciduous forests and the forest-steppes (e.g. Walter & Breckle 1989). However, recent evidence shows that most of the lowlands of the Basin were covered by forest-steppes prior to intensive anthropogenic impacts (Magyari et al. 2010).

The existence of forest-steppes in Mongolia is sometimes attributed to human activity (Hilbig 2000; Fujita et al. 2013), but there is strong evidence suggesting that the forest-steppes are natural in this region (Dulamsuren et al. 2005; Hais et al. 2016)

The existence of forest-steppes in the Russian Far East is sometimes attributed to human deforestation. The debate has not yet settled, but there is some evidence on the natural origin of forest-grassland mosaics in this area (Berg 1958; Skripnikova & Uspenskaya 2006; Martynenko 2007).

Forest-steppes of northern Eurasia, extending from the Carpathian Basin to the Chinese and Russian Far East are relatively well-known. However, there is also a less known southern belt of forest-steppes, extending from Turkey and Iran to the Qilian Mountains and the Chinese Loess Plateau. Granted, these southern forest-grassland mosaics are usually known under names such as “open woodland” or “sparse arid woodland”. In addition, their structure is somewhat different: instead of the meadow-steppes of the northern belt, the grassland component in the southern belt is usually semidesert-like. According to Walter (1956), this difference is due to the different effects of grazing: while the meadow-steppes of the northern belt can better tolerate grazing, the steppes of the Middle East are more sensitive and, when grazed, these southern steppes turn into a semidesert-like state (see alo Fırıncıoğlu et al. 2009). Despite some obvious differences, however, these forest-grassland mosaics of the southern parts of Eurasia undoubtedly satisfy the criteria of forest-steppes, as they have formed under semi-arid to semi-humid conditions, and have alternating woody and herbaceous components

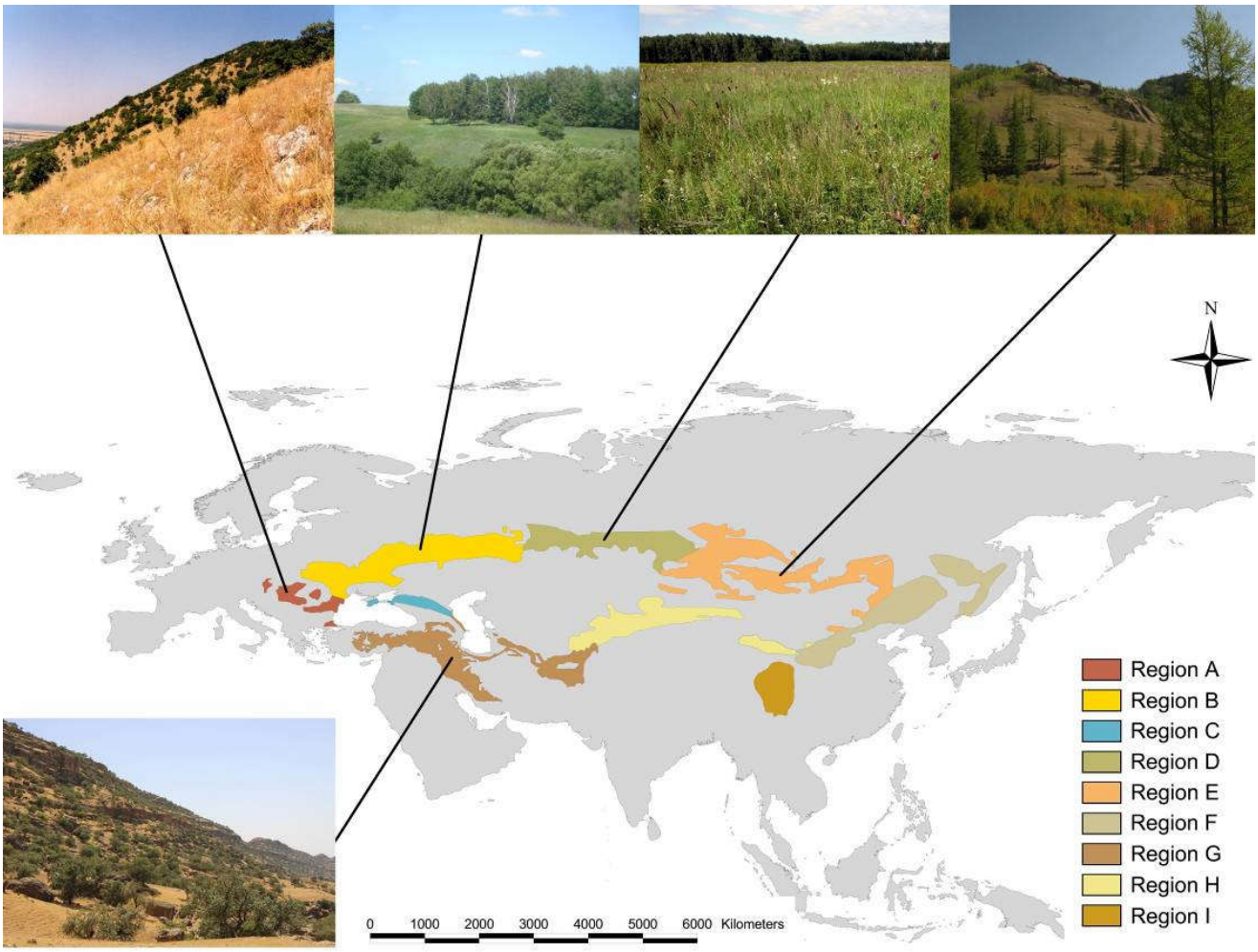

Fig. 1. The main forest-steppe regions of Eurasia: Southeast Europe (Region A), East Europe (Region B), North Caucasus and Crimea (Region C), West Siberia and north Kazakhstan (Region D), Inner Asia (Region E), Far East (Region F), Middle East (Region G), Central Asia and southwestern Inner Asia (Region H), and Eastern Tibetan Plateau (Region I). Photo credits: upper line: László Erdős, Yury A. Semenishchenkov, Zoltán Bátori, Zsolt Molnár; bottom left: Alireza Naqinezhad.

(Wesche et al. 2016). If both the northern and the southern forest-steppes are shown on a map, it turns out that forest-steppe regions form an elongated shape surrounding the most arid central parts of Eurasia (Erdős et al. 2018a).

The importance of habitat heterogeneity for diversity and conservation

Numerous types of forest, scrub and grassland habitats with different environmental, structural and compositional features occur in forest-steppes (Erdős et al. 2018a). Despite this fact, the conservation implications of habitat heterogeneity have received surprisingly little attention in many forest-steppe areas. For example, in the Carpathian Basin, conservation actions usually focus on the grassland component, which may have serious conservation consequences in forest-steppes. For example, a recent study has shown that different components of forest-steppes contribute differently to the overall conservation value of the total landscape in sandy forest-steppes (Erdős et al. 2018b): grasslands contain the largest number of protected, endemic and rare species, north-facing forest edges have the highest species richness, south-facing forest edges are the main areas for tree recruitment, while forest patch interiors are important for structural reasons (shrubs and large trees). Kelemen et al. (2017) reported that the presence of small shrubs improves the flowering success of plants in grazed forest-steppe habitats. Forest edges and forest interiors (primarily in openings) can support species that are not able to survive under the harsh conditions of the grasslands (Erdős et al. 2014). Forest patches may support some grassland species during unusually severe drought events and may thus contribute to grassland regeneration in more humid years (Bartha et al. 2008, 2011). Similarly, forests and their edges may serve as refuges for steppe species during habitat destruction or degradation (Molnár et al. 2008). In addition, forest patches can lessen the effects of increasing aridity from ongoing climate change, thus having a primary role in forest-steppe resistance against climate change (Bartha et al. 2008; Biró et al. 2008; Erdős et al. 2015). A study from the Vienna Basin also showed that the mosaic-like configuration of forest and grassland patches is the most

desirable from a conservation perspective (Erdős et al. 2017).

The above examples show that conservation measures should take the mosaic character of forest-steppes into account. For example, the recruitment of native trees should be of high priority in areas that have been overgrazed. During forest-steppe restoration, both woody and non-woody habitats should be reconstructed, as was done in a recent project (Török et al. 2017).

Cultural significance of forest-steppes

Some of the forest-steppes in Southwest Asia (present-day Turkey, Iraq, Iran) are located in a region that is usually considered the cradle of Western civilization (Poschlod 2015; Wesche et al. 2016). In northern Eurasia, forest-steppes (together with steppes) served as conduits for cultural inventions and as major migration routes for several peoples during history (Anthony 2007; Bone et al. 2015). The distribution pattern of forest-steppes even influenced settling patterns, as certain tribes and nations probably preferred park-like landscapes and tended to avoid closed forests (Borhidi 2002; Sümegi et al. 2012).

Herders of the forest-steppe belt possess rich traditional ecological knowledge of the steppes, their forage species, and the spatial and temporal patterns of forage availability (Fernández-Giménez 2000; Molnár 2012). While "modern" cultures eliminated natural vegetation in vast areas for arable cultivation and confined billions of animals into factory farms, herders' lifestyle seems to be much more compatible with forest-steppe survival and animal welfare. It seems clear that traditional ecological knowledge can contribute to a better, ecologically and culturally more site-specific nature conservation management (Molnár 2013; Molnár et al. 2016).

The human species and its ancestors have spent much of the last couple of million years of their evolution in forest-grassland mosaics (tropical or temperate), which probably contributes to the fact that humans (well beyond the circle of ecologists) usually seem to prefer park-like habitats, as shown by several analyses (e.g. Orians 1980; Balling & Falk 1982). This is in line with the biophilia hypothesis of Wilson (1984), which presumes that humans might be genetically determined to enjoy forest-steppes and other ecosystems with similar patterns. Whether our aesthetic preference for woody-herbaceous mosaics has a genetic background remains to be explored. What seems evident is that losing Eurasian forest-steppes would not only mean a huge loss in terms of diversity at several levels, but also the vanishing of some of our history and culture as well.

Author contributions

L.E. planned the study, L.E. and P.T. led the writing, D.A., O.A.A., D.C., L.E., M.K., H.L., M.M., A.N. and Y.A.S. did the delineation of the main regions, Z.B., L.E., G.K-D., Z.M., C.T. and P.T. contributed to the parts about heterogeneity and conservation, L.E. and Z.M. wrote about the cultural significance, and all authors critically revised the manuscript.

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References

Anthony, D.W. 2007. *The horse, the wheel, and language: How Bronze-age riders from the Eurasian steppes shaped the modern world.* Princeton University Press, Princeton, NJ, USA.

Archibold, O.W. 1995. *Ecology of world vegetation.* Springer, Dordrecht, NL.

Balling, J.D. & Falk, J.H. 1982. Development of visual preference for natural environments. *Environment and Behavior* 14: 5–28.

Bartha, S., Campetella, G., Ruprecht, E., Kun, A., Házi, J., Horváth, A., Virágh, K. & Molnár, Z. 2008. Will interannual variability in sand grassland communities increase with climate change? *Community Ecology* 9: 13–21.

Bartha, S., Campetella, G., Kertész, M., Hahn, I., Kröel-Dulay, G., Rédei, T., Kun, A., Virágh, K., Fekete, G. & Kovács-Láng, E. 2011. Beta diversity and community differentiation in dry perennial sand grasslands. *Annali di Botanica* 1: 9–18.

Berg, L.S. 1958. *Die geographischen Zonen der Sowjetunion I-II.* Teubner, Leipzig, DE.

Biró, M., Révész, A., Molnár, Z., Horváth, F. & Czúcz, B. 2008. Regional habitat pattern of the Danube-Tisza Interfluve in Hungary II. *Acta Botanica Hungarica* 50: 19–60.

Bone, M., Johnson, D., Kelaidis, P., Kintgen, M. & Vickerman, L.G. 2015. *Steppes. The plants and ecology of the world's semi-arid regions.* Timber Press, Portland, OR, US.

Borhidi, A. 2002. *Gaia zöld ruhája [The green cloth of Gaia].* MTA, Budapest, HU.

Chibilyov, A. 2002. Steppe and forest-steppe. In: Shahgedanova, M. (ed.) *The physical geography of northern Eurasia*, pp. 248–266. Oxford University Press, Oxford, UK.

Cox, C.B., Moore, P.D. & Ladle, R.J. 2016. *Biogeography: An ecological and evolutionary approach.* 9th ed. Wiley, Oxford, UK.

Dengler, J., Janišová, M., Török, P. & Wellstein, C. 2014. Biodiversity of Palaearctic grasslands: A synthesis. *Agriculture, Ecosystems & Environment* 182: 1–14.

Dulamsuren, C., Hauck, M. & Mühlenberg, M. 2005. Ground vegetation in the Mongolian taiga forest-steppe ecotone does not offer evidence for the human origin of grasslands. *Applied Vegetation Science* 8: 149–154.

Erdős, L., Tölgyesi, C., Horzse, M., Tolnay, D., Hurton, Á., Schulcz, N., Körmöczi, L., Lengyel, A. & Bátori, Z. 2014. Habitat complexity of the Pannonian forest-steppe zone and its nature conservation implications. *Ecological Complexity* 17: 107–118.

Erdős, L., Tölgyesi, C., Körmöczi, L. & Bátori, Z. 2015. The importance of forest patches in supporting steppe-species: a case study from the Carpathian Basin. *Polish Journal of Ecology* 63: 213–222.

Erdős, L., Tölgyesi, C., Bátori, Z., Semenishchenkov, Y.A. & Magnes, M. 2017. The influence of forest/grassland proportion on the species composition, diversity and natural values of an eastern Austrian forest-steppe. *Russian Journal of Ecology* 48: 350–357.

Erdős, L., Ambarlı, D., Anenkhonov, O.A., Bátori, Z., Cserhalmi, D., Kiss, M., Kröel-Dulay, G., Liu, H., Magnes, M., (…) & Török, P. 2018a. The edge of two worlds: A new review and synthesis on Eurasian forest-steppes. *Applied Vegetation Science* 21: 345-362.

Erdős, L., Kröel-Dulay, G., Bátori, Z., Kovács, B., Németh, C., Kiss, P.J. & Tölgyesi, C. 2018b. Habitat heterogeneity as a key to high conservation value in forest-grassland mosaics. *Biological Conservation* 226: 72–80.

Fernández-Giménez, M.E. 2000. The role of Mongolian nomadic pastoralists' ecological knowledge in rangeland management. *Ecological Applications* 10: 1318–1326.

Fırıncıoğlu, H.K., Seefeldt, S.S., Şahin, B. & Vural, M. 2009. Assessment of grazing effect on sheep fescue (*Festuca valesiaca*) dominated steppe rangelands, in the semi-arid Central Anatolian region of Turkey. *Journal of Arid Environments* 73: 1149–1157.

Fujita, N., Amartuvshin, N. & Ariunbold, E. 2013. Vegetation interactions for the better understanding of a Mongolian Ecosystem Network. In: Yamamura, N., Fujita, N. & Maekawa A. (eds.) *The Mongolian ecoystem network*, pp. 157-184. Springer, Tokyo, JP.

Hais, M., Chytrý, M. & Horsák, M. 2016. Exposure-related forest-steppe: A diverse landscape type determined by topography and climate. *Journal of Arid Environments* 135: 75–84.

Hilbig, W. 2000. Forest distribution and retreat in the forest steppe ecotone of Mongolia. *Marburger Geographische Schriften* 135: 171–187.

Hoekstra, J.M., Boucher, T.M., Ricketts, T.H. & Roberts, C. 2005. Confronting a biome crisis: Global disparities of habitat loss and protection. *Ecology Letters* 8: 23–29.

Kelemen, A., Tölgyesi, C., Kun, R., Molnár, Z., Vadász, C. & Tóth, K., 2017. Positive small-scale effects of shrubs on diversity and flowering in pastures. *Tuexenia* 37: 399–413.

Lavrenko, E.M. & Karamysheva, Z.V. 1993. Steppes of the former Soviet Union and Mongolia. In: Coupland R.T. (ed.) *Ecosystems of the world 8B. Natural grasslands. Eastern hemisphere and résumé*, pp. 3–59. Elsevier, Amsterdam, NL.

Lomolino, M.V., Riddle, B.R., Brown, J.H. & Whittaker R.J. 2010. *Biogeography.* 4th ed. Sinauer Associates, Sunderland, MA, US.

Magyari, E.K., Chapman, J.C., Passmore, D.G., Allen, J.R.M., Huntley, J.P. & Huntley, B. 2010. Holocene persistence of wooded steppe in the Great Hungarian Plain. *Journal of Biogeography* 37: 915–935.

Martynenko, A.B. 2007. The steppe insect fauna in the Russian Far East: myth or reality? *Entomological Review* 87: 148–155.

Molnár, Z. 2012. Classification of pasture habitats by Hungarian herders in a steppe landscape (Hungary). *Journal of Ethnobiology and Ethnomedicine* 8: Article e28.

Molnár, Z. 2013. Traditional vegetation knowledge of the Hortobágy salt steppe (Hungary): a neglected source of information for vegetation science and conservation. *Phytocoenologia* 43: 193–205.

Molnár, Z., Fekete, G., Biró, M. & Kun, A. 2008. A Duna-Tisza közi homoki sztyepprétek történeti tájökológiai jellemzése [Land-use history of the sandy steppes of the Danube-Tisza Interfluve]. In: Kröel-Dulay, G., Kalapos, T. & Mojzes, A. (eds.) *Talaj-vegetáció-klíma kölcsönhatások*, pp. 39–56. MTA ÖBKI, Vácrátót, HU.

Molnár, Z., Biró, M., Bartha, S. & Fekete, G. 2012. Past trends, present state and future prospects of Hungarian forest-steppes. In: Werger, M.J.A. & van Staalduinen, M.A. (eds.) *Eurasian steppes. Ecological problems and livelihoods in a changing world*, pp. 209–252. Springer, Dordrecht, NL.

Molnár, Z., Kis, J., Vadász, C., Papp, L., Sándor, I., Béres, S., Sinka, G. & Varga, A. 2016. Common and conflicting objectives and practices of herders and nature conservation managers: the need for the 'conservation herder'. *Ecosystem Health and Sustainability* 2: e01215.

Müller, P. 1981. *Arealsysteme und Biogeographie.* Ulmer Verlag, Stuttgart, DE.

Orians, G.H. 1980. Habitat selection: General theory and applications to human behavior. In: Lockard, S.J. (ed.) *The evolution of human social behavior*, pp. 49–66. Elsevier, New York, NY, US.

Pfadenhauer, J.S. & Klötzli, F.A. 2014. *Vegetation der Erde: Grundlagen, Ökologie, Verbreitung.* Springer, Berlin, DE.

Pielou, E.L. 1979. *Biogeography.* John Wiley & Sons, New York, NY, US.

Poschlod, P. 2015. *Geschichte der Kulturlandschaft.* Ulmer Verlag, Stuttgart, DE.

Rachkovskaya, E.I. & Bragina, T.M. 2012. Steppes of Kazakhstan: Diversity and present state. In: Werger, M.J.A. & van Staalduinen, M.A. (eds.) *Eurasian steppes. Ecological problems and livelihoods in a changing world*, pp. 103–148. Springer, Dordrecht, NL.

Schultz, J. 2005. *The ecozones of the world.* Springer, Berlin, DE.

Skripnikova, M.I. & Uspenskaya, O.N. 2006. Applied aspects of studying the Holocene evolution of soil vegetation complexes in the Middle Amur Region, the Far East of Russia. In: *18th World Congress of Soil Science Abstracts*, pp. 288-289. Philadelphia, PA, US.

Smelansky, I.E. & Tishkov, A.A. 2012. The steppe biome in Russia: Ecosystem services, conservation status, and actual challenges. In: Werger, M.J.A. & van Staalduinen, M.A. (eds.) *Eurasian steppes. Ecological problems and livelihoods in a changing world*, pp. 45–101. Springer, Dordrecht, NL.

Sümegi, P., Persaits, G. & Gulyás, S. 2012. Woodland-grassland ecotonal shifts in environmental mosaics: Lessons learnt from the environmental history of the Carpathian Basin (Central Europe) during the Holocene and the last ice age based on investigation of paleobotanical and mollusk remains. In: Myster, R.W. (ed.) *Ecotones between forest and grassland*, pp. 17–57. Springer, New York, NY, US.

Tishkov, A. 2002. Nature protection and conservation. In: Shahgedanova, M. (ed.) *The physical geography of northern Eurasia*, pp. 527–544. Oxford University Press, Oxford, UK.

Török, K., Csecserits, A., Somodi, I., Kövendi-Jakó, A., Halász, K., Rédei, T. & Halassy, M. 2017. Restoration prioritization for industrial area applying multiple potential natural vegetation modeling. *Restoration Ecology* 26: 476–488

Walter, H. 1956. Das Problem der Zentralanatolischen Steppe. *Die Naturwissenschaften* 43: 97–102.

Walter, H. 1979. *Vegetation of the Earth.* 2nd ed. Springer, Berlin, DE.

Walter, H. & Breckle, S.-W. 1989. *Ecological systems of the geobiosphere 3 – Temperate and polar zonobiomes of northern Eurasia.* Springer, Berlin, DE.

Wesche, K., Ambarlı, D., Kamp, J., Török, P., Treiber, J. & Dengler, J. 2016. The Palaearctic steppe biome: a new synthesis. *Biodiversity and Conservation* 25: 2197–2231.

Wilson, E.O. 1984. *Biophilia.* Harvard University Press, Cambridge, UK.

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The LUCAS Grassland Module Pilot – qualitative monitoring of grassland in Europe

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Abstract: The Land Use/Cover Area-Frame Survey (LUCAS) is a European inventory carried out every three years and coordinated by Eurostat. It aims to provide information for policy and science on land use, land cover and environmental parameters by surveying a statistically representative sample of points spread across the EU countries. In 2018, a new grassland module was piloted within the survey. This pilot aims to collect detailed information on the environmental and ecological quality of the grassland, as well as its type and intensity of use. Between April and July 2018, 3734 grassland points in 26 countries were surveyed using this standardised methodology. Of these points, 747 underwent an additional quality control to check the accuracy of the survey method. This is the first time a standardised methodology has been used to collect ecological data on grasslands in a coordinated manner over so wide a geographical range in Europe. The analysis of the data from this survey is ongoing, so the purpose of this article is to briefly describe the method used in the new grassland module and inform readers about how this pilot was developed.

Keywords: biodiversity; EU; field survey; grassland; indicator species; land use; long-term monitoring; quality control.

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Eurostat has carried out the LUCAS (Land Use/Cover Area frame Survey: http://ec.europa.eu/eurostat/web/lucas, accessed 13.11.2018) campaign every 3 years since 2006. Its aim is to identify changes in land use, land cover and selected environmental parameters in the European Union. LUCAS relies on a grid of sampling points, based on a regular 2 km grid with over 1,100,000 points overlain across the territory of the EU. Only a subset of these points are included in each survey: this year saw the most recent iteration of the survey, in which 337,854 points were assessed in the EU-28 either via photointerpretation (almost 30% of the points) using the most up to date orthophotos available or in-situ. For the in-situ points, surveyors travel to the point in the field and record the preselected parameters for that point. They categorise land use and land cover following a defined classification system, as well as recording environmental parameters such as vegetation type, evidence of human activity such as drainage or irrigation management and structural elements in the landscape. Soil samples have also been collected at more than 25,000 points to determine soil properties. In 2018, 1000 of these points were also selected for a pilot survey of soil biodiversity.

This campaign is a huge undertaking: in 2018, more than 800 surveyors were employed for the fieldwork. The data from the LUCAS surveys provides important information for some of the major EU policy areas, such as the Common Agricultural Policy, the European Climate Change Programme, EU Biodiversity Strategy and the Europe 2020 Strategy. LUCAS data allows to monitor trends in e.g. land abandonment, sealing of surfaces, soil organic carbon, landscape elements and the findings are used to inform policy and measure success at meeting targets. The results are freely available via the Eurostat website (https://ec.europa.eu/eurostat/web/lucas/overview).

Development of the LUCAS grassland methodology

In recent years, demand has been growing among policy analysts in the EU to increase the depth of information that LUCAS delivers on grassland quality. This was requested in the context of the important role grassland plays in meeting urgent environmental (e.g. climate change, water quality) and biodiversity targets. There is little systematic field data available on grassland types and quality at the European level, making such a grassland quality survey potentially of great use for the scientific community as well as for policy makers.

In 2016, an in-depth grassland survey was designed, based on input from a group of experts in grassland ecology and conservation from across the EU. To be selected, a parameter must be able to be accurately and rapidly re-

Habitat type (e.g. EUNIS type, presence of structural species)
Environmental conditions (e.g. slope in degrees, orientation, heterogeneity of soil surface)
Age of grassland (estimated based on visible evidence)
Use type (e.g. type of grazing animal, evidence of abandonment, presence of agroforestry)
Use intensity (e.g. evidence of reseeding or fertiliser application)
Structure of vegetation (e.g. heights and coverages of different elements of vegetation layers)
Biodiversity value (e.g. presence of indicator species, balance of elements of herb layer)
Pollinator value (e.g. number of flowering species, flower density)

Box 1. Aspects of grassland ecological and environmental conditions for which information was collected in the 2018 grassland pilot (and examples of relevant parameters from which estimations can be derived).

corded by non-experts with only a small amount of training. Over 50 individual parameters were defined, addressing the aspects of grassland ecology and management shown in Box 1.

The parameters are recorded on a transect of 20 m in length and 2.5 m in width, giving a total surveyed area of 50 m² (Fig. 1). Certain parameters regarding the wider habitat, such as presence of fertilisation or cover of trees, are observed on a larger transect of 10 m width or at parcel level. The transect is always laid to the east of the LUCAS point, to avoid subjective selection of the vegetation surveyed.

One of the most important ecological parameters is the list of key, or indicator, species (Fig. 2). This was also the most complex parameter to design, and is based on the experience of the experts surveying different types of grasslands in their home countries.

The aim of the indicator species is to reflect the vegetation diversity and (to some extent) use history, in a way that is relatively easy for non-experts to record (Fig. 3). The concept has been used successfully e.g. in results-based agri-environment schemes for species rich meadows in regions of Germany, Switzerland and France (Oppermann & Gujer 2003; Fleury et al. 2015; Herzon et al. 2018). The challenge with the scale of this survey is to make the list of indicator species robust enough to be relevant for the huge range of grassland habitat present in the EU. The survey area is thus subdivided into simplified biogeographic zones: in addition to a core list of 10 indicator species or species groups (e.g. *Geranium* sp. with flowers > 1 cm) that are recorded in every zone, each zone has a further 10 species that are specifically selected for that zone.

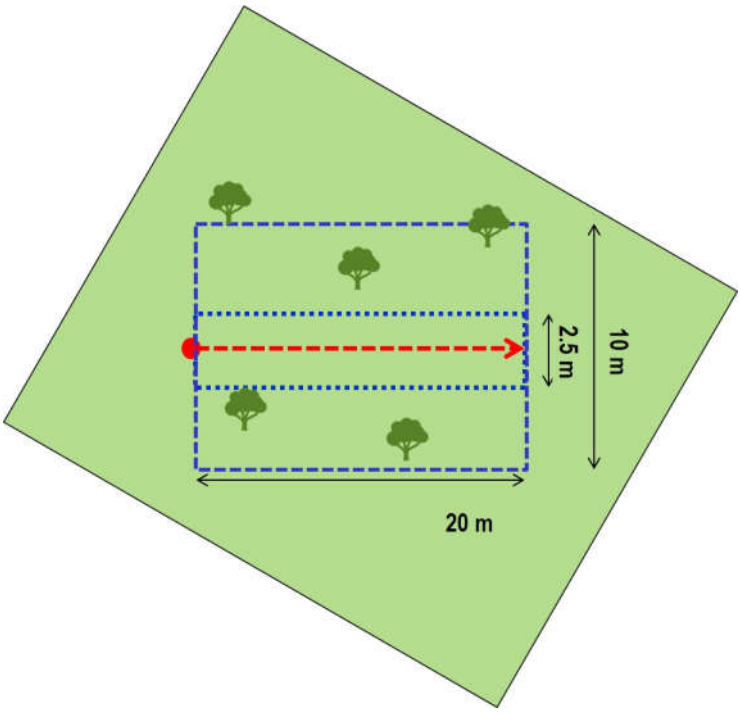

Fig. 1. Grassland transect methodology. Photo: D. Gómez.

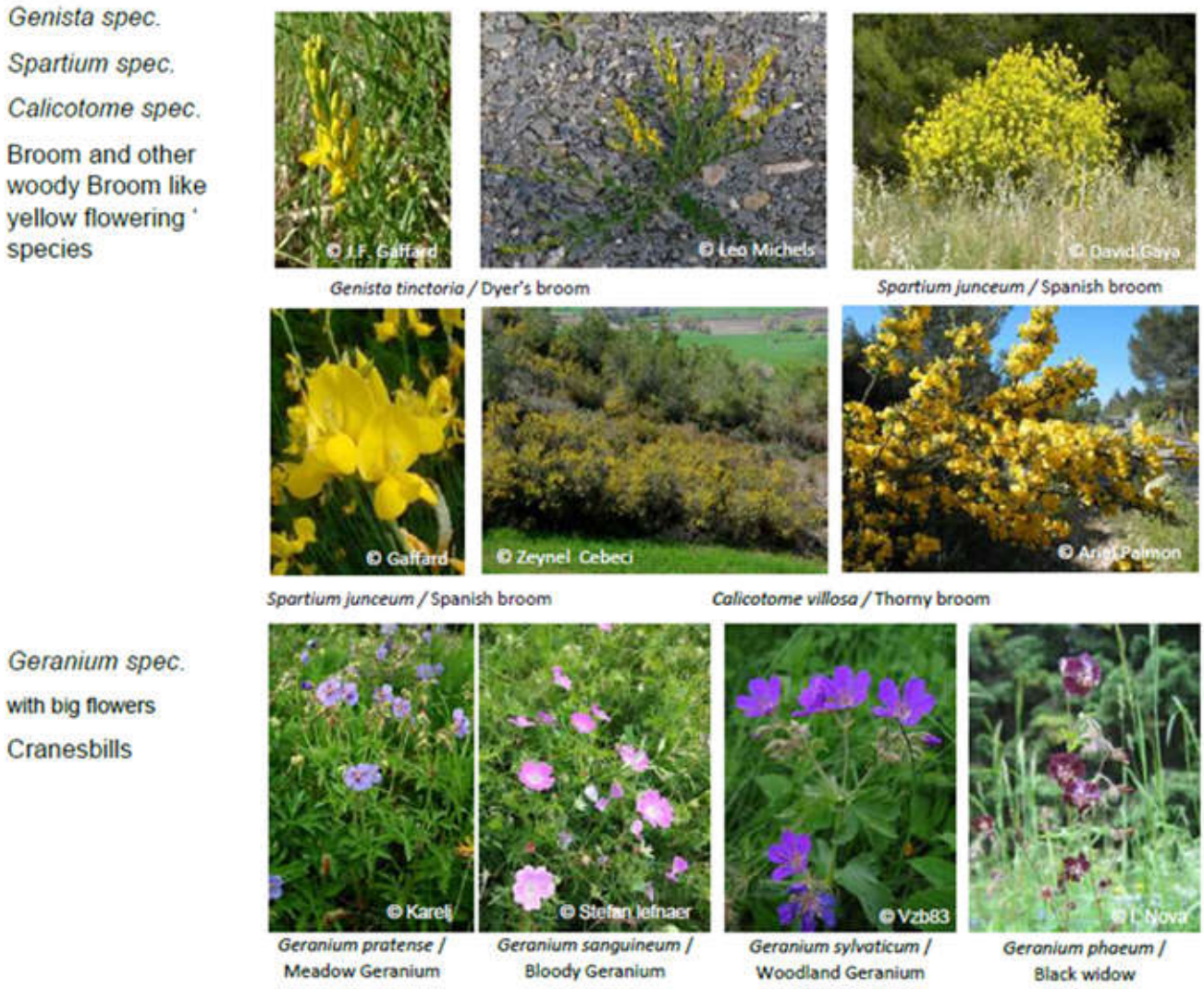

Fig. 2. Examples of indicator species taken from the guidance booklet for surveyors © Eurostat.

Survey implementation in 2018

This methodology was implemented for the first time in the LUCAS survey in 2018. A subsample of 3734 points were selected for the pilot: these points had been recorded in the last survey as being dominated by non-arable herbaceous vegetation and cover all elevation zones up to 1500 m a.s.l., all biogeographic zones and LUCAS land cover categories (Fig. 4, https://ec.europa.eu/eurostat/web/lucas/data/primary-data/2018 [accessed 05.12.2018]). Between 80 and 90 points were selected randomly in each of the aforementioned strata (elevation, biogeographic zone and the LUCAS land cover categories "grassland with sparse tree/shrub cover", "grassland without trees", "spontaneously revegetated surfaces", "shrubland with trees", "shrubland without trees"). In addition to this random stratified sample, eight clusters were selected to assess specific natural environments in the biogeographical regions where they can be found: broad-leaved forests with significant grass cover in Boreal and Mediterranean zones, temporary grasslands in Boreal, Atlantic and Mediterranean zones and fruit trees and berries with relevant grass cover in Continental and Mediterranean zones.

A total of 164 surveyors, as well as most coordinators and quality controllers were trained in the methodology in April/May 2018 before the survey was carried out. For each biogeographic region and elevation zone, an optimum time frame of 15 days is defined during which the survey must be carried out. This is important to ensure that the parameters can be recorded accurately, as most of them depended on a vegetation that is well developed but not yet cut or heavily grazed. An earlier start or later finish for the survey of 5–10 days is possible if weather conditions mean that the phenology is earlier or later than usual. The earliest surveys started in Cyprus in mid-April, and the latest ended in mid-July in northern Scandinavia.

The usual challenges of fieldwork applied: points had to be abandoned and alternatives sought out when the land use had changed (e.g. fallows that had been classified as grassland and subsequently recultivated), animals were present, or access to the land was not possible through blocked

Fig. 3. An easy way to count the number of flowering or indicator species is to collect an example of each during the transect walk. Photo: R. Oppermann.

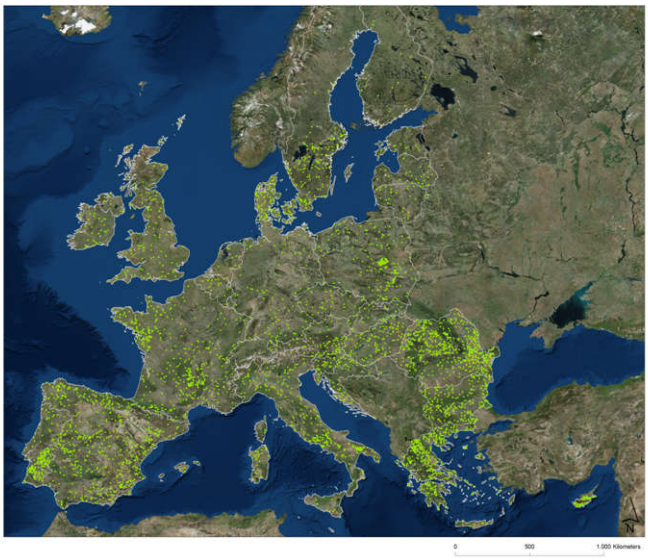

Fig. 4. Distribution of the surveyed grassland points in Europe.

roads or difficult terrain (Fig. 5). This meant that not all points had valid records at the end of the survey.

Quality control

To check the accuracy of the recording, a further subsample of 747 of the grassland points were surveyed a second time by an experienced botanist. We recruited 35 botanists from 19 countries, who in addition to recording the grassland parameters, also carried out full vegetation inventories (relevés) on the transect area of 50 m². The wide range of grasslands surveyed (Fig. 6) led to a high diversity of species – in total, 2672 species and subspecies were recorded. This in-depth species data is important to verify the usefulness of the parameters related to habitat type and diversity.

Analysis and next steps

The analysis of the survey results is ongoing, and the first results should be available in mid-2019. As a pilot study, a major goal of the analysis is to validate the approach, to check the accuracy of implementation by non-botanists and to identify improvements to the survey methodology (removing redundant parameters or those that were not well implemented, simplifying parameters that were misunderstood, etc.). Although the small sample size of the pilot means that the results will not be statistically representative for the areas surveyed, they will provide an interesting insight into the state of the EU's grasslands and the potential of this survey to deliver regular monitoring information in the future. If the results show that the parameters provide useful and meaningful results, Eurostat will

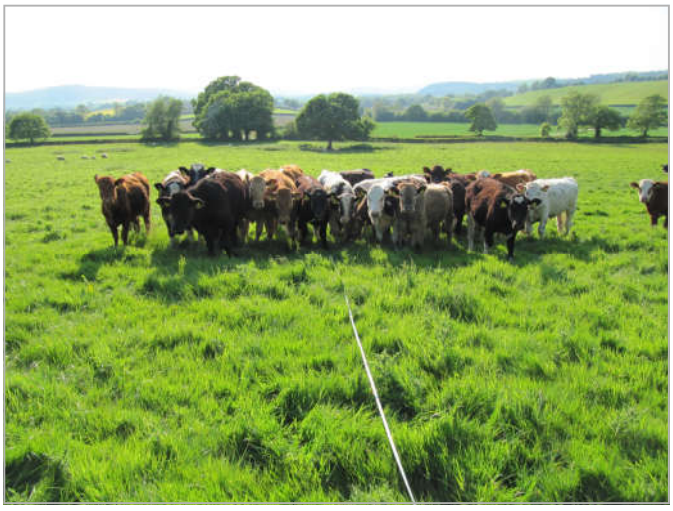

Fig. 5. As with most fieldwork, there were some unexpected challenges. Photos: F. O'Neill & N. Velev.

Fig. 6. The huge variety in the types of grassland surveyed was a challenge when designing the parameters. From top left clockwise: Portugal (Photo: C. Pinto Cruz), Finland (Photo: L. Kasari), Romania (Photo: T. Ursu), Spain (Photo: D. Gómez).

decide on the integration of the grassland module into future LUCAS surveys.

Author contributions

R.O. developed the survey concept, all authors helped to coordinate the field sampling, L.M.E.S. drafted the manuscript, and all authors critically revised the manuscript.

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References

Fleury, P., Seres, C., Dobremez, L., Nettier, B., & Pauthenet, Y. 2015. "Flowering Meadows", a result-oriented agri-environmental measure: Technical and value changes in favour of biodiversity. *Land Use Policy* 46: 103–114.

Herzon, I., Birge, T., Allen, B., Povellato, A., Vanni, F., Hart, K., Radley, G., Tucker, G., Keenleyside, C., (…) & Prazan, J. 2018. Time to look for evidence: Results-based approach to biodiversity conservation on farmland in Europe. *Land Use Policy* 71: 347–354.

Oppermann, R. & Gujer, H. 2003. *Artenreiches Grünland bewerten und fördern – MEKA und ÖQV in der Praxis*. Ulmer, Stuttgart, DE.

Photo Story

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Impressions from the Matsch/Mazia valley, part of the Inner-Alpine dry valley system Vinschgau/Val Venosta (South Tyrol, Northern Italy)

Photos and text by Andreas Hilpold, Michael Steinwandter, Elia Guariento, Manuel Pramsohler & Julia Seeber

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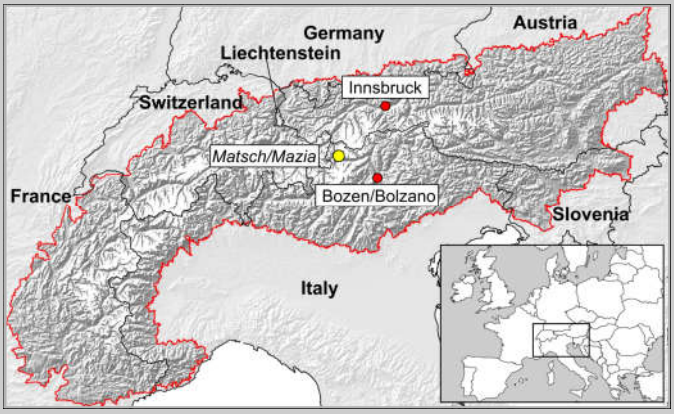
The Matsch/Mazia Valley is a small tributary valley of the Vinschgau Valley (Val Venosta), the most extreme inner-Alpine dry valley of the Eastern Alps (Braun-Blanquet 1961). Due to large barriers in the South (Ortles/Ortler Group) and in the North (Ötztal Alps) there is little precipitation, mainly during the sommer months. Mals/Malles and Schluderns/Sluderno, villages at the southern entrance of the Matsch Valley, have only about 500 mm of rainfall per year.

The area looks back on a long pastoral tradition, resulting in large areas of dry pastures, mainly located on the northern (i.e. S-exposed) slopes of the Vinschgau and the Matsch Valleys, which therefore have a distinct steppe character. Especially in the latter, dry meadows represent a smooth transition to grazed alpine meadows. In the montane belt we can therefore find elements of alpine flora and fauna merged with typical dry meadow species. The area is part of the south-western end of the Ötztal Alps, thus consisting of predominantly metamorphic bedrock with only limited sediment packages (containing also material of different origin) at the entrance of the valley. Only small areas of the dry meadows in the Vinschgau and Matsch/Mazia Valleys are protected (to a large extent as Natura 2000 areas). Phytosociologically, dry meadows of the Vinschgau valley belong predominantly to the alliance *Stipo-Poion xerophilae* (within *Festucetalia valesiacae*).



Literature:

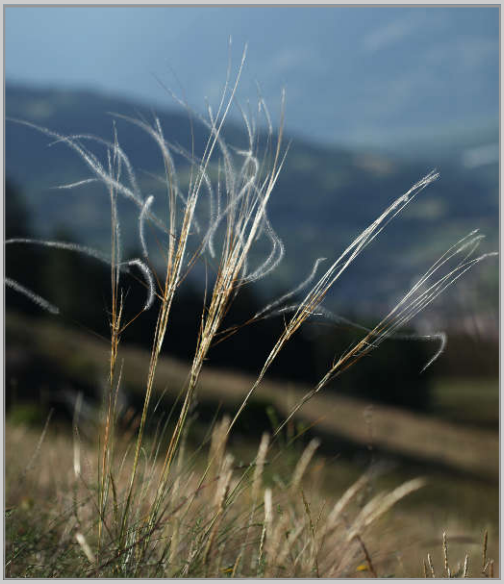
Braun-Blanquet J. 1961. *Die inneralpine Trockenvegetation – von der Provence bis zur Steiermark*. Fischer, Stuttgart. DE.

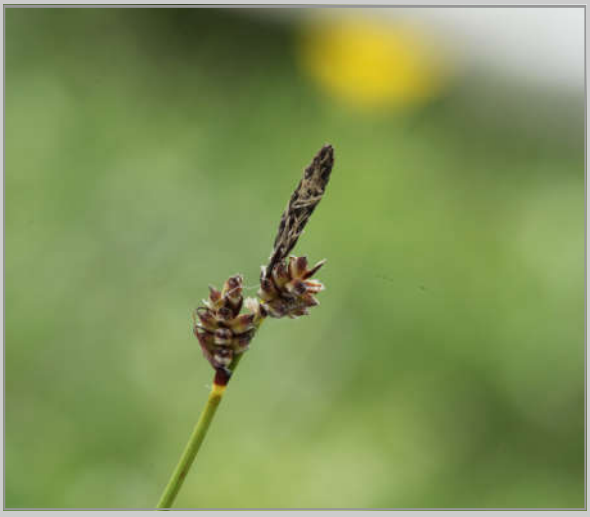
***Stipa* grasslands, mainly with *Stipa eriocaulis* and *Stipa capillata*. Photo: A. Hilpold.**

Landscape in the Matsch/Mazia Valley. Photo: A. Hilpold.

Sites with nitrophilous plants, *Marrubium vulgare* and *Onopordium acanthium*. Photo: A. Hilpold.






Plant species: *Astragalus onobrychis* (Photo: A. Hilpold), *Festuca valesiaca* (Photo: A. Hilpold), *Orobanche lucorum* (Photo: A. Hilpold), *Stipa eriocaulis* (Photo: A. Hilpold), *Achillea tomentosa* (Photo: M. Pramsohler), *Carex ericetorum* (Photo: A. Hilpold), *Oxytropis pilosa* (Photo: A. Hilpold).



Vertebrates: *Lacerta bilineata*, juvenile (Photo: A. Hilpold), *Oenanthe oenanthe,* male and juveniles (Photo: M. Steinwandter).





Butterflies: *Plebejus argus* (Photo: A. Hilpold) and *Plebejus trappi* (Photo: A. Hilpold), the latter one feeds on the rare steppe species *Astragalus exscapus* and is an endemic species of the inner-Alpine dry valleys. *Parnassius apollo* (Photo: M. Steinwandter), *Pyrgus carthami* (Photo: A. Hilpold), *Pyrgus serratulae* (Photo: A. Hilpold).



Insects: *Stenobothrus nigromaculatus* (Photo: A. Hilpold) is a steppe species restricted to the most dry valleys of the Alps and has its center of distribution in Eastern Europe and Central Asia, *Zygaena carniolica* (Photo: M. Steinwandter), *Mantis religiosa* (Photo: E. Guariento).

Photo competition

Best Shots on "Grassland people"

Here the three winners of the 3rd EDGG Photo Competition!
The Jury of the Photo Competition was composed by Edy Fantinato, Magdalena Firganek-Fulcher, Anna Kuzemko, Rocco Labadessa, Jim Martin & Salza Palpurina

1st place:

From the author:

In winter time, the Nomads live in lowlands of Azerbaijan Plateau (NW Iran) and in the growing season move to higher elevations.

Reviews from the Jury:

"For colours and composition. There is a particular beauty in this scene."

"Grasslands, grazing and the shepherds – all in a good balance"

Milking sheep by Shahsavan Nomads in northern slopes of Sabalan Mts (NW Iran, 2200 m a.s.l.). Jalil Noroozi.
Taken with Panasonic DMC-FZ50 (1/100s at f/4, ISO 100).

Jalil Noroozi
noroozi.jalil@gmail.com

2nd place

Reviews from the Jury:

"There was something joyous about the bountiful harvest being collected"

"This brings the attention to the precious close relationship of human and grasslands, which is becoming so rare these days".

"This picture perfectly summarizes the joy of working together to manage grasslands. Once considered the humblest of jobs, haymaking is rather the highest example of teaming up with Others and Nature"

Bringing home the harvest from a hay meadow (Viscri, Transylvania, Romania). 25 July 2009. Jürgen Dengler.
Taken with Nikon D300 (lens Tamron AF SP 2,8/90 Macro; 1/400s at f/9, ISO 200).

Jürgen Dengler
juergen.dengler@uni-bayreuth.de

3rd place

From the author:

In August 2017, a heatwave nicknamed "Lucifer" has seen temperatures soar to over 40° C across Europe, causing wildfires, drought, and chaos over the continent. During this time I spent holiday with the family (my wife Karina and 5 years old daughter Hania) in Hungary and Romania. In Hungary we visited the UNESCO listed Hortobágy National Park – mainly because of the possibility of ornithological observations.

However, it was also an opportunity to see cultural landscape constituted by a pastoral society. In the presented photo the blue clad horsemen and their animals are dominant. The Hungarian grey cattle (Bos primigenius taurus hungaricus) is a real national symbol of Hungary, an animal that is indigenous to the country and is protected by law. The long Hortobágy barn, visible in the background, houses the racka sheep (Ovis aries strepsiceros hungaricus), an another unique breed. The composition is complemented by traditional T-shaped sweep well dot the landscape. It's a fascinating area to visit - the Puszta, real land of cranes and grey cattle.

Reviews from the jury:

"A well captured scene and a good linear composition. The strength of this shot is in the game of contrasts: bright clothing stands out from the muted straw-coloured background of a ripe summer grassland. The dust raised by the bulls brings the photo alive and adds a sense of movement to the otherwise still landscape."

"Good focus on people, grasslands and the context well visible"

Hortobágy National Park – the land of cranes and grey cattle (Hungary). 3 august 2017. Dominik Chłond.
Taken with Nikon D300S, lens 18-300mm, (exposure 1/400s at f/10, ISO 250)

Dominik Chłond
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Short Contribution

Luhansk Nature Reserve celebrate the 50th anniversary

The reserve celebrated several memorable dates in the autumn of 2018. It celebrated the 50th anniversary of the Luhansk Nature Reserve creation, the 70th anniversary of the Striltsivskyi Steppe, the 10th anniversary of the «Tryokhizbenskyi Steppe», and the 90th anniversary of the creation of the first nature protection territory within the «Provalskyi Steppe».

Luhansk Nature Reserve is located in eastern Ukraine, in Luhansk region (Fig. 1). Now it includes four compartments with total area in 5403.01 ha: «Stanichno-Luhanske» (498 ha), «Striltsivskyi Steppe» (1036.51 ha), «Provalskyi Steppe» (587.5 ha), Tryokhizbenskyi Steppe (3281 ha).

The reserve was established on November 12, 1968. Initially, the structure of the reserve included «Striltsivsky steppe» with an area of 494 ha in Milovsky district and «Stanychno-Luhanske» with an area of 494 ha in the Stanychno-Luhansk district. «Striltsivskyi steppe» was declared as a local reserve in 1923. The first attempt to create a reserve in the south of the Luhansk region, in the Provalskyi steppe, was held in the late 1920s. Striltsivskyi steppe was transformed into the State Marmot Reserve «Streletskyi Steppe» after the Second World War, on March 27, 1948. "Provalskyi steppe" compartment was created on December 22, 1975 on an area of 587.5 ha and attached to Luhansk Reserve. Striltsivskyi Steppe compartment was expanded in 2004 by 501.7 ha. The last compartment of the reserve was the «Tryokhizbenskyi Steppe» created in 2008.

«Striltsivskyi Steppe». Striltsivskyi Steppe is located on the southeastern foothills of the Middle Russian Highland, in the basin of the left tributaries of the Siverskyi Donets river.

The reserve was created to preserve of the *Marmota bobak* population and a typical area of the Pontic herb bunchgrass steppes. There are 695 species of vascular plants, 78 species of green algae, 26 bryophytes, 164 fungi and 28 lichens on the compartment territory. Of them 28 vascular

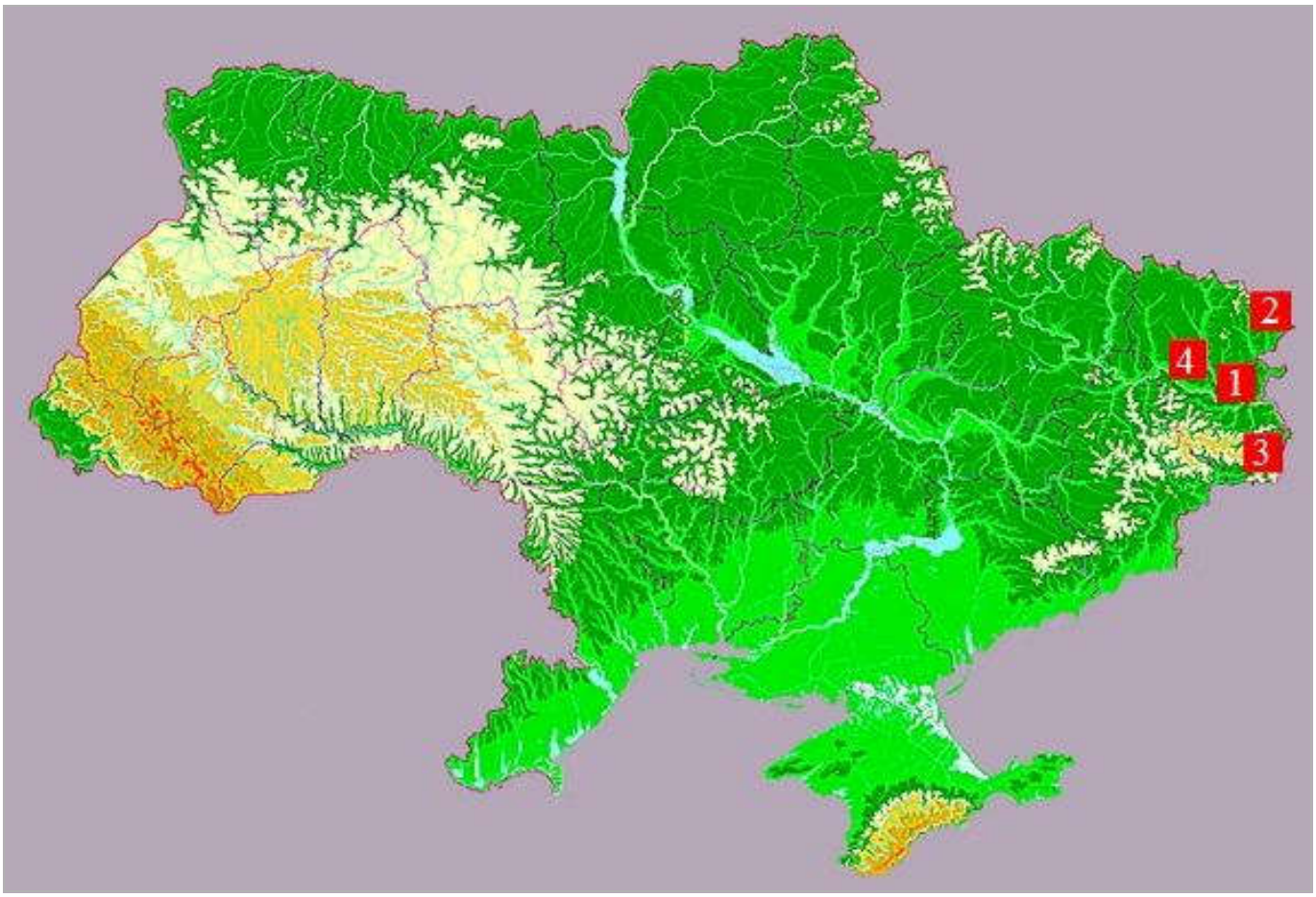

Fig. 1. The department of the Luhansk Nature Reserve on the map of Ukraine. 1 – «Stanychno-Luhanske», 2 – «Striltsivskyi Steppe», 3 – «Provalskyi Steppe», 4 – «Tryokhizbenskyi Steppe».

Fig. 2. «Striltsivskyi Steppe», the aspect of *Stipa tirsa*. Photo: G. Gouz.

plants and 4 fungi species from the Red Data Book of Ukraine (2009) are protected here. The fauna of the Striltsivskyi Steppe reserve contains about 1800 species. There are 1487 species of insects, 298 spiders, 8 amphibians, 7 reptiles, 221 birds and 54 species of mammals. Of them 62 animal species are contained to the Red Book of Ukraine.

«Provalskyi Steppe». This compartment is located near Provallia village of Dovzhanskyi (Sverdlovskyi) district. It consists of two segments – Kalynivska area of 299.61 ha and Grushevska area of 287.89 ha.

The reserve was created to preserve a unique area of stony steppes on the Donetsk ridge. There are 783 vascular plant species in Provalskyi steppe reserve. There are 46 known bryophyte species, 119 algae, 126 lichens, and 157 fungi species. Of them 35 vascular plant species are in the Red Data Book of Ukraine. More than 2000 animal species are registered in the territory of the Provalskyi steppe: 244 spiders species, 1776 insects, 6 amphibians, 8 reptiles, about 200 bird species and 54 species of mammals. Of them 68 animal species from the Red Data Book of Ukraine are protected here.

«Stanychno-Luhanske». Is located on the Siverskyi Donets left bank, near the village of Pishchane, about 8 km from the district center of Stanytsia Luhanska.

The territory of the reserve is a part of the river floodplain and the adjoining part of the sandy terrace. Large lakes provide an open water surface. Increased areas of alluvial sediments are occupied by sandy steppes and shrub communities.

The total number of known vascular plant species is 743, with 131 algae, 392 fungi and 75 lichens. There are 10 vascular plant species from the Red Data Book of Ukraine. The fauna structure includes about 2250 species of invertebrates, 30 fish species, 7 amphibians, 7 reptiles, about 200 species of birds and 57 species of mammals. Of them 71 species are in the Red Data Book of Ukraine.

«Tryokhizbenskyi Steppe». Is located near the Trokhizbenka and Kalaus villages of Novoaydarskyi district. It is within the sandy terrace of the Siverskyi Donets. Vegetation of sands of varying recovery degrees is interspersed with forest, meadow, marsh and psamophytic-steppe plant association. There are about 500 vascular plants species, 167 fungi and 52 lichens. There are 9 species of vascular plants and 2 species of lichens from the Red Data Book of Ukraine.

Fauna of Tryokhizbenskyi steppe consists of representatives of forest, steppe and even desert complexes. Overall, 1188 species of animals have been noted, including 1038 species of invertebrates, 4 species of amphibians, 4 species of reptiles, 116 species of birds, and 26 species of mammals. Of them 28 animal species are included in the Red Data Book of Ukraine.

The central office of the Luhansk Nature Reserve is located in the village Stanytsia Luhanska. Compartment of the reserve «Provalskyi steppe» does not function because it is located within territories not controlled by the Ukrainian government. Two areas – «Stanychno-Luhanske» and «Tryokhizbeskyi steppe» – are on the military line of delimitation and their work is very difficult. Most of their territory are located directly in the war zone and are not available for monitoring purposes.

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Fig. 3. «Tryokhizbenskyi Steppe», the aspect of *Stipa borysthenica*. Photo: V. Moroz.

Recent Publications of our Members

In this section, the contents of which will also be made available via our homepage, we want to facilitate an overview of **grassland-related publications** throughout Eurasia and to improve their accessibility. You are invited to send lists of such papers from the last three years following the format below to Iwona Dembicz, iwodem@op.pl. We will include your e-mail address so that readers can request a pdf. For authors who own full copyright, we can also post a pdf on the EDGG homepage.

Biodiversity

Polchaninova, N., García-Mijangos, I., Berastegi, A., **Dengler, J.** & Biurrun, I. 2018. New data of the spider fauna (Araneae) of Navarre, Spain: results from the 7th EDGG Field Workshop. *Arachnology Letters* 56: 17–23.

Conservation and restoration

Boch, S., Petrik, P. & Schatz, B. 2018. Chapter 3.4.9 – Vascular plants. In: Rounsevell, M., Fischer, M., Torre-Marin Rando, A. & Mader, A. (eds.) *The IPBES regional assessment report on biodiversity and ecosystem services for Europe and Central Asia,* pp. 294–295. Secretariat of the Intergovernamental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, DE.

Boch, S. 2018. Chapter 3.4.10 – Bryophytes. In: Rounsevell, M., Fischer, M., Torre-Marin Rando, A. & Mader, A. (eds.) *The IPBES regional assessment report on biodiversity and ecosystem services for Europe and Central Asia*, pp. 295-296. Secretariat of the Intergovernamental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, DE.

Boch, S. 2018. Chapter 3.4.11 – Lichens. In: Rounsevell, M., Fischer, M., Torre-Marin Rando, A. & Mader, A. (eds.) *The IPBES regional assessment report on biodiversity and ecosystem services for Europe and Central Asia,* pp. 296–297. Secretariat of the Intergovernamental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, DE.

Kozub, Ł., Goldstein, K., Dembicz, I., Wilk, M., Wyszomirski, T. & Kotowski, W. 2018. To mow or not to mow? Plant functional traits help to understand management impact on rich fen vegetation. *Applied Vegetation Science*. DOI: 10.1111/avsc.12411.

Ecology

Bruelheide, H., **Dengler, J.**, Purschke, O., Lenoir, J., Jiménez-Alfaro, B., Hennekens, S.M., Botta-Dukát, Z., Chytrý, M., Field, R., (…) & Jandt, U. 2018. Global trait–environment relationships of plant communities. *Nature Ecology and Evolution* 2: 1906–1917.

Palpurina, S., Chytrý, M., Hölzel, N., Tichý, L., Wagner, V., Horsák, M., Axmanová, I., Hájek, M., Hájková, P., (…) & Dřevojan, P. 2018. The type of nutrient limitation affects the plant species richness–productivity relationship: evidence from dry grasslands across Eurasia. *Journal of Ecology*. DOI:10.1111/1365-2745.13084.

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Forthcoming Events

13th annual meeting of the Specialist Group Macroecology
11-14 March 2019 in Würzburg, Germany
Abstract submission deadline: 15 December 2018
Conference website: https://www.biozentrum.uni-wuerzburg.de/cctb/research/ecosystem-modeling/events/macroecology-2019/

32nd meeting of the GfÖ-Specialist Group Plant Population (PopBio)
23–25 May 2019 in Warsaw, Poland

XXI European Congress of Lepidopterology
3–7 June 2019 at the University of Molise, Campobasso, Italy
Early registration deadline: March 15, 2019, abstract submission deadline: April 15, 2019.
Conference website: http://www.sel2019conference.com/

12th EDGG Field Workshop: Inneralpine dry valleys of Switzerland
11–19 May 2019, Switzerland
see details in *Palaearctic Grasslands* 38, pp. 10-11

16th Eurasian Grassland Conference (EGC)
29 May – 5 June 2019 in Graz, Austria and Maribor, Slovenia
Early registration deadline: March 1, 2019, abstract submission deadline: March 22, 2019
see details in *Palaearctic Grasslands* 40, pp. 11-21
Conference website: https://edgg.org/egc2019

13th EDGG Field Workshop: Grasslands of Armenia along the elevational gradient
26 June –7 July 2019, Armenia
see details in *Palaearctic Grasslands* 38, pp. 10-11

10th International Association for Landscape Ecology (IALE) World Congress
1-5 July 2019 in Milan, Italy
Conference website: http://www.iale2019.unimib.it/

62nd Annual Symposium of International Association for Vegetation Science (IAVS)
14–19 July 2019 in Bremen, Germany
Conference website: http://iavs.org/2019-Annual-Symposium/Home.aspx

SCB's 29th International Congress for Conservation Biology (ICCB 2019)
21–25 July 2019 in Kuala Lumpur, Malaysia
Conference website: https://conbio.org/mini-sites/iccb-2019/

28th Workshop of Vegetation European Survey (EVS)
2–6 September 2019 in Madrid, Spain

20th European Congress of Herpetology
2–6 September 2019 in Milan, Italy
Conference website: http://seh-congress-2019.unipv.it/

49th Annual Meeting of the Ecological Society of Germany, Austria and Switzerland (GfÖ)
9–13 September 2019 in Münster, Germany
Conference website: https://www.gfoe-conference.de/

8th World Conference on Ecological Restoration
22–27 September 2019 in Cape Town, South Africa
Conference website: https://ser2019.org/

"Lost world" in biodiversity studies: focus at the Earth's blank spaces
23–27 September 2019, Vladivostok, Russia
Conference website: http://www.geobotanica.ru/symposium_2019

World Conference of the Ecosystem Service Partnership
21–25 October 2019 in Hannover, Germany, with UFZ/iDiv as co-organisers
Conference website: https://www.espconference.org/esp10

***Syntrichia ruralis* var. *ruraliformis*. Photo: J. Dengler.**

EDGG on the web:
http://www.edgg.org

EDGG in Facebook:
https://www.facebook.com/groups/938367279561202

EDGG on the ResearchGate
https://www.researchgate.net/project/EDGG-Eurasian-DryGrassland-Group

The Eurasian Dry Grassland Group (EDGG), founded in 2008, is a working group of the International Association for Vegetation Science (IAVS) and member of the European Forum on Nature Conservation and Pastoralism (EFNCP). On **5** February 2019, it had 1337 members from 67 countries.

The **Eurasian Dry Grassland Group (EDGG)** is a network of researchers and conservationists interested in any type of Palaearctic natural and semi-natural grasslands. It is an official subgroup of IAVS (http://www.iavs.org) but one can join our group without being an IAVS member. We live from the activities of our members. Everybody can join the EDGG without any fee or other obligation.

The EDGG covers all aspects related to grasslands, in particular: plants - animals - fungi - microbia - soils - taxonomy - phylogeography - ecophysiology - population biology - species' interactions - vegetation ecology - syntaxonomy - landscape ecology - biodiversity - land use history - agriculture - nature conservation - restoration - environmental legislation - environmental education.

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***Stipa capillata*. Photo: J. Dengler.**