



Content

Editorial	1
Eurasian Dry Grassland Group	2
Elections for EDGG EC: Call for nominations	3
Third call EGC 2017	4-13
Invitation to contribute to the vegetation-plot databases of EDGG	14-18
<i>Acic et al.</i> : Biodiversity patterns of dry grasslands at the meeting point of Central Europe and the Balkans: Impressions and first results from the 9th EDGG Field Workshop in Serbia	19-31
<i>Tokarsky & Tokarskaya</i> : Review of current state, threats and necessity of conservation of the original flora and fauna of East Ukraine steppes	32-37
<i>Vasyliuk</i> : Chronicles of the protection of Tarutynsk'kyj Steppe	38-41
Short contributions	42-43
Book reviews	44-45
Recent publications of our members	46
Forthcoming events	47

Dear members of the Eurasian Dry Grassland Group,

We are pleased to present the new issue of the EDGG Bulletin, which comes with several important official announcements, such as the third call for the 14th Eurasian Grassland Conference, to be held in Latvia and Western Lithuania, with extended registration deadlines. We also include a report about the GrassPlot database, with an invitation to join its Consortium, as well as short reports and invitations to join other EDGG-affiliated vegetation-plot databases. Last but not least, this issue also contains a call for nominations for the elections to the EDGG Executive Committee 2017-2019, with deadline on 15 May 2017. We encourage all of you to participate actively in this election, and to consider nominating yourselves or others as candidates for the election .

This issue also includes a report on the 9th EDGG Field Workshop in Serbia, and two forum papers dealing with different conservation aspects of Ukrainian steppes.

We encourage all of you again to send us your grassland-related papers to be included in the section devoted to recent publications of our members. And finally, we would like to take the opportunity again to emphasize that the Bulletin welcomes submissions of scientific articles (in the form of Research papers, Forum papers, Reviews or Reports).

We hope that reading the Bulletin will inspire you to new ideas and discoveries that, in turn, will find their place on the pages of future issues.

Anna Kuzemko, Idoia Biurrun & the Editorial Board

At the top:

Natural habitat of Hyacinthella pallasiana near Volnukhine village, Lutuhine district, Lugask region, Ukraine. Photo: M. Peregrym.

Eurasian Dry Grassland Group (EDGG)

The basic aims of the EDGG are:

- to compile and to distribute information on research and conservation of natural and semi-natural grasslands beyond national borders;
- to stimulate active cooperation among grassland scientists (exchanging data, common data standards, joint projects).

To achieve its aims, the EDGG provides seven instruments for the exchange of information among grassland researchers and conservationists:

- **the Bulletin of the EDGG** (published quarterly);
- **the EDGG homepage** (www.edgg.org);
- e-mails via our **mailing list** on urgent issues;
- **the Eurasian Grassland Conference** - organized annually at different locations throughout the Palaeartic Realm;
- **EDGG research expeditions and field workshops** to sample baseline data of under-represented regions of the Palaeartic Realm;
- **EDGG vegetation databases**;
- **Special Features** on grassland-related topics in various peer-reviewed journals.

The **Eurasian Dry Grassland Group (EDGG)** is a network of researchers and conservationists interested in any type of Palaeartic 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.

To become a member of the Eurasian Dry Grassland Group or its subordinate units, please send an e-mail to Idoia Biurrun, including your name and complete address, and specify any of the groups you wish to join. More detailed information can be found at:

http://www.edgg.org/about_us.htm

As of 30th April 2017, the EDGG had 1184 members from 67 countries. While we are well-represented in most European countries, though with some few European countries still underrepresented, the extra-European part of the Palaeartic realm (which according to our Bylaws is included in the geographic scope of the EDGG!) is still grossly underrepresented.

EDGG Subgroups

The members are automatically included in the regional subgroup of the region in which they reside. If you additionally wish to join the Topical Subgroup on Grassland Conservation and Restoration, just send an e-mail to the Membership Administrator (idoia.biurrun@ehu.es or Stephen.Venn@Helsinki.Fi).

Arbeitsgruppe Trockenrasen (Germany) (contact: Thomas Becker - beckerth@uni-trier.de), Ute Jandt - jandt@botanik.uni-halle.de: 250 members

Working Group on Dry Grasslands in the Nordic and Baltic Region (contact: Jürgen Dengler -

juergen.dengler@uni-bayreuth.de): 102 members

South-East European Dry Grasslands (SEEDGG) (contact: Iva Apostolova - iva@bio.bas.bg): 306 members

Mediterranean Dry Grasslands (Med-DG) (contact: Michael Vrahnakis - mvrahnak@teilar.gr): 325 members

Topical Subgroup Grassland Conservation and Restoration (contact: Péter Török - molinia@gmail.com): 72 members

EDGG Executive Committee and responsibilities of its members

Didem Ambarlı: Editor-in-Chief of homepage, Deputy Conferences Coordinator, didem.ambarli@gmail.com

Idoia Biurrun: Membership Administrator, Deputy Editor-in-Chief of Bulletin, Deputy Field Workshop Coordinator, Deputy IAVS Representative, Deputy Editor-in-Chief of homepage, idoia.biurrun@ehu.es

Jürgen Dengler: Coordinator for Special Features; Field Workshop Coordinator, juergen.dengler@uni-bayreuth.de

Monika Janišová: Deputy Editor-in-Chief of the EDGG Bulletin; monika.janisova@gmail.com

Anna Kuzemko: Editor-in-Chief of Bulletin, Book Review Editor, Facebook Group Administrator, anyameadow.ak@gmail.com

Péter Török: IAVS Representative, Contact Officer to other organisations, Deputy Coordinator of Species Features, Deputy Secretary-General, Deputy Book Review Editor, molinia@gmail.com

Stephen Venn: Secretary-General, Deputy Membership Administrator, Deputy Policy Officer, Deputy Facebook Group Administrator, Stephen.Venn@Helsinki.Fi

Michael Vrahnakis: Conferences Coordinator, Policy Officer, Deputy Contact Officer to other organizations, mvrahnak@teilar.gr

Announcement

Elections to the EDGG Executive Committee 2017-2019

Call for nominations

Dear fellow members of the EDGG,

The two-year term of the current Executive Committee is almost complete, which means that there is once again an opportunity for you as members to influence the way the EDGG is run. The size of the committee is set at seven by our Bylaws but can be more in the case of a tie. We would like to increase the number of representatives of taxa (e.g. animals) that are currently underrepresented, though we are also glad to receive nominations from anyone interested in participating in the work of the Executive Committee. As we represent the whole Palaearctic region and any type of grassland, we would also be keen to have better representation from Asia.

We invite you, the EDGG members, to nominate one or several candidates from the EDGG membership, whom you would like to see being involved in the EDGG Governance over the next two years. Self-nominations are not only acceptable but even encouraged. The workload is not great, so if you feel that you could bring something new to the committee in terms of visions for the development of the organization, new skills or expertise, or simply wish to be more involved and share some of the responsibilities, then we encourage you to consider standing in the forthcoming election.

The **deadline for nominations is midnight CET on Tuesday 15th May 2017**, by which time nominations should be submitted to the EDGG Secretary General, preferably by e-mail. So please feel encouraged to submit your nominations of potential candidates for election to the Executive Committee of the EDGG. Self-nominations should already include a short biosketch of 100-150 words, including current affiliations/positions, research activities and relevant interests, any previous activities in the EDGG, as well as plans/visions for what you would like to do if elected (responsibilities,

new EDGG activities). The nomination should also include the consent of the candidate to take up the post if elected and preferably also include a recent photograph of the candidate. For reference, please look at the biosketches of the current chairs on our web page: http://www.edgg.org/about_us.htm. Please send the material to the Secretary General, Stephen Venn (stephen.venn@helsinki.fi), Department of Environmental Sciences, P.O. Box. 65 (Viikinkaari 2a), 00014 University of Helsinki, FINLAND, before the deadline of **15th May**. For nominees that have been nominated by others, please provide contact details, for use in communication regarding the election.

The election period will extend for three weeks, from approximately **1st –14th June 2017**. During the election period, EDGG members will be invited to vote for up to seven candidates and the seven candidates with the highest numbers of votes will be elected. The results will be officially announced at the General Assembly of the EDGG, to be held in Riga, Latvia on 8th July 2017, though elected candidates will be informed immediately after the closure of the election, to permit arrangements for them to attend the GA. The election will be conducted by means of an electronic ballot. The link to the ballot form and information on how to participate will be provided via the EDGG web site at <http://www.edgg.org/> and through a general mailing.

The procedure for the elections is described in our Bylaws. Please note that the term of duty of the EC will commence immediately after the election and continue until the General Assembly of our meeting in 2019.

The Executive Committee of the EDGG

DOI: 10.21570/EDGG.Bull.34.04-13

Announcement

EGC 2017

14th Eurasian Grassland Conference

in Riga, Latvia and Western Lithuania, 4-11 July 2017

Semi-natural grasslands across borders

Third Call



This is the 14th annual conference of the EDGG, the organization which aims to promote exchange and collaboration between those interested in all aspects of semi-natural and natural grassland research and conservation across the Palaearctic realm. The conference is intended to present the latest research, and to link this to practical management and policy contributing to the sustainability of semi-natural and natural grasslands. Emphasis will be placed on cases in which grassland ecosystems are shared between man-made and natural geographical borders. The conference will include the following sessions:

- Ecological, biogeographical and phytosociological boundaries
- Grasslands on borders: environmental and agricultural policies
- Overcoming the marginality of semi-natural grasslands in agricultural landscapes
- Networking and best practices for grassland conservation

All other topics related to semi-natural and natural grasslands are also welcome. 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. In addition to two session days, there will be four optional events: a preconference workshop on R program for beginners and three excursions before, during and after the conference.

We invite you to register and submit abstracts for talks and poster via the website www.edgg.org/conference_2017.html.

Registration deadline **Extended to 10 May 2017**

Important dates

Early Bird registration deadline **extended to 30 April**

Late registration deadline **extended to 10 May**

Abstract submission deadline **extended to 10 May** (travel grant applicants to 30 April)

Travel grant application deadline **extended to 30 April**

Information about travel grants – 15 May

Acceptance of abstracts

and type of presentation – 20 May

Preliminary Programme

4-5 July	Pre-conference excursion (optional, max. 40 participants)
4 July 08:00	Departure from Riga to Eastern Latvia (The Daugava River Valley)
5 July 21:00	Return to Riga
5 July	Technical workshops (optional, max. 17 participants, min. 5 participants) University of Latvia, 1 Jelgavas Street, Riga (participation only in the first day of pre-conference excursion and early return to Riga on 5 th July will be possible)
09:00-13:00	Introduction to R for statistical analysis
14:00-18:00	Introduction to ggplot2 graphical system (program R)
6 July	Talks and Posters – Sessions I and II (University of Latvia, 1 Jelgavas Street, Riga)
08:30-09:30	Registration
09:30	Opening ceremony
09:45	Invited speaker (keynote lecture)
10:45-18:30	Talks and posters
7 July	Mid-conference excursion
08:00	Departure from Riga to Western Latvia (Sabile town, The Abava River Valley) - Grassland party in Sabile
22:00	Return to Riga
8 July	Talks and posters – Sessions III and IV (University of Latvia, 1 Jelgavas Street, Riga)
09:00-10:00	Invited speaker (keynote lecture)
10:00-18:30	Talks and posters
19:00-21:00	EDGG General Assembly
9-11 July	Post-conference excursion (optional, max. 40 participants)
9 July 08:00	Departure from Riga to Lithuania (Curonian Spit)
10 July	Excursion at Nemunas Delta
11 July 08:00	Departure to Riga (arrival at the Riga Airport at approx. 12:30)



Fig. 1. *Koelerion glaucae* vegetation on the terrace slope of the Daugava River valley. Photo: S. Rusina.

Fees and Registration

	Early Bird registration – until 30 April 2017	Late registration – from 1st May 2017
Student IAVS members *	110 €	140 €
Students (including PhD students) who are not IAVS members *	120 €	150 €
Other IAVS members *	140 €	170 €
Non-students and non-IAVS members	150 €	180 €

* Please submit evidence of IAVS membership and/or your enrolment at a University by emailing confirmation of matriculation to lauma.gustina@lu.lv

Basic registration fee provides full participation in the conference including registration and conference materials, admission to the conference, lunch and coffee breaks on Thursday, 6th July, and Saturday 8th July.

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

- Participation in the workshop Introduction to R for statistical analysis (half day, limited to 17 people) — **30 €**
- Participation in the workshop Introduction to ggplot2 graphical system (program R) (half day, limited to 17 people) — **30 €**
- Mid-conference excursion to the Abava River Valley incl. Grassland Party — **50 €**

- Pre-conference field trip to the Daugava River Valley, including accommodation, lunch, dinner and refreshments—**110 €**
- Post-conference field trip to the Curonian Spit and the Nemunas Delta in Lithuania including accommodation, lunch, dinner and refreshments—**180 €**.

Cancellation and repayment:

- 100% - for cancellations until 1st of May,
- 80% - for cancellations until 1st of June,
- no refund for cancellations after 1st of June,
- Unfortunately we must charge 25 Euro in case of refund to cover the bank commission fee.

Payments should be made by bank transfer by **20 May** at the latest for early bird registration and by **10 June** 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 EDGG bulletins. Travel grants can be applied for during registration until **30 April**, including a short motivation letter. Applicants for IAVS travel grants must be IAVS members for the year 2017. Information about travel grants will be given at the latest by **15 May**.

Field excursions

The Eastern Baltics lie in the mixed broad-leaved and coniferous forest zone and are divided between two phytogeographical provinces: the western regions belonging to the Central European, and the eastern to the East European province. The Baltic botanists L. Laasimer and A. Rasins have argued for the establishment of an independent Baltic province. A substantial oceanicity belt crosses the eastern coast of the Baltic Sea, and continentality rises rather quickly to the east in this area. Three excursions will be offered to the participants (Fig. 2).

Practical advice

In Latvia, July is the warmest month of the year. The average air temperature is around +19°C, with exceptional temperatures as low as 7°C and as high as 32°C having been recorded in previous years. The weather can be quite variable during the day from heavy rain to sunshine. The average amount of rain recorded during July in Latvia is 10 mm and you would typically have 16 rainy days. Rainwear is recommended for the excursions. Please take care of your health insurance during the conference. Be aware that ticks occur in areas we will visit. There is a risk of tick-borne encephalitis and Lyme disease throughout the country. Travellers should avoid tick bites by wearing long sleeves and pants, preferably tucked-in. Use insect repellent on exposed skin, socks and outer clothing. Travellers should check their skin regularly for ticks and remove them as early as possible. The organizers will bring tick removers. There are also tick-borne encephalitis vaccines. Consult a physician at least five months in advance before traveling, because the usual schedule is to have three injections of vaccine. Please note that these vaccines do not protect against all tick-borne infections.

Pre-conference excursion (optional, max. 40 participants)

We will see the Eastern Baltic semi-natural grasslands of the Daugava River Valley. Plant communities include the classes *Koelerio-Corynephoretea* (*Koelerion glaucae*), *Festuco-Brometea* (*Filipendulo-Helictotrichion*), *Molinio-Arrhenatheretea* (*Calthion*, *Arrhenatherion*, *Cynosurion*), and hygrophylous tall herb communities of the *Galio-Urticetea* along the river banks. Rare plant species include *Centaurea rhenana*, *Dianthus arenarius* subsp. *borussicus*, *Helichrysum arenarium*, *Gentiana cruciata*, *Jovibarba globifera*, *Allium schoenoprasum*, etc.

We will visit several sites including a recently restored site which was overgrown by pines. The second day will be devoted to the Dviete River Valley (tributary of the Daugava) with extensive floodplain grasslands (*Calthion*, *Magnocari-cion*) grazed by semi-wild horses (Figs. 9-10) and supporting the rare species *Iris sibirica*, *Gladiolus imbricatus*, *Viola persicifolia* and *Cnidium dubium*. The area near Daugavpils town is also known as an important cultural center for the Orthodox Old-Believers of Eastern Latvia. Old-believers separated from the official Russian Orthodox Church after 1666, as a protest against church reforms introduced by Patriarch Nikon of Moscow in the mid-17th century. Participants will have the opportunity to visit the Naujene local history museum's outdoor branch – Old-believer's house (Fig. 6). Accommodation will be at a camping site situated near the Daugava River in a dry grassland area in cottages, each with four beds (Figs. 11-14). Basic common shower and toilet facilities are available (note, that no private bathrooms are available). For those who would like to participate also in one or both of the R program workshops, participation only in the first day of the excursion will be possible, with an early return to Riga on 5th July.

Mid conference excursion

The Abava River Valley is a pearl of dry calcareous grassland diversity in Latvia. Plant communities include the classes *Koelerio-Corynephoretea* (*Plantagini-Festucion*), *Festuco-Brometea* (*Filipendulo-Helictotrichion*), and *Juniperus communis* stands on calcareous grasslands (Figs. 15–16 and 27). We



Fig. 2. Map of Lithuania and Latvia with indication of the itineraries of the excursions.



Fig. 3. Restoration of dry semi-natural grassland near Old-Believers' village "Slutiški". Photo: S. Rusina.



Fig. 4. Xerophytic grassland with *Koeleria glauca* and high lichen diversity. Photo: S. Rusina.

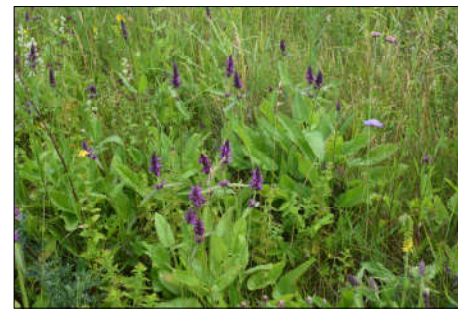


Fig. 5. Semi-dry *Filipendulo-Helictotrichion* grasslands with *Stachys officinalis*. Photo: S. Rusina.



Fig. 6. Old-Believers' village "Slutiški". Photo: S. Rusina.



Fig. 7 and 8. Dry grasslands near the Old-Believers' village "Slutiški". Photos: S. Rusina.

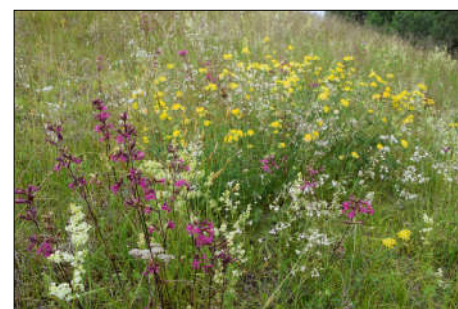


Fig. 9 and 10. The Dviete floodplain grasslands. Photos: S. Rusina.

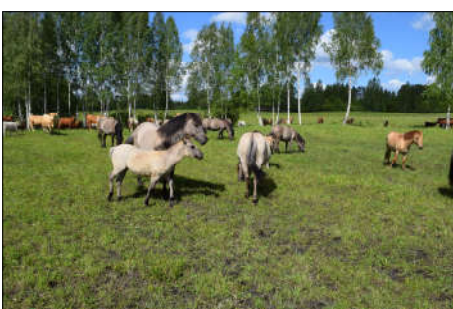


Fig. 11. Camping site. Photos: www.piedaugavas.lv



Fig. 12-14. Camping site. Photos: www.piedaugavas.lv

will also see broad-leaved forests (*Querco-Fagetea*) and calcareous fens (*Caricion davallianae*). Rare plant species include the dry grassland species *Astragalus danicus*, *Carex ornithopoda*, *Gymnadenia conopsea*, *Viola collina*, *Sesleria caerulea*, and the fen species *Carex davalliana*, *Schoenus ferrugineus*, *Pinguicula vulgaris*, *Primula farinosa* and *Crepis praemorsa*.

The *grassland* party of the EDGG will take place in the traditional town of Sabile, late in the evening.

Post-conference excursion - Lithuania (optional, max. 40 participants)

Two sites will be visited in Lithuania – the Curonian Spit and the Nemunas River Valley.

For those who would like to participate in the post-conference excursion, personal data will be required after registration, because a visit to the EU borderland with the Russian Federation is included. While staying in the border-



Fig. 15. *Juniperus communis* stand in semi-dry grassland of *Filipendulo-Helictotrichion*. Photo: S. Rusina.



Fig. 16. The Abava River Valley. Photo: S. Rusina.



Fig. 17. Complex of shifting and grey dunes. Photo: V. Rašomavičius.



Fig. 18. The Curonian Spit. Photo: <http://whc.unesco.org/en/list/994>

land, participants should have a valid passport and visa (if applicable) with them.

The Curonian Spit is a unique and vulnerable sandy and wooded cultural landscape on a coastal spit, which features small Curonian lagoon settlements. The sand dune peninsula, 98 km long and 0.4-4 km wide, shared by Lithuania and the Russian Federation, is included in the UNESCO World Heritage List (2000). The diversity of the coastal sand vegetation (*Ammophiletea*, *Koelerio-Corynephoretea*) include sandy beaches, coastal foredune ridge, sea sand plain/palve, and the Great Dune Ridge, with shifting and fixed dunes and populations of *Linaria loeselii* – an endemic species to the eastern Baltic coast (Figs. 17-18).

Nemunas is the largest Lithuanian river. It is noted for spectacular floods during the spring thaw. The flooded area on the right bank can stretch for up to 300 km². Meadows and pastures, annually fertilized with alluvium, along with a variety of wetlands, comprise the dominant vegetation type in the region. The delta is internationally important as a resting and feeding place for migratory birds, also as a habitat of the

Aquatic warbler (*Acrocephalus paludicola*) – a globally endangered bird species. The diversity of the floodplain vegetation includes swamp and fen vegetation (*Phragmito-Magnocaricetea*), managed grasslands of different floodplain ecological belts (*Molinio-Arrhenatheretea*, *Festuco-Brometea*) and dry grasslands of riverine dunes (*Koelerio-Corynephoretea*) (Figs. 19-20).

Keynote Lectures

14th EGC is pleased to welcome two keynote speakers.

Dr. Irina Herzon, University of Helsinki

In Hands of Farmers and Society: Fate of the Semi-Natural Grasslands in the Boreal Region

The plight of semi-natural grasslands in the EU is well documented. In the boreal regions, these habitat types are particularly vulnerable to rapid overgrowing and thus their continuous survival is entirely in the hands of land managers. Markets, policy, wider societal changes and culture have a decisive role in the use of biological resources within agricultural landscapes. Here, I summarize the established impacts



Fig. 19. Flooded area of the Nemunas Delta. Photo: V. Rašomavičius.



Fig. 20. Wetland of the Nemunas Delta. Photo: V. Rašomavičius.

of EU policy on semi-natural grasslands. I will proceed with an overview of the most recent policy developments of relevance, including the reform of the Common Agricultural Policy in 2013 with its “greening” elements, and discuss if we can expect it to contribute to conservation. We will then look at the evidence behind the pros and cons of the key strategies for grassland conservation: the preservation strategy, highlighting public values of the grasslands outside their production value, and transformation strategy that aims at strengthening and rediscovering the economic potential of semi-natural grasslands. I will illustrate these with some implementation examples from the boreal region. Finally, I will outline tentative directions for future research in grassland conservation and policy.

About the Keynote Speaker



Irina Herzon is an adjunct professor at the Department of Agricultural Sciences at the University of Helsinki. Her research focus is in applied ecology, with an emphasis on conservation in farmland as a multidisciplinary issue. Her aspiration as a teacher is to make conservation of biological resources part of the mainstream agricultural education. Outside academia, Dr. Herzon volunteers as an advisor to BirdLife Finland on agriculture and has been involved in developing

and evaluating Finnish agro-environmental policy. She serves on the Board of the European Forum on Nature Conservation and Pastoralism. Since 2011, her family co-owns a large organic farm, which is the largest manager of coastal meadows in the region and is active in awareness raising.

Dr. Aveliina Helm, University of Tartu

Semi-natural grasslands in Estonia: importance, ecology and conservation efforts

Semi-natural grasslands are the most diverse ecosystems in Europe, harbouring a large number of plant species and associated animal species. Grassland biodiversity is linked with the provision of a number of ecosystem services in agricultural landscapes, including pollination and biological pest control. During the past century, these unique, highly-valued habitats have undergone remarkable changes in environmental conditions and their landscape-scale spatial configuration throughout Europe. In Estonia, semi-natural grasslands have been lost from 90% of their historical area. Decreased habitat area and reduced connectivity between the remaining grassland patches, have substantial influence on the persistence of grassland-specific biodiversity and related ecosystem services. In my talk, I will provide an overview of the multi-trophic diversity of dry calcareous grassland ecosystems in Estonia and analyse the effects of habitat loss and isolation on the diversity and composition of several species groups, including agriculturally important pollinators, predators and parasitoid insects. I'll discuss the delayed responses of species diversity to changes in habitat spatial configuration, explore the susceptibility of species with different life-history traits and habitat specificity to landscape changes, and analyse the effect of dispersal on maintaining and restoring grassland biodiversity.

In Estonia, mitigation measures against grassland loss include subsidized habitat management schemes and support for habitat restoration. In 2014, an ambitious grassland restoration project “LIFE to Alvars” was launched in Estonia, with the help of EC LIFE+ Nature programme and the Estonian state. The project aims to restore 2500 hectares of overgrown calcareous alvar grasslands by 2019. I'll provide an overview of the activities carried out during the project and discuss the possible effects of landscape-scale restoration activities in

maintaining the grassland species diversity and related ecosystem services.

About the Keynote Speaker

Dr. Aveliina Helm is a senior researcher at the Institute of Ecology and Earth Sciences, University of Tartu, Estonia. She has studied the development and maintenance of the species diversity of dry calcareous grasslands habitats in Europe, especially focusing on landscape-scale patterns and the existence of time-lags in species responses to habitat changes. Aveliina Helm is a scientific advisor to the large-scale grassland restoration project "LIFE to Alvars", through which 2500 hectares of dry calcareous alvar grasslands will be restored in Estonia by 2019.



Workshops

Introduction to R for statistical analysis (5 July, 9:00-13:00) (max. 17 participants, min. 5 participants)

The workshop is devoted to scientists and practitioners with no or minimal knowledge of the program (language) R, who want to learn how to use the program and how to do basic statistical analyses in R. The workshop will consist of an introduction to R and IDE program RStudio, then codes for basic statistical tests will be shown (sample comparisons, correlation and regression analysis, ANOVA, glm). Participants will be given practical tasks to check progress during the workshop.

Introduction to the ggplot2 graphical system (program R) (5 July, 14:00-18:00) (max. 17 participants, min. 5 participants)

ggplot2 is one of the graphical systems available in the program R for making high quality graphics. ggplot2 graphics are made layer by layer, providing users with possibilities to get different combinations of data representations and to customize the final look. Nowadays there are lot of implementations of the ggplot2 system for representation of the results of different fields/analyses, for example, clustering, ordination, etc. The workshop will give an introduction to ggplot2 graphics – how to build your first plot, how to modify the data representation and how to modify the final look of your plot to get the desired results. Participants should have some prior knowledge of R and advisable also IDE program RStudio.

About the Tutor

Didzis Elferts obtained his PhD in ecology (dendroecology) from the University of Latvia and he is an associate professor of biometry and head of the Botany and Ecology Department at the Faculty of Biology of the University of Latvia. His main scientific interests are dendroclimatology and dendroecology, and he is co-author of many scientific publications in different fields, involved as author responsible for data analysis and graphical representation. Didzis Elferts is a passionate user of the program R with almost 10 years' experience.



Venue and Accommodation

Conference Venue

The conference will be held at the Academic Centre for Natural Sciences of the University of Latvia (Fig. 21-25) situated in the heart of Riga - the capital of Latvia, with about 700 000 inhabitants (Fig. 26). A heritage of 800 year old Gothic churches, built by the founders of Riga, medieval buildings in the Old Town, exquisite Art Nouveau, as well as wooden buildings, make Riga a true pearl of architecture.

Accommodation

Accommodation should be booked independently by each participant (except for student dormitories, see next section). The hotels in Riga are expected to be very busy over the con-

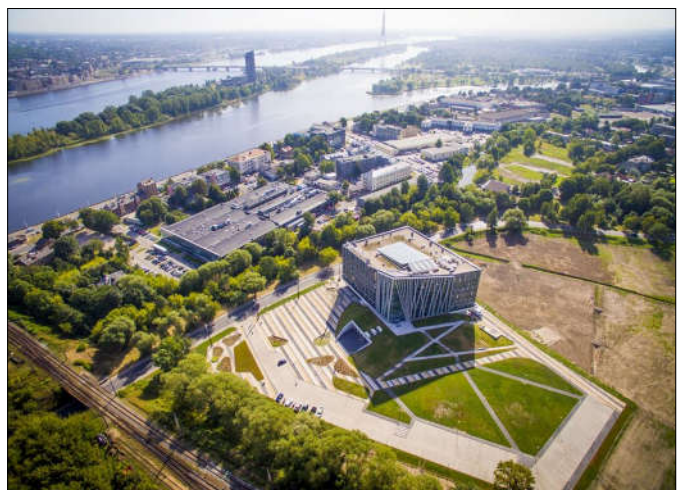


Fig. 21. Conference venue in Riga. Photo: Toms Grīnbergs, Media and Marketing Centre of the University of Latvia http://foto.lu.lv/arhivs/2016/i_sep/



Fig. 22-25. Conference venue in Riga. Photo: Toms Grinbergs, Media and Marketing Centre of the University of Latvia http://foto.lu.lv/arhivs/2016/i_sep/



Fig. 26. Location of the conference venue in Riga.

ference dates. **The organizers therefore strongly recommend that you make your hotel reservation as early as possible to secure your room.**

<http://www.latvia.travel/en/page/accommodation>

Accommodation is not included in the basic registration fee, but we have reserved a limited number of rooms at student dormitories for economy travelers. This option can be selected during the registration process and added to your invoice. Student dormitories offer triple rooms for 7 EUR/person per night. Basic kitchen equipment (stove, microwaves, fridges) and dining-room on each floor's household area (no pans, pots, dishes included) is available, shared shower/WC for all tenants of each floor, NO breakfast included. Direct public transport connects dormitories and the conference venue. This option is possible only for the whole stay period (payment should be done also for nights, so you will not stay in a dormitory (e.g. pre-conference excursion).

Traveling

Riga is well connected both by plane <http://www.riga-airport.com/en> and buses <http://www.autoosta.lv/?lang=en>. Traveling from Riga's airport to the city center takes 30 mins by public transport <https://www.rigassatiksm.lv/en/>.

Visas

In case you need an invitation, please contact Lauma Gustina (lauma.gustina@lu.lv). For those who would like to participate in the post-conference excursion, personal data will be asked by organizers, because a visit to the EU borderland with the Russian Federation is included in the itinerary.

Useful information

Travelling to Latvia, visas, customs procedures: <http://www.pmlp.gov.lv/en/>; <http://www.latvia.travel/en/article/travelling-latvia-visas-customs-procedures>

Tourist information: <http://www.latvia.travel/en/article/discover-latvia>; <http://www.latvia.travel/en/city/riga-8>

Organizers

- The Eurasian Dry Grassland Group (EDGG) (www.edgg.org) was established in August 2008 as the European Dry Grassland Group. Recently it expanded its ecological and geographical scope to cover all types of natural and semi-natural grasslands of the whole Palaearctic realm. The EDGG is an official working group of the International Association for Vegetation Science (IAVS, www.iavs.org). Its basic aims are to compile and to distribute information on research and conservation of natural and semi-natural grasslands beyond national borders, and to stimulate active cooperation between scientists, practitioners and all who work with or are interested in grasslands.

- The University of Latvia (<http://www.lu.lv/eng/>) has 15,000 students, 13 faculties and more than 20 research institutes. The University offers more than 130 state-accredited academic and professional study programmes. Research is conducted in over 50 scientific fields, which represent four main areas of inquiry: the humanities, sciences, social sciences and education sciences. The University pays great attention to the development of international collaboration. At present the University of Latvia has signed more than 500 agreements with 326 institutions in 31 European countries within the ERASMUS programme.

- The Latvian Botanical society's (LBS, <http://botanika.daba.lv>) roots go back as far as 1952, but as an NGO, it was officially registered in 1994. The LBS unites most active botanists from different generations and nowadays the society has 130 members. The LBS has taken an active part in the organization of field trips - excursions of the Baltic botanists that took place in Lithuania, Latvia and Estonia. Annually, the LBS arranges excursions and meetings where the most important botanical findings are presented. Every year the LBS votes for the *plant of the year*, which is one of nature's symbols, for which botanists would like to attract public attention to the protection status and/or distribution. It could be a very rare plant but sometimes a common species with interesting ecology. The LBS also implements plant species monitoring, especially for species of EU importance.

- The Nature Research Centre, Lithuania (NRC), was established in 2009 by merging the Institute of Botany and the Institute of Ecology of Vilnius University and the Institute of Geology and Geography. The NRC pursues and coordinates long-term scientific research in various fields of biotic and abiotic nature and ensures the competence of Lithuania on the international stage. The NRC takes an active role in the development and implementation of a conceptual framework for the protection of the living environment and its sustainable development. (http://www.gamtostyrimai.lt/en/about_us/information_about_the_research_centre)

Supporters

- International Association for Vegetation Science (IAVS, www.iavs.org): its original precursor was the International Phytosociological Society (IPS), which was founded in 1939. IAVS is a worldwide union of scientists and others interested in theoretical and practical studies of all aspects of vegetation. The main goals of the IAVS are to facilitate personal contacts among vegetation scientists all over the world and to promote research in all aspects of vegetation science and its applications.
- John Wiley & Sons, Inc. (<http://eu.wiley.com/WileyCDA/>) was founded in 1807. It aspires to be a valued and respected provider of products and services that make im-

portant contributions to advances in knowledge and understanding, a role that is essential to progress in a healthy and prosperous society. Wiley's mission is to provide must-have content and services to professionals, scientists, educators, students, lifelong learners, and consumers worldwide.

Contacts

Contact persons

Solvita Rūsiņa / University of Latvia, coordinator, rusina@lu.lv

Mike Vrahnakis / EDGG Executive Committee, EGC coordinator, mvrahnak@teilar.gr

Didem Ambarli / EDGG Executive Committee, EGC coordinator, didem.ambarli@gmail.com

Local Organising Committee

Solvita Rūsiņa / University of Latvia, rusina@lu.lv

Valerijus Rašomavičius / Nature Research Centre, Lithuania, valerijus.rasomavicius@botanika.lt

Lauma Gustiņa / University of Latvia, lauma.gustina@lu.lv

Rūta Sniedze-Kretalova / Latvian Botanical Society, ruta.sniedze@ldf.lv

Inese Silamiķele / University of Latvia, inese.silamikele@lu.lv

Domas Uogintas / Nature Research Centre, Lithuania, domas.uogintas@botanika.lt

Registration, invitations etc.

Lauma Gustiņa / University of Latvia, lauma.gustina@lu.lv

Pre-conference excursion

Solvita Rūsiņa / University of Latvia, coordinator, rusina@lu.lv

Post-conference excursion

Valerijus Rašomavičius / Nature Research Centre, Lithuania, valerijus.rasomavicius@botanika.lt



Fig. 27. Dry calcareous grassland (habitat type 6210) in the Abava River Valley. Photo: S. Rusina.

Invitation to contribute to the vegetation-plot databases of EDGG



GrassPlot — the new EDGG database of high-quality grassland plot observations from the whole Palaeartic

The **Database of Scale-Dependent Phytodiversity Patterns in Palaeartic Grasslands (GrassPlot)** was established on 10 March 2017 in Bayreuth during an international workshop organized by Jürgen Dengler and supported by the BayIntAn program of the Bavarian Research Alliance (BayFor) and BayCEER (Fig. 1).

GrassPlot is a collaborative initiative within the framework of the Eurasian Dry Grassland Group (EDGG). The GrassPlot database succeeds the former database of nested-plot data from grasslands in Europe founded in 2010, which consisted mainly of the data collected during the EDGG Research Expeditions/Field Workshops. Now the scope of GrassPlot has

been widened (see below), and everyone with suitable data can join the Consortium. The purpose of GrassPlot is to establish and maintain a common data repository of high-quality vegetation-plot observations (relevés) of grasslands and related vegetation types from the whole Palaeartic biogeographic realm, and to facilitate the use of these data for non-commercial purposes, mainly academic research and applications in nature conservation and ecological restoration.

The GrassPlot database aims at complementing existing broad-scale vegetation databases such as the European Vegetation Archive (EVA) and the global database “sPlot”. Data suitable for GrassPlot and EVA/sPlot should preferably be contributed both to GrassPlot and an EVA/sPlot member database (see call to contribute to some of such databases in this Bulletin at p.16). The special focus of GrassPlot is on **multi-scale and multi-taxon sampling in precisely delimited plots with extensive environmental data**.

During the GrassPlot workshop in Bayreuth, the participants developed Bylaws aiming at balancing the interests of data providers and data users in a fair and transparent manner.



Fig. 1. Participants of the GrassPlot Workshop I. Left to right: back row: Santiago Soliveres, Viktoria Wagner, Idoia Biurrun, Itziar García-Mijangos, Timo Conradi, Manuel Steinbauer; middle row: Alireza Naqinezhad, Goffredo Filibeck, David Storch, Riccardo Guarino, Jürgen Dengler, Monika Janišová; front: Iwona Dembicz.

The data owners can decide on the data access regime of their data; either restricted, semi-restricted or free. Persons who are willing to contribute their own published or unpublished plot records or plot records of other authors which they digitised from the literature can apply to become a member of the GrassPlot Consortium. Data must be provided in an electronic format, but exceptionally unpublished data in paper format will be accepted if they fill important gaps.

Obligatory requirements for data contributions to GrassPlot are

- (a) origin in the Palearctic biogeographic realm;
- (b) grassland vegetation in the wide sense, i.e. terrestrial and semi-terrestrial vegetation types dominated by hemicryptophytes, therophytes, geophytes, and occasionally bryophytes, lichens and chamaephytes (forests, shrublands, aquatic, ruderal and segetal vegetation are not considered);
- (c) careful sampling of precisely delimited plots with the aim of complete species lists;
- (d) providing details of sampling methodology (in particular, whether rooted or shoot presence was recorded and which plot shape was used); and
- (e) meeting one of the following criteria (or a combination of these): **(i) data for one or several of our eight standard grain sizes (0.0001; 0.001 or 0.0009; 0.01; 0.1 or 0.09; 1; 10 or 9; 100; 1000 or 900 or 1024 m²) or (ii) nested-plot series with at least four different grain sizes.**

Additional desired (but not obligatory) criteria

- (f) precise GPS coordinates;

- (g) complete sampling of one or several macroscopic non-vascular taxa of the terricolous vegetation (bryophytes, lichens, “algae”) in addition to vascular plants;

- (h) multi-scale, nested-plot sampling;

- (i) direct cover estimates of species in percent for at least one grain size; and

- (j) extensive environmental variables measured or determined at the plot scale (vegetation structure, topography, soil, land use).

GrassPlot is represented and governed by its Governing Board elected by the GrassPlot Consortium for two-year renewable terms. The first Governing Board for the period March 2017 – March 2019 consists of Idoia Biurrun (ES), Timo Conradi (DK/DE), Iwona Dembicz (PL), Jürgen Dengler (DE), Riccardo Guarino (IT), Alireza Naqinezhad (IR) and Viktoria Wagner (CZ/AT), with Jürgen Dengler being Custodian and Idoia Biurrun Deputy Custodian.



Fig. 2. Distribution of GrassPlot data (as of 14th April 2017) in the Palearctic biogeographic realm (Source of base map: GoogleEarth).

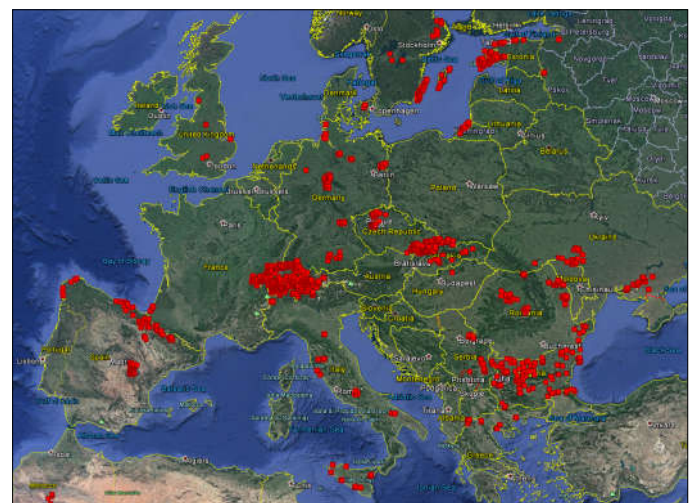


Fig. 3. The highest density of GrassPlot data is currently in hemiboreal-temperate-submediterranean Europe (Source of base map: GoogleEarth).

Current content of GrassPlot

By now (14th April 2017), already a substantial amount of data has been collected in GrassPlot (Figs. 2, 3), including 82 datasets from 107 data owners and 28 countries. They comprise 26,682 plots with vascular plant data, of which 12,278 plots have also data on bryophytes and lichens, as well as 1,132 nested-plot series (with at least four grain sizes).

Opportunities of GrassPlot and invitation to join

The establishment of the GrassPlot database opens new opportunities for extensive studies on grassland ecology and biodiversity in the Palaeartic realm. The members of the GrassPlot Consortium are informed about and invited to forthcoming paper projects using the GrassPlot data and they can propose paper projects themselves. **You are welcome to join the GrassPlot Consortium with your data meeting the GrassPlot criteria to advance science and to take advantage of these benefits!** Data that are **contributed by 14 May 2017** at the latest can still be considered for the first two GrassPlot publications, and their owners will become co-authors.

For further information on the GrassPlot project and database, please visit the GrassPlot webpage at http://www.bayceer.uni-bayreuth.de/ecoinformatics/en/grassplot/gru/html.php?id_obj=139267 or contact database custodians Jürgen Dengler and Idoia Biurrun.

Other vegetation-plot databases associated with EDGG

While the **Database of Scale-Dependent Phytodiversity Patterns in Palaeartic Grasslands (GrassPlot)** is the central EDGG database for high quality relevés from grasslands throughout the whole Palaeartic biogeographic realm (see previous report on GrassPlot and its specific requirements), there are also various [regional grassland databases](#) whose criteria are less restrictive and their content thus more comprehensive. Many of these regional grassland databases have been established and are run with major support from EDGG. Nearly all of them are also contributing their data to the European Vegetation Archive (EVA) and the global vegetation-plot database “sPlot”.

If you have data that fit both the criteria of GrassPlot and of a regional grassland database (or a comprehensive national vegetation database of your country), we recommend contributing the data to both in order to allow maximum benefit for science and for yourselves. The regional grassland databases normally allow plots of areas from (0.25-) 1-400 (-1000) m² and require a cover or cover-abundance estimate. They cannot handle very small and very big plots, nested-plot series and plots with presence-absence data only (which are all accepted by GrassPlot). On the other hand, the regional grassland databases do not have so strict requirements that only certain plot sizes are accepted nor that plots must have

been delimited in the field very precisely (with pins in the corners and a surrounding tape).

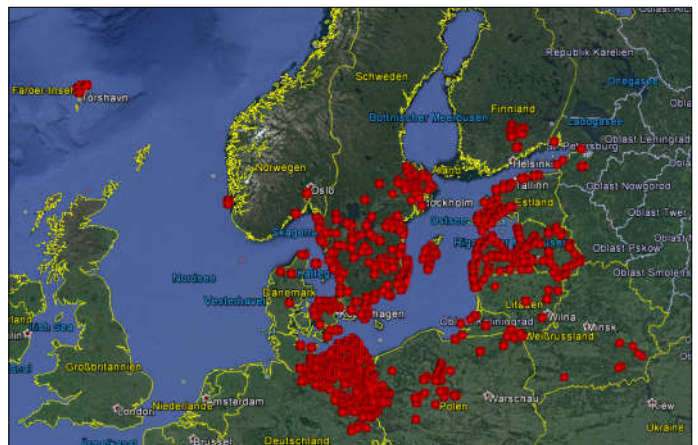
The following regional grassland databases have been launched in the context of EDGG. These collaborative databases aim at **filling major data gaps for continental and global analyses in the context of EVA and sPlot by providing grassland data from otherwise largely underrepresented regions**. Most of them have Bylaws that ensure a transparent and fair participation of data contributors in the benefits from their data (including options for co-authorship and to propose papers themselves). **If you wish to join one of these databases, please directly contact the respective Custodian or Deputy Custodian** (and let them know if part of your data is also in GrassPlot).

NBGVD – Nordic-Baltic Grassland Vegetation Database

GIVD: <http://www.givd.info/ID/EU-00-002>

Geographic coverage: Denmark, Faroer Islands, Iceland, Norway, Sweden, Finland, Svalbard and Jan Mayen, NW Russia, Belarus, Estonia, Latvia*, Lithuania*, N Poland*, NE Germany* (* = new data from these countries are meanwhile collected by specialised national databases).

Syntaxonomic coverage: *Festuco-Brometea*, *Koelerio-Coryneporetea* (including *Sedo-Scleranthetea*), *Molinio-Arrhenatheretea*, *Juncetea maritimi* (including *Saginetetea maritimae*), *Juncetea trifidi*, *Carici-Kobresietea*, *Calluno-Ulicetea* (including *Nardetea strictae*), *Loiseleurio-Vaccinetea*, *Salicetea herbaceae*, *Scheuchzerio-Caricetea fuscae*, *Trifolio-Geranietea sanguinei* (including *Melampyro-Holcetea*), *Mulgedio-Aconitetea* (smaller amounts from other classes are also accepted).



Custodian: Jürgen Dengler (Bayreuth, DE; juergen.dengler@uni-bayreuth.de)

Deputy Custodian: Łukasz Kozub (Warsaw, PL; kozub.lukasz@gmail.com)

Bylaws:

<https://www.researchgate.net/publication/312332996>

Webpage: http://www.bayceer.uni-bayreuth.de/eoinformatics/en/forschung/gru/html.php?id_obj=139255

Consortium members: 25

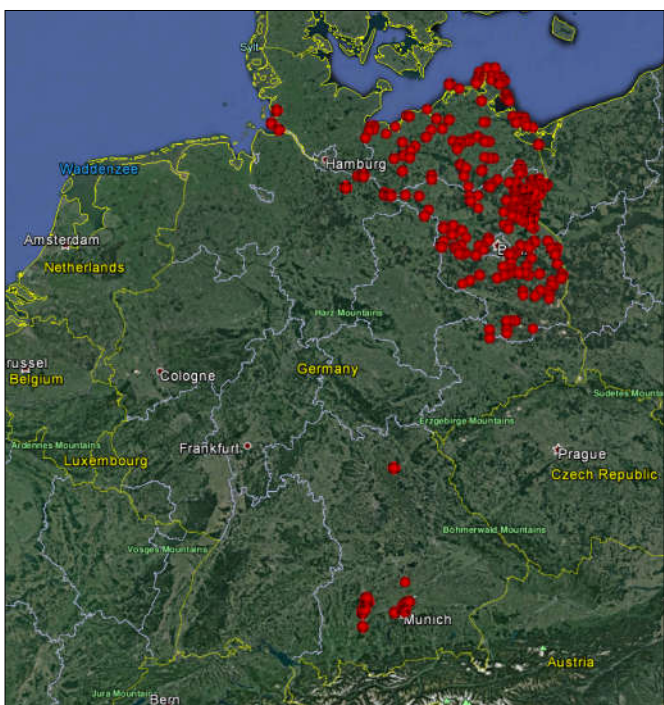
Content: 9,391 plots (as of 21 March 2017)

GrassVeg.DE – German Grassland Vegetation Database

GIVD: <http://www.givd.info/ID/EU-DE-020>

Geographic coverage: Germany

Syntaxonomic coverage: Terrestrial herbaceous vegetation, i.e. all vegetation types EXCEPT forests, shrublands, aquatic and segetal vegetation. This includes all types of grasslands, tall-herb communities, ruderal communities, mires and swamps, heathlands and alpine communities (smaller amounts from other classes are also accepted).



Custodian: Jürgen Dengler (Bayreuth, DE; juergen.dengler@uni-bayreuth.de)

Deputy Custodian: Thomas Becker (Trier; DE; beckerth@uni-trier.de)

Bylaws:

<https://www.researchgate.net/publication/312191873>

Webpage: http://www.bayceer.uni-bayreuth.de/eoinformatics/en/forschung/gru/html.php?id_obj=139259

Consortium members: 7

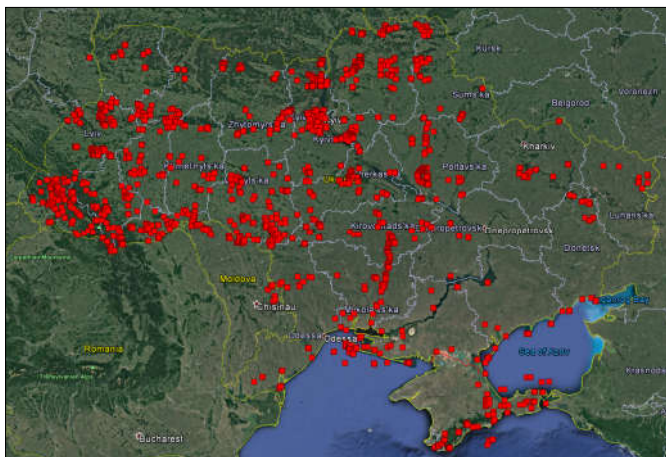
Content: 2,295 plots – very fast growing (as of 10 April 2017)

UGD – Ukrainian Grassland Database

GIVD: <http://www.givd.info/ID/EU-UA-001>

Geographic coverage: Ukraine

Syntaxonomic coverage: *Molinio-Arrhenatheretea*, *Festuco-Brometea* (including *Helianthemo-Thymetea*), *Koelerio-Corynephoretea* s.l., *Calluno-Ulicetea* (including *Nardetea*



strictae), *Phragmito-Magnocaricetea*, *Scheuchzerio-Caricetea fuscae*, *Festuco-Puccinellietea*, *Ammophiletea*, *Cakiletea maritima*, *Trifolio-Geranietea sanguinei*.

Custodian: Anna Kuzemko (Uman', UA; anyameadow.ak@gmail.com)

Deputy Custodian: Yulia Vashenyak (Khmelnitsky, UA, vashenyak@mail.ru)

Bylaws: to be published soon...

Webpage: http://www.bayceer.uni-bayreuth.de/eoinformatics/en/forschung/gru/html.php?id_obj=140377

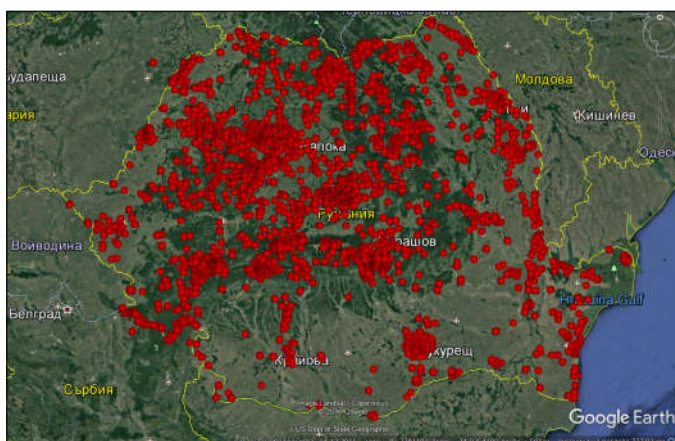
Consortium members: 17

Content: 9,568 plots (as of 20 March 2017)

RGD – Romanian Grassland Database

GIVD: <http://www.givd.info/ID/EU-RO-008>

Geographic coverage: Romania



Syntaxonomic coverage: All vegetation types except forests and shrublands.

Custodian: Estzer Ruprecht (Cluj-Napoca, RO; eszter.ruprecht@ubbcluj.ro)

Deputy Custodian & data manager: Kiril Vassilev (Sofia, BG; kiril5914@abv.bg)

Bylaws: [http://www.bayceer.uni-bayreuth.de/ecoinformatics/en/top/138914/14/140227/Rule s Romanian Grassland Database approved.pdf](http://www.bayceer.uni-bayreuth.de/ecoinformatics/en/top/138914/14/140227/Rule%20Romanian%20Grassland%20Database%20approved.pdf)

Webpage: http://www.bayceer.uni-bayreuth.de/ecoinformatics/en/forschung/gru/html.php?id_obj=140287

Consortium members: 43

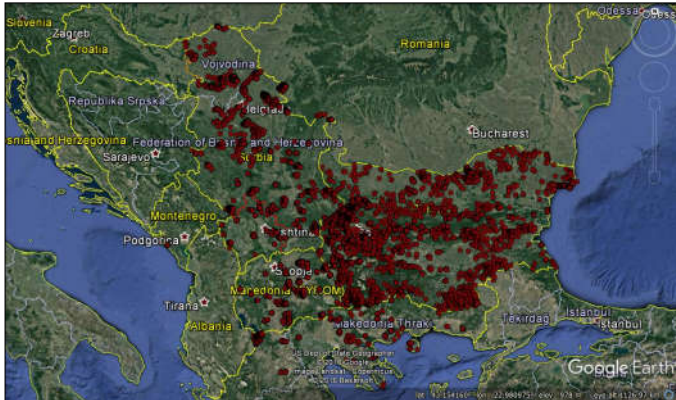
Content: 19,700 plots (as of 30 March 2017)

BDGD – Balkan Dry Grassland Database

GIVD: <http://www.givd.info/ID/EU-00-013>

Geographic coverage: Bulgaria, Serbia, Croatia, Slovenia, Bosnia and Hercegovina, Kosovo, Montenegro, Macedonia, Albania, Greece.

Syntaxonomic coverage: *Festuco-Brometea*, *Helichryso-Crucianelletea*, *Helianthemetea guttati*, *Koelerio-Coryneporetea* s.l., *Lygeo-Stipetea*, *Poetea bulbosae*, *Stipo-Agrostietea*, *Stipo-Trachynietea*, *Daphno-Festucetea*, *Molinio-Arrhenatheretea*, *Elyno-Seslerietea*, *Trifolio-Geranietea sanguinei*.



Custodian: Kiril Vassilev (Sofia, BG; kiril5914@abv.bg)

Deputy Custodian: not elected yet

Bylaws: to be published soon...

Webpage: http://www.bayceer.uni-bayreuth.de/ecoinformatics/en/forschung/gru/html.php?id_obj=140290

Consortium members: 31

Content: 8,576 plots (as of 30 March 2017)

TGD – Turkish Grassland Database

Also for Turkey a collaborative EDGG-affiliated database of non-forest vegetation types is in preparation. Details will be announced in one of the next Bulletins. People interested in joining with their data can contact the Custodian Didem Ambarli (didem.ambarli@gmail.com).

For countries not covered before...

For those countries that do not have a specialised grassland database associated with the EDGG, there is usually a comprehensive national vegetation database available for all vegetation types. You can find out the databases from these countries that might be willing to accept your data at one of the following webpages:

<http://www.givd.info/givd/faces/databases.xhtml>

<http://euroveg.org/eva-database-participating-databases>

Monika Janišová, Banská Bystrica, Slovak Republik

(monika.janisova@savba.sk),

Idoia Biurrun, Bilbao, Spain

(idoia.biurrun@ehu.es)

Jürgen Dengler, Bayreuth, Germany

(juergen.dengler@uni-bayreuth.de),

Kiril Vassilev, Sofia Bulgaria

(kiril5914@abv.bg) &

Anna Kuzemko, Uman, Ukraine

(anyameadow.ak@gmail.com)

Biodiversity patterns of dry grasslands at the meeting point of Central Europe and the Balkans: Impressions and first results from the 9th EDGG Field Workshop in Serbia

Svetlana Ačić^{1*}, Jürgen Dengler^{2,3}, Idoia Biurrun⁴, Thomas Becker⁵, Ute Becker⁶, Asun Berastegi⁷, Steffen Boch⁸, Iwona Dembicz^{2,9}, Itziar García-Mijangos⁴, Riccardo Guarino¹⁰, Monika Janišová¹¹, Ute Jandt^{12,3}, Martin Magnes¹³, Corrado Marcenò¹⁴, Salza Palpurina¹⁴, Mariya Polyakova¹⁵, Yulia Vasheniak¹⁶, Kiril Vassilev¹⁷, Nikolay Velev¹⁷, Verica Stojanović¹⁸, Predrag Lazarević¹⁹, Mirjana Krstivojević Čuk²⁰, Zora Dajić Stevanović¹

¹ University of Belgrade, Faculty of Agriculture, Department of Agrobotany, Nemanjina 6, 11080 Belgrade-Zemun, Serbia; acic@agrif.bg.ac.rs; dajic@agrif.bg.ac.rs

² Plant Ecology, Bayreuth Center of Ecology and Environmental Research (BayCEER), University of Bayreuth, Universitätsstr. 30, 95447 Bayreuth, Germany; juegen.dengler@uni-bayreuth.de; iwona.dembicz@uni-bayreuth.de

³ German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig, Deutscher Platz 5e, 04103 Leipzig, Germany.

⁴ Department of Plant Biology and Ecology, University of the Basque Country UPV/EHU, PO. Box 644, 48080 Bilbao, Spain; idoia.biurrun@ehu.es

⁵ Geobotany, Faculty of Geography and Geosciences, University of Trier, Behringstr. 21, 54296 Trier, Germany; beckerth@uni-trier.de

⁶ Green School in the Botanic Garden, University of Mainz, Anselm-Franz-von-Bentzel-Weg 9b, 55128 Mainz, Germany; beckeru@unimainz.de

⁷ Department of Biodiversity, Gestión Ambiental de Navarra, S.A., Padre Adoain 219 Bajo, 31015 Pamplona, Spain; aberastg@ganasa.es

⁸ Institute of Plant Sciences and Botanical Garden, University of Bern, Altenbergrain 21, 3013 Bern, Switzerland; steffen.boch@ips.unibe.ch

⁹ Department of Plant Ecology and Environmental Conservation, Faculty of Biology, University of Warsaw, Al. Ujazdowskie 4, 00-478 Warszawa, Poland

¹⁰ Dept. STEBICEF- Botanical Unit, University of Palermo, via Archirafi, 38, 90123 Palermo, Italy; guarintrotro@hotmail.com

¹¹ Institute of Botany, Slovak Academy of Sciences, Ďumbierska 1, 97411 Banská Bystrica, Slovakia; monika.janisova@gmail.com

¹² Institute for Biology, Geobotany and Botanical Garden, Am Kirchtor 1, 06108 Halle/Saale, Germany; ute.jandt@botanik.uni-halle.de

¹³ Institute of Plant Sciences, Department of Systematic Botany and Geobotany, Karl-Franzens- University of Graz, Holteigasse 6, 8010 Graz, Austria; martin.magnes@uni-graz.at

¹⁴ Department of Botany and Zoology, Faculty of Science, Masaryk University, Kotlářská 2, 61137, Brno, Czech Republic; marcenocor rado@libero.it; salza.palpurina@gmail.com

¹⁵ Laboratory of Ecology and Geobotany, Central Siberian Botanical Garden, Russian Academy of Sciences, Siberian Branch, Zolotodolinskaya str. 101, 630090 Novosibirsk, Russia; galatella@mail.ru

¹⁶ Khmelnytskyi Institute of Interregional Academy of Personnel Management, 29010 Khmelnytsky, Ukraine; vasheniak@mail.ru

¹⁷ Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 23 Acad. G. Bonchev Str., 1113 Sofia, Bulgaria. kiril5914@abv.bg, nvelev@bio.bas.bg

¹⁸ Institute for Nature Conservation of Serbia, Dr Ivana Ribara 91, 11070 Belgrade, Serbia; verica.stojanovic@zzps.rs

¹⁹ University of Belgrade, Faculty of Biology, Institute of Botany and Botanical Garden, Takovska 43, 11000 Belgrade, Serbia; predrag.lazarevic@bio.bg.ac.rs

²⁰ University of Novi Sad, Faculty of Sciences, Department of Biology and Ecology, Trg Dositeja Obradovića 2, 21000 Novi Sad, Serbia; mirjana.krstivojevic@dbe.uns.ac.rs

*) Corresponding author

Bulletin of the Eurasian Dry Grassland Group 34 (2017): 19-31

Abstract: The 9th EDGG Field Workshop took place in Serbia in July 2016. A group of 22 researchers from ten countries sampled the different types of dry grassland vegetation of some protected and non-protected areas of Mt. Rtanj, Mt. Devica and Mt. Ozren near Sokobanja in east Serbia, Mt. Suva planina, Jelašnička and Sićevačka gorge close to the city of Niš in southeast Serbia and Ram and Deliblatska sands in the northern part of Serbia, along the Danube. Standardized EDGG sampling procedures including nested-plot series (biodiversity plots) and phytosociological relevés of 10-m² were used. In all plots, vascular plants, bryophytes and lichens were sampled. The data will be used for analyses of scale-dependent diversity patterns, species-area relationships, vegetation-environment relationships and performing phytosociological classification. Preliminary data suggest that Serbian dry grasslands display intermediate richness of vascular plants and below-average richness of bryophytes and lichens across all spatial scales compared to other regions in the Palaearctic.

Keywords: Balkan; biodiversity; bryophyte; EDGG sampling method; *Festuco-Brometea*; *Festucion vaginatae*; grassland; nested plots; Serbia; vascular plant; vegetation classification; vegetation plot database.

Abbreviations: EDGG = Eurasian Dry Grassland Group; IAVS = International Association for Vegetation Science; GIVD = Global Index of Vegetation-Plot Databases

Introduction

EDGG Field Workshops are annual research expeditions that take place in different countries, with the aim of collecting high-quality plant (and sometimes animal) diversity data of different types of grasslands with the standardized EDGG sampling method (Dengler et al. 2016b). Typically they last for one to two weeks and are organised by a team of regional experts. The first expedition was conducted in 2009 in Transylvania (Dengler et al. 2009) and, so far, has been followed by seven more: Central Podolia, in Ukraine (Dengler et al. 2010), NW Bulgaria (Apostolova et al. 2011), Sicily (Guarino et al. 2012), NW Greece (Dengler & Demina 2012), Khakassia in Russia (Janišová et al. 2013), Navarre in Spain (Biurrun et al. 2014) and Poland (Kącki et al. 2014).

Here we report from the 9th EDGG Field Workshop, which was conducted in Serbia from 2 to 9 July 2016. It was organized by a team of Serbian botanists from the Department of Agrobotany, Faculty of Agriculture, University of Belgrade. With 22 researchers from 10 countries (Austria, Bulgaria, Germany, Italy, Poland, Russia, Slovakia, Spain, Ukraine and Serbia), this was so far the largest EDGG Field Workshop (Table 1). The group combined experienced senior scientists, young postdocs and PhD students. Jürgen Dengler, Monika Janišová, Ute Jandt, Itziar García-Mijangos, Idoia Biurrun, Asun Berastegi, Martin Magnes, Thomas Becker, Ute Becker, Riccardo Guarino, Nikolay Velev, Kiril Vasilev, Mariya Polyakova, Iwona Dembicz, Salza Palpurina and Yulia Vasheniak, already participated in previous expeditions, while Corrado Marcenò, Verica Stojanović, Predrag Lazarević, Zora Dajić Stevanović, Mirjana Krstivojević Ćuk and Svetlana Ačić were “newcomers” (Fig. 1).

The study area

The Republic of Serbia is located in the north-central part of the Balkan Peninsula and covers an area of 88,361 km². The northern part of Serbia (Vojvodina) lies on the south-eastern part of the Pannonian plain, where broad alluvial lowlands and adjacent loess plateaus extend along the rivers Danube, Tisa, Sava, Begej and Tamiš.

In Serbia, the climate is continental in the northern and south-eastern parts, with cold winter and semi-arid summer periods. In the western and south-western regions, the climate is humid temperate, while in the central and eastern parts it is subcontinental or semi-arid temperate continental, with transitional sub-Mediterranean parts (Stevanović & Šinžar-Sekulić



Fig. 1. Participants of the 9th EDGG Field Workshop in Serbia. Photo: J. Dengler.

2009). There are four types of geological substrata in Serbia: 1. silicate rocks of alkaline to ultra-alkaline reaction (serpentinites and peridotites, ophiolitic belt); 2. carbonate rocks of neutral to alkaline reactions (sedimentary, clastic); 3. silicate rocks of acidic to neutral pH (sedimentary, igneous, metamorphic); 4. loess and Pleistocene sediments (sands, alluvial fans). Due to the different climatic, geological and edaphic conditions, the flora and vegetation of the territory of Serbia are highly diverse and include 3662 taxa assigned to 141 families (Stevanović & Stevanović 1995).

Grasslands in Serbia occupy about 1.4 million hectares, distributed over a wide altitudinal range from lowland areas to the highest alpine zone. Semi-natural grasslands (hay meadows and pastures) in Serbia are recognized for their high species diversity and significant conservation value (Lakušić & Sabovljević 2005; Dajić Stevanović et al. 2010; Tomović et al. 2014). However, many grassland communities are at present

Table 1. Statistics of the past EDGG Expeditions/Field Workshops.

No.	Period	Research area	Elevation (m a.s.l.)	Participants	Countries	Biodiversity plots	10-m ² plots (total)
1	14-26 July 2009	Romania	321-670	6	3	20	63
2	10-25 July 2010	Ukraine	73-251	18	8	21	226
3	14-24 August 2011	Bulgaria	633-1460	9	5	15	98
4	29 March-5 April 2012	Sicily	4-1200	14	5	21	67
5	15-23 May 2012	Greece	1-1465	16	6	14	31
6	22 July-1 August 2013	Siberia	300-700	14	7	39	133
7	15-24 June 2014	Spain	295-1970	16	10	35	119
8	13-23 June 2015	Poland	108-465	16	6	31	86
9	2-9 July 2016	Serbia	92-1555	22	10	32	141

threatened by rapid changes in agricultural practices, especially related to the effects of either land abandonment or eutrophication (Dajić Stevanović et al. 2010). Phytosociological studies of the vegetation of Serbia using the Braun-Blanquet approach have a long tradition, resulting in many publications on vegetation classification of various geographic areas of the country (reviewed by Kojić et al. 1998, 2004). On the basis of these reviews, dry grasslands in Serbia traditionally have been grouped within the classes *Festuco-Brometea* and *Koelerio-Corynephoretea*, whereas its more detailed classification and status has been recently reviewed (Aćić et al. 2015).

The main goal of the 9th EDGG field workshop was to assess the floristic composition, biodiversity patterns and ecological drivers of the selected sites (Fig. 2) distributed in protected (Mt. Rtanj, Mt. Suva planina, Mt. Ozren, Jelašnička and Sićevačka gorges, and Deliblatska sands) and non-protected areas (Mt. Devica and Ram sand) typical for dry grassland and steppe vegetation (see the photo diary in the Appendix).

Sampling methods

As in the previous EDGG expeditions, we applied the standardized sampling approach for biodiversity data (details provided by Dengler et al. 2016b; for equipment, see Fig. 3) allowing large-scale comparisons and syntheses of phytodiversity data (e.g. Dengler et al. 2016a). The core part of the sampling are “biodiversity plots” that consist of nested sampled areas of 0.0001, 0.001, 0.01, 0.1, 1, 10 and 100 m², with the smaller ones always replicated twice within the 100-m² plot in two opposite corners. In each plot, all terricolous com-

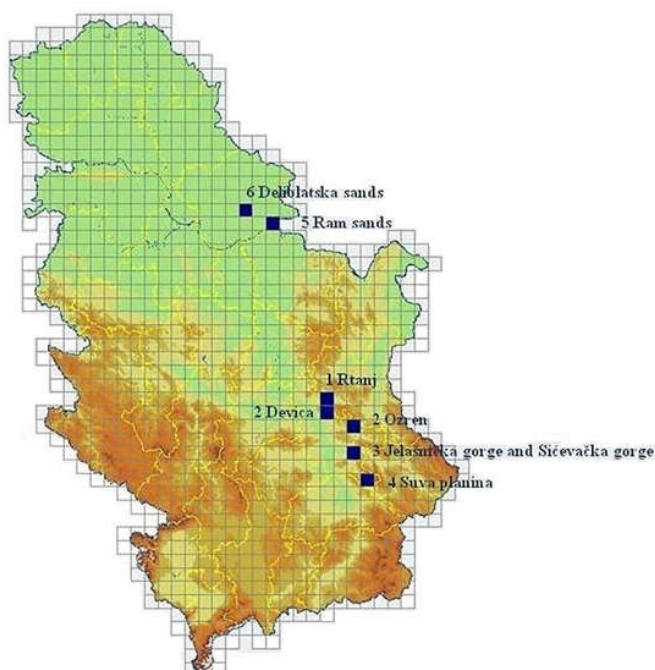


Fig. 2. Map with location of the study sites of the 9th EDGG Field Workshop in Serbia.

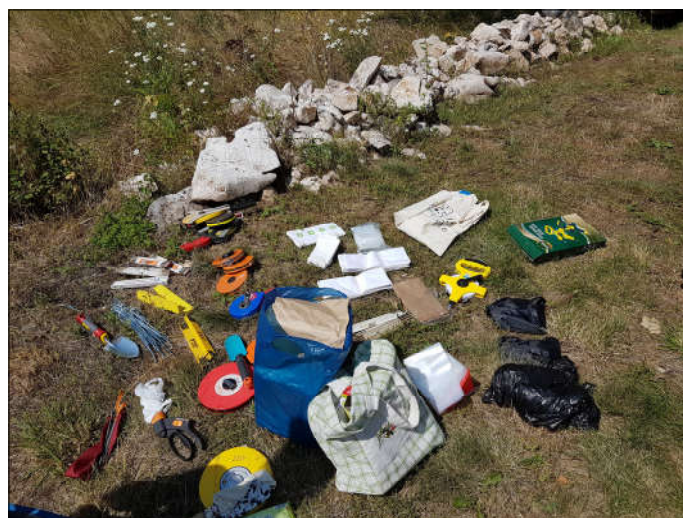


Fig. 3. The necessary equipment for the EDGG biodiversity sampling, Mt. Rtanj. Photo: C. Marcenò.

ponents of the vegetation were recorded – all perennial and annual vascular plants as well as bryophytes and lichens. Additionally, for the 10-m² plots, percentage cover per species and structural data of the vegetation were estimated and a set of environmental parameters related to topography and soil were determined. In each individual study region, the biodiversity plots were placed in homogenous stands of different grassland types with the aim to cover the full environmental gradient. To complement this time-consuming sampling, we additionally surveyed “normal” plots, which have exactly the same parameters as the 10-m² corners of the biodiversity plots and thus, can be easily combined for joint analyses.

Mixed soil samples were collected from all 10-m² plots to determine texture class, pH, C and N content, and other relevant soil parameters. We also took biomass samples of defined subplots to quantify productivity (by dry weight of standing biomass per m²) and elemental composition and nutritional value of plant material. For the first time on an EDGG expedition, we measured mean vegetation height in a standardized way, using a falling plastic disc (for details see Dengler et al. 2016b).

Plant species were mostly identified in the field; some of the species that were not confidently identified *in situ* were collected and identified during the evenings (Fig. 4). The specimens of critical taxa have been identified at the Faculty of Agriculture in Belgrade. Vascular plants were mainly identified using *Flora Europaea* (Tutin et al. 1968-1993), the electronic interactive identification tool of the *Flora d'Italia* second edition (Guarino et al. 2010), *Flora of Bulgaria* (Jordanov 1966-1979) and *Flora of Serbia* (Josifović 1970-1986).

Workshop presentations and discussions

The field work and plant identification in the evening was complemented by several oral presentations, followed by discussions. Zora Dajić Stevanović presented a lecture about *Biodiversity and conservation of vegetation of Serbia*. Fur-



Fig. 4. Plant determination and entering the data. Photo: S. Palpurina.

ther, the four recipients of the IAVS travel grants also gave presentations on studies similar to the topic of the Field Workshop:

- Iwona Dembicz: *Scale- and taxon-dependent patterns of plant diversity in steppes of Khakassia, South Siberia (Russia)*
- Yuliya Vashenyak: *Distribution of limestone outcrops communities on the slopes of Dniester River*
- Kiril Vassilev: *Syntaxonomical diversity of calcareous grassland vegetation west of Sofia*
- Salza Palpurina: *Fine-scale species richness in Eurasian dry grasslands: does nutrient limitation matter?*
- Jürgen Dengler: *Scale-dependent plant diversity patterns - introduction to the EDGG sampling methodology and data entering.*

Preliminary results

During 7 1/2 days of field work, we surveyed 32 biodiversity plots and 77 additional “normal” plots, resulting in a total of 141 10-m² plots which can be compared with the 226, 98 and 119 10-m² plots sampled during the expeditions in Ukraine, Bulgaria and Spain, respectively (Table 1).

Bryophytes have been sent for identification to Marko Sabovljević, at the Institute of Botany and Botanical Garden, Faculty of Biology of University of Belgrade, whereas lichens have already largely been identified by Steffen Boch from the Institute of Plant Sciences and Botanical Garden, University of Bern, Switzerland. The soil samples were dried and prepared for the set of analyses, which will be carried out in the Department for Soil Science at the Faculty of Agriculture, University of Belgrade. The data have been digitised by several of the participants (M. Magnes, S. Palpurina, M. Polyakova, R. Guarino, U. Jandt and J. Dengler).

The most frequent species in the Serbian dry grasslands were *Teucrium chamaedrys*, *Asperula cynanchica*, *Festuca valesiaca*, *Carex caryophylla*, *Bothriochloa ischaemum*, *Asperula purpurea*, *Orlaya grandiflora*, *Petrorhagia saxifraga*, *Acinos*

Table 2. Statistics of scale-dependent vascular plant species richness (shoot presence).

Plots size [m ²]	n	Min	Mean	Max
0.0001	64	0	1.9	6
0.001	64	0	3.1	9
0.01	64	0	6.1	16
0.1	64	3	12.0	23
1	64	6	20.6	46
10	141	10	30.9	57
100	32	23	56.5	107

arvensis and *Artemisia alba*. Other frequent graminoids were *Carex humilis*, *Poa compressa*, *Koeleria splendens*, *Stipa borysthena* and *S. capillata*.

Our data suggest that the mean vascular plant richness of Serbian dry grasslands (Table 2) is intermediate compared to dry grasslands in other regions of the Palaearctic (Dengler et al. 2016a) and quite similar to the values reported from Bulgaria (Pedashenko et al. 2013).

Conclusion and outlook

The sampled data, as in the case of the previous EDGG Research Expeditions and Field Workshops, will become part of GrassPlot, the Database Scale-Dependent Phytodiversity Patterns in Palaearctic Grasslands (formerly: *Database Species-Area Relationships in Palaearctic Grasslands*; GIVD ID EU-00-003; Dengler et al. 2012), the *Balkan Dry Grasslands Database* (EU-00-013; Vassilev et al. 2012) and additionally of the *Vegetation Database Grassland Vegetation of Serbia* (EU-RS-002; Ačić et al. 2012), all registered in the *Global Index of Vegetation-Plot Databases* (GIVD; <http://www.givd.info>; see Dengler et al. 2011). After our initial publication, these data can also be used by other researchers. Moreover, the data from the Field Workshop will contribute to the data of the emerging global vegetation-plot database sPlot (see <http://www.idiv-biodiversity.de/sdiv/workshops/pastworkshops/splot>) and the *European Vegetation Archive* (EVA, Chytrý et al. 2016).

Once the dataset is complete, we aim to conduct a regional study on phytodiversity patterns and their drivers. It will be interesting to compare the biodiversity patterns and species-area relationships with those of the previous EDGG Expeditions (Pedashenko et al. 2013; Turtureanu et al. 2014; Kuzemko et al. 2016; Polyakova et al. 2016) and similar studies. Additional papers might be devoted to the elemental composition and nutritional value of the different grassland types sampled.

Beyond our regional Serbian studies using only the data from this expedition, our data will likely become valuable in several supraregional studies for which we fill important data gaps. They will be used in studies led by W. Willner and K. Vassilev, respectively, on the broad-scale classification of Pannonian-Pontic *Festuco-Brometea* communities and Balkan dry grass-

land communities, both down to the association level. At continental scale, they are important contributions to analyses of plot-scale alpha diversity (led by M. Večera) and functional composition of grasslands (led by J. Dengler). They will also contribute, through GrassPlot, to a paper on benchmarking plant diversity of Palaeartic grasslands, led by I. Biurrun, quasi a follow-up to Dengler et al. (2016a).

Further, the Field Workshop in Serbia has already given rise to two third-party grant proposals. The colleagues from Slovakia, Austria and Serbia have applied for a joint project within Multilateral scientific and technological cooperation in the Danube region (2017-2018), entitled: "Grassland phytodiversity in the Danube region" aiming at continuation of survey and writing scientific papers. Thanks to funding from the BayIntAn program of the Bavarian Research Alliance (BayFor) and co-funding from BayCEER, an international workshop on Scale-dependent phytodiversity patterns in Palaeartic grasslands took place in Bayreuth from 6-10 March 2017. The main aims were the organization of the further development of GrassPlot database (see announcement in this Bulletin at pp. 14-18), planning of overarching analyses of the data and papers as well as third-party grant proposals based on them.

After nine successful field workshops, the EDGG will certainly continue the expedition programme. The next 10th EDGG Field Workshop will be held in the Central Apennine Mountains (Italy), from 3 to 11 June 2017 (Filibeck et al. 2017). Criteria for the selection to organize future EDGG Field Workshops are: the lack of methodologically comparable phytosociological and biodiversity data from the particular study region, the interest of potential participants and, most importantly, one or several reliable local organizers who preferably should have participated in at least one previous expedition. Persons interested in organizing future EDGG Expeditions are encouraged to contact the EDGG Field Workshop Coordinator (Jürgen Dengler, juergen.dengler@uni-bayreuth.de) and Deputy Coordinator (Idoia Biurrun, idoia.biurrun@ehu.es).

Acknowledgements

We are grateful to the Global Sponsorship Committee of the International Association for Vegetation Science (IAVS) for supporting some of the workshop participants with travel grants. Moreover, we received financial support from the BayIntAn program of the Bavarian Research Alliance (grant UBT_2015_119 to J.D.). Finally, we are grateful to the Institute for Nature Conservation of Serbia for the support in the organization of workshop. Without these supports, the workshop would not have been possible.

References

- Ačić, S., Petrović, M., Šilc, U. & Dajić Stevanović, Z. 2012. Vegetation Database Grassland Vegetation of Serbia. *Biodiversity & Ecology* 4: 418–418.
- Ačić, S., Šilc, U., Petrović, M., Tomović, G. & Dajić Stevanović, Z. 2015. Classification, ecology and biodiversity of Central Balkan dry grasslands. *Tuexenia* 35: 329–353.
- Apostolova, I., Dengler, J., Janišová, M., Todorova, S. & Vasilev, K. 2011. Bulgarian dry grasslands – Report from the 3rd EDGG Research Expedition 14–24 August 2011. *Bulletin of the European Dry Grassland Group* 12: 10–14.
- Biurrun, I., García-Mijangos, I., Berastegi, A., Ambarli, D., Dembicz, I., Filibeck, G., Jandt, U., Janišová, M., Jaunatre, R., (...) & Dengler, J. 2014. Diversity of dry grasslands in Navarre (Spain): Experiences from the 7th EDGG Field Workshop, 15–24 June 2014. *Bulletin of the European Dry Grassland Group* 24/25: 4–21.
- Chytrý, M., Hennekens, S.M., Jiménez-Alfaro, B., Knollová, I., Dengler, J., Jansen, F., Landucci, F., Schaminée, J.H.J., Ačić, S., (...) & Yamalov, S. 2016. European Vegetation Archive (EVA): an integrated database of European vegetation plots. *Applied Vegetation Science* 19: 173–180.
- Dajić Stevanović, Z., Lazarević, D., Petrović, M., Ačić, S. & Tomović, G. 2010. Biodiversity of natural grasslands of Serbia: state and prospects of utilization. Biotechnology in Animal Husbandry. In: *XII International Symposium on Forage Crops of Republic of Serbia "Forage Crops Basis of Sustainable Animal Husbandry Development"*, pp. 235–247. Kruševac, RS.
- Dengler, J. & Demina, O. 2012. 5th EDGG Research Expedition to Northern Greece, May 2012. *Bulletin of the European Dry Grassland Group* 16: 18–20.
- Dengler, J., Ruprecht, E., Szabó, A., Turtureanu, D., Beldean, M., Uğurlu, E., Pedashenko, H., Dolnik, C. & Jones, A. 2009. EDGG cooperation on syntaxonomy and biodiversity of *Festuco-Brometea* communities in Transylvania (Romania): report and preliminary results. *Bulletin of the European Dry Grassland Group* 4: 13–19.
- Dengler, J., Kuzemko, A. & Yavorska, O. 2010. Impressions from the EDGG Research Expedition 2010 to Central Podillia (Ukraine). *Bulletin of the European Dry Grassland Group* 8: 15–16.
- Dengler, J., Jansen, F., Glöckler, F., Peet, R.K., De Cáceres, M., Chytrý, M., Ewald, J., Oldeland, J., Lopez-Gonzalez, G., (...) & Spencer, N. 2011. The Global Index of Vegetation-Plot Databases (GIVD): a new resource for vegetation science. *Journal of Vegetation Science* 22: 582–597.
- Dengler, J., Todorova, S., Becker, T., Boch, S., Chytrý, M., Diekmann, M., Dolnik, C., Dupré, C., Giusso del Galdo, G.P., (...) & Vassilev, K. 2012. Database Species-Area Relationships in Palaeartic Grasslands. *Biodiversity & Ecology* 4: 321–322.
- Dengler, J., Biurrun, I., Apostolova, I., Baumann, E., Becker, T., Berastegi, A., Boch, S., Dembicz, I., Dolnik, C., (...) & Weiser, F. 2016a. Scale-dependent plant diversity in Palaeartic grasslands: a comparative overview. *Bulletin of the Eurasian Dry Grassland Group* 31: 12–26.
- Dengler, J., Boch, S., Filibeck, G., Chiarucci, A., Dembicz, I., Guarino, R., Henneberg, B., Janišová, M., Marcenò, C., (...) & Biurrun, I. 2016b. Assessing plant diversity and composition in grasslands across spatial scales: the standardised EDGG sampling methodology. *Bulletin of the Eurasian Dry Grassland Group* 32: 13–30.
- Filibeck, G., Cancellieri, L., Sperandii, M.G., Dengler, J., & Biurrun, I. 2017. Invitation to the 10th EDGG Field Workshop "Biodiversity patterns across a precipitation gradient in the Central Apennine mountains" Italy, 3-11 June 2016. *Bulletin of the Eurasian Dry Grassland Group* 33: 3-12.
- Guarino, R., Addamiano, S., La Rosa, M. & Pignatti, S. 2010. "Flora Italiana Digitale": an interactive identification tool for the Flora of Italy. In: Nimis, P.L. & Vignes Lebbe, R. (eds.) *Tools for Identifying Biodiversity: Progress and Problems*, pp. 157-162. Ed. Università di Trieste, Trieste, IT.
- Guarino, R., Becker, T., Dembicz, I., Dolnik, C., Kački, Z., Kozub, Ł., Rejžek, M. & Dengler, J. 2012. Impressions from the 4th EDGG Research Expedition to Sicily: community composition and diversity of Mediterranean grasslands. *Bulletin of the European Dry Grassland Group* 15: 12–22.
- Janišová, M., Becker, T., Becker, U., Demina, O., Dembicz, I., Ermakov, N., Filibeck, G., Frank, D., Guarino, R., (...) & Dengler, J. 2013. Steppes of Southern Siberia – Experiences from the 6th EDGG Research Expedition to Khakassia, Russia (22 July – 1 Au-

- gust 2013). *Bulletin of the European Dry Grassland Group* 19/20: 31–48.
- Jordanov, D. (ed.). 1966-1979. *Flora Republicae Popularis Bulgariae*. In *Aedibus Acad. Sci. Bulgaricae, Serdicae* BG. [in Bulgarian]
- Josifović, M. (ed.) 1970-1986. *Flora of Serbia* 1-8. Academy of Science and Arts of Serbia, RS. [in Serbian]
- Kącki, Z., Dembicz, I., Kozub, L., Swacha, G. & Dengler, J. 2014. Invitation to the 8th EDGG Field Workshop, Poland, June 2015. *Bulletin of the European Dry Grassland Group* 24/25: 26–34.
- Kojić, M., Mrfat-Vukelić, S., Dajić, Z. & Đjordžević-Milošević, S. 1998. *Sintaksonomski pregled vegetacije Srbije* (Syntaxonomical review of vegetation in Serbia). Institut za biološka istraživanja "Siniša Stanković", Beograd, RS. [in Serbian]
- Kojić, M., Mrfat-Vukelić, S., Dajić, Z. & Đjordžević-Milošević, S. 2004. *Livade i pašnjaci Srbije* (Meadows and pastures in Serbia). Institut za istraživanja u poljoprivredi Srbija, Beograd, RS. [in Serbian]
- Kuzemko, A.A., Steinbauer, M.J., Becker, T., Didukh, Y.P., Dolnik, C., Jeschke, M., Naqinezhad, A., Ugurlu, E., Vassilev, K. & Dengler, J. 2016. Patterns and drivers of phytodiversity of steppe grasslands of Central Podolia (Ukraine). *Biodiversity and Conservation* 25: 2233–2250.
- Lakušić, D. & Sabolvjević, M. 2005. Fitocenološka klasifikacija staništa (Phytocoenological classification of vegetation) [in Serbian]. In: Lakušić, D. (ed.) *Staništa Srbije, Rezultati projekta "Harmonizacija nacionalne nomenklature u klasifikaciji staništa sa standardima međunarodne zajednice"* (Habitats in Serbia, results of the project "Harmonization of national nomenclature in the classification of habitats with the international standards"). Institut za Botaniku i Botanička Bašta "Jevremovac", Biološki fakultet, Univerzitet u Beogradu, Ministarstvo za nauku i zaštitu životne sredine Republike Srbije, RS. [in Serbian]
- Pedashenko, H., Apostolova, I., Boch, S., Ganeva, A., Janisová, M., Sopotlieva, D., Todorova, S., Ūnal, A., Vassilev, K., Velez, N. & Dengler, J. 2013. Dry grasslands of NW Bulgarian mountains: first insights into diversity, ecology and syntaxonomy. *Tuexenia* 33: 309–346.
- Polyakova, M.A., Dembicz, I., Becker, T., Becker, U., Demina, O.N., Ermakov, N., Filibeck, G., Guarino, R., Janišová, M., (...) & Dengler, J. 2016. Scale- and taxon-dependent patterns of plant diversity in steppes of Khakassia, South Siberia (Russia). *Biodiversity and Conservation* 25: 2251–2273.
- Stevanović, V. & Stevanović, B. 1995. Osnovni klimatski, geološki i edološki činioci biodiverziteta kopnenih ekosistema Jugoslavije (The main climatic, geological and pedological factors of biodiversity of the terrestrial ecosystems of Yugoslavia). In: Stevanović, V. & Vasić, V. (eds.) *Biodiverzitet Jugoslavije sa pregledom vrsta od međunarodnog značaja*, pp. 75–95. Ecolibri, Biološki fakultet, Beograd, RS. [in Serbian]
- Stevanović, V. & Šinžar-Sekulić, J. 2009. Serbia. In: Radford, E.A. & Odé, B. (eds.) *Conserving Important Plant Areas: investing in the green Gold of South East Europe*, pp. 63–68. Plantlife International, Salisbury, UK.
- Tomović, G., Niketić, M., Lakušić, D., Randelović, V. & Stevanović, V. 2014. Balkan endemic plants in Central Serbia and Kosovo regions: distribution patterns, ecological characteristics and centres of diversity. *Botanical Journal of the Linnean Society* 176: 73–202.
- Turtureanu, P.D., Palpurina, S., Becker, T., Dolnik, C., Ruprecht, E., Sutcliffe, L.M.E., Szabó, A. & Dengler, J. 2014. Scale- and taxon-dependent biodiversity patterns of dry grassland vegetation in Transylvania (Romania). *Agriculture, Ecosystems and Environment* 182: 15–24.
- Tutin, T.G., Heywood, V.H., Burges, N.A., Moore, D.M., Valentine, D.H., Walters, S.M. & Webb, D.A. (eds.) 1968-1993. *Flora Europaea*. Cambridge University Press, Cambridge, UK.
- Vassilev, K., Dajić, Z., Cušterevska, R., Bergmeier, E. & Apostolova, I. 2012. Balkan Dry Grasslands Database. *Biodiversity & Ecology* 4: 330–330.



Dianthus petraeus. Photo: J. Dengler.

Appendix: A photo diary of the Field Workshop

2 July 2016 - Belgrade

The meeting of all participants of the EDGG Field Workshop in Serbia was on 2 July at the Faculty of Agriculture in Belgrade. From there, we went to Sokobanja where we were accommodated for three days. Sokobanja is a spa town with thermal water situated in eastern Serbia. In the evening we visited the city center and the herbal tea factory "Adonis". During the field work near Sokobanja we visited three Karst mountains (Rtanj, Devica and Ozren Mts) which are located on the south-western part of the Carpathian-Balkan mountain system.



Photo 1. Herbal tea factory "Adonis". Photo: S. Palpurina.

3 July 2016 - Mt. Rtanj

The first day of our survey we went to mountain Rtanj which is protected as Special Nature Reserve. The cone shaped peak Šiljak, with mountain slopes inclined at different angles, dominates over the entire area. The karst relief includes numerous deep pits and various forms of the exhumed subcutaneous karst. The north-facing slopes are mainly covered with forests, some of which can be very old, e.g. the mixed community of silver fir (*Abies alba*) and Balkan beech (*Fagus moesiaca*), which spreads out as far as to the peak Šiljak. The south-facing slopes are covered with vegetation typical of rocky terrains, pastures and shrubs, characterised by a very diverse flora, with many steppe relict species such as *Sternbergia colchiciflora*, *Hya-cinthella leucophaea*, *Prunus tenella*, and many Balkan endemic species such as *Festuca bosniaca*, *F. panciciana*, *Genista subcapitata*, *Silene sendtneri*, *Viola grisebachiana*. The Balkan endemic *Satureja kitaibelii* is used as medicinal plant, spice and even as aphrodisiac.

The plant drug contains up to 2% of essential oil with very strong antimicrobial activity, acting better than standard antibiotics (Dajić Stevanović et al., unpublished results). *Nepeta rtanjensis* is a strict local endemic of the mountain Rtanj included in the Serbian Red List of the flora.

On the Rtanj Mt. we sampled 10 biodiversity plots and 12 additional normal plots at an altitude of 789-935 m a.s.l. The sampled vegetation belongs to sub-continental steppe grasslands of the *Saturejion montanae* alliance. These are rocky grasslands developed on shallow mountainous soil on limestone with domination of species such as *Carex humilis*, *Potentilla tommasiniana* and *Stipa pulcherrima*. Stands of the associations *Galio purpurei-Festucetum valesiacae* (*Festucion valesiacae*) and *Danthonietum alpinae* (*Chrysopogono-Danthonion alpinae*) were also surveyed.



Photo 2. Mt. Rtanj. The Rtanj Mountain has the shape of a three-sided pyramid. According to a legend, it was made by aliens and the members of the UFO Association believe that it is still regularly visited by aliens even nowadays. It is also believed that Mt. Rtanj could act as a shelter for people when the "end of the world" comes. Photo: S. Palpurina.

4 July 2016 - Devica and Ozren Mts.

In the morning we went to the Devica Mt. The relic polydominant forest communities with *Carpinus orientalis* and steppe grassland vegetation (alliances *Saturejion montanae* and *Festucion valesiaca*) are developed on limestone habitats of Devica Mt. Despite the exceptional natural values and locality of many endemic and rare species (such as, for example, the rare and endangered relict species *Paeonia tenuifolia*) the Devica mountain is still unprotected.

We made six biodiversity plots and 15 additional normal plots at an altitude of 937-978 m a.s.l. The sampled vegetation belongs to steppe grasslands of the *Saturejion montanae* and *Festucion valesiaca* alliances. Among the most interesting plants, the following were recorded: *Hypericum rumeliacum*, *H. rochelii*, *Hyssopus officinalis*, *Gymnadenia conopsea*, *Himantoglossum calcaratum*.



Photo 4. *Himantoglossum jankae*. Photo: J. Dengler.



Photo 5. *Saturejion montanae* at Rtanj Mt. Photo: J. Dengler.



Photo 3. The xerothermic relict species *Paeonia tenuifolia*. Photo: C. Marcenò.



Photo 6. As a break from sampling on Devica Mt., we had lunch in the field. Photo: U. Jandt.



Photo 7. Belmuž is an old shepherd's dish and specialty from the mountain regions of eastern and south-eastern Serbia, Mt. Devica. Photo: C. Marcenò.

Recipe for belmuž

You need about 1 kg of cow or sheep full-fat cheese, teaspoon of salt and a cup of integral corn flour. Melt the cheese in a saucepan, then add salt and flour, and with a wooden spoon stir constantly until belmuž starts to separate from the walls of the saucepan. Stir approximately 20 minutes until the mixture becomes smooth and the fat of the cheese starts to separate. Belmuž was often made in the wild when the shepherds were celebrating the day of beginning the period for milking the sheep.

In the afternoon we went to Ozren Mt. with the highest peak being Leskovik (1174 m a.s.l.). Besides forest communities with *Quercus ceris*, *Q. frainetto* and *Carpinus orientalis*, there are relict communities developed on this mountain such as *Syringo-Carpinetum orientalis* and *Cotino-Syringetum vulgaris*. "Ozren Meadows" is under state protection and the habitat of two strictly protected and 22 protected species, such as endemic coral peony (*Paeonia corallina*). The grassland communities belong to the alliances *Cirsio-Brachypodium pinnati*, *Chrysopogono-Danthonion alpinae* and *Festucion valesiaca*.



Photo 8. Grassland vegetation of the alliance *Cirsio-Brachypodium* in the Ozren Mt. Photo: J. Dengler.



Photo 9. On the Ozren Mt. Photo: U. Jandt.

We sampled two biodiversity plots and two normal plots on the mountain Ozren at an altitude of 971-1013 m a.s.l. The sampled vegetation belongs to continental steppes of the *Festucion valesiaca* and subcontinental meadow-steppes of the *Cirsio-Brachypodium pinnati* with predominance of the species *Festuca valesiaca*, *Rhinanthus rumelicus*, *Briza media*, *Teucrium chamaedrys*.



Balkan endemic species *Ramonda nathaliae*.

Photo: <http://tesla.pmf.ni.ac.rs/sfses/Ramonda%20nathaliae.htm>



Serbian soldier, photo: Simson Čarnov, 1914. The drawing of the endemic species *Ramonda nathaliae* is a symbol to mark the Armistice Day in First World War. This is the so called "Phoenix flower". Even when it is completely dry, Natalie's Ramonda can be revived when humidified.

This species grows also at Mt. Kajmakčalan where Serbian soldiers had the hardest fighting in the First World War.



Photo 10. Jelašnička gorge. Photo: S. Palpurina.

5 July 2016 - Jelašnička and Sićevačka gorges

In the morning we travelled to Niš, the largest city in south-eastern Serbia, where we were accommodated for two days. Our first sampling destination was Jelašnička gorge which was formed by the activity of the Jelašnička river and is about 2 km long, and only 30 m wide. It is a nature reserve with more than 65 endemic and rare plants such as *Parietaria serbica*, *Crocus adamii*, *Pyrus nivalis*.

In the Jelašnička gorge we sampled 10 biodiversity plots and six additional normal plots at an altitude of 412-473 m a.s.l. We surveyed rocky dry grassland vegetation of the *Seslerion rigidae* and steppe vegetation of the alliances *Saturejion montanae* and *Festucion valesiaca*. The following species were predominating: *Artemisia alba*, *Satureja montana*, *Achillea clypeolata*, *Galium purpureum*, *Teucrium montanum*.



Photo 11. Lunch and refreshment near the Jelašnička river. Photo: S. Palpurina.

We had lunch and refreshment near the Jelašnička river and after that we went to the nearby Sićevačka gorge. The limestone Sićevačka gorge has been cut by the activity of the Nišava river into numerous caves, rock shelters and boulders. Jelašnička and Sićevačka gorges are the only locality in Serbia where the two Tertiary relicts and Balkan endemics - *Ramonda serbica* and *Ramonda nathaliae* - can be found growing together. Both gorges harbour a large number of endemic, relict and rare plant species such as *Achillea clypeolata*, *Tragopogon pterodes*, *Ruta graveolens*, *Prunus mahaleb* (tertiary relict), etc.

We sampled eight normal plots in the Sićevačka gorge at an altitude of 369-503 m a.s.l. The majority of the sampled vegetation belongs to steppe grasslands of the alliance *Festucion valesiaca* dominated by *Andropogon ischaemum*. We also surveyed stands of *Saturejion montanae* alliance. We have noticed that dry grassland vegetation in Sićevačka gorge is under serious threat by the spread of the invasive tree species *Ailanthus altissima*.

6 July 2016 - Suva planina Mt.

In the morning we went to Suva planina Mt., a Karst massif composed of sediments of different age, rich in fossil flora and fauna. It is a Natural Reserve harbouring 1244 plant species. The flora consists of many endemic, relict or protected species, according to several national and international criteria, such as *Achillea ageratifolia*, *Edraianthus serbicus*, *Lilium jankae*, *Silene sendtneri*, *Eryngium palmatum*, etc. Besides, two local endemics are present, the Pančič's columbine (*Aquilegia pancicii*) and Serbian rose (*Rosa serbica*). The north-exposed, cool and humid foothills slopes of the mountains are mostly covered with forests and the wind-exposed ridgetops and southern slopes are covered mainly by rocky pastures and meadows. The shrubby formation belts of the dwarf mountain pine (*Pinus mugo*) are restricted to the highest peaks, but at much lower altitudes than in other parts of Europe.

On the mountain Suva planina we sampled 10 biodiversity plots and 15 additional normal plots at altitudes from 1319 to 1555 m a.s.l. The majority of the sampled vegetation belongs to subcontinental steppe grasslands of the *Saturejion montanae* alliance. We also surveyed rocky dry grassland vegetation of the *Seslerion rigidae* alliance, including stands dominated by *Sesleria latifolia* or *S. filifolia* as well as stands dominated by *Festuca varia*.



Photo 12. Rocky dry grasslands of the Sičevačka gorge. Photo: S. Ačić.



Photo 13. Sampling a biodiversity plot at Suva planina Mt. Photo: N. Velev.



Photo 14. *Saturejion montanae* at Suva planina Mt. Photo: S. Palpurina.



Photo 15. *Seslerietum filifoliae* at Suva planina Mt. Photo: S. Palpurina.



Photo 16. Suva planina Mt. Photo: S. Palpurina.



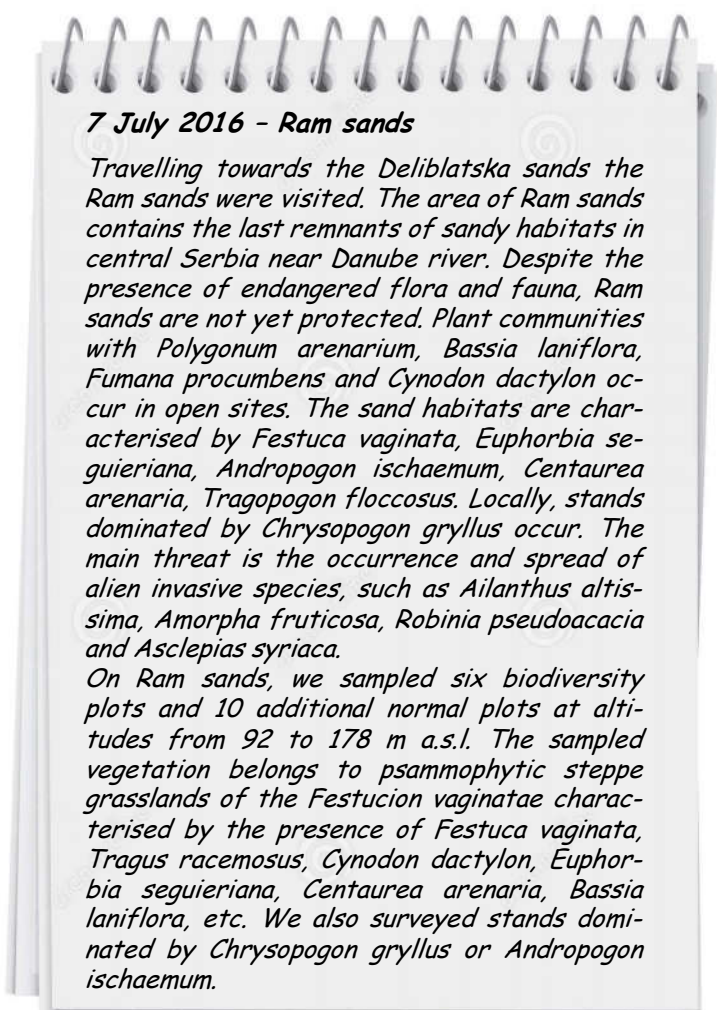
Photo 17. Travelling towards Deliblatska sands from Ram sands we had to cross the river Danube by a ferry. Photo: N. Velev.



Photo 18. Ram fortress built 1483 by Sultan Bayezid II. Photo: C. Marcenò.



Photo 19. Sand steppe vegetation on Ram sands. Photo: J. Dengler.



7 July 2016 - Ram sands

Travelling towards the Deliblatska sands the Ram sands were visited. The area of Ram sands contains the last remnants of sandy habitats in central Serbia near Danube river. Despite the presence of endangered flora and fauna, Ram sands are not yet protected. Plant communities with *Polygonum arenarium*, *Bassia laniflora*, *Fumana procumbens* and *Cynodon dactylon* occur in open sites. The sand habitats are characterised by *Festuca vaginata*, *Euphorbia seguieriana*, *Andropogon ischaemum*, *Centaurea arenaria*, *Tragopogon floccosus*. Locally, stands dominated by *Chrysopogon gryllus* occur. The main threat is the occurrence and spread of alien invasive species, such as *Ailanthus altissima*, *Amorpha fruticosa*, *Robinia pseudoacacia* and *Asclepias syriaca*.

On Ram sands, we sampled six biodiversity plots and 10 additional normal plots at altitudes from 92 to 178 m a.s.l. The sampled vegetation belongs to psammophytic steppe grasslands of the *Festucion vaginatae* characterised by the presence of *Festuca vaginata*, *Tragus racemosus*, *Cynodon dactylon*, *Euphorbia seguieriana*, *Centaurea arenaria*, *Bassia laniflora*, etc. We also surveyed stands dominated by *Chrysopogon gryllus* or *Andropogon ischaemum*.



Photo 20. *Festucion vaginatae* at Ram sands. Photo: S. Palpurina.

8-9 July 2016 - Deliblatska sands

During the last two days, we were in Deliblatska sands, the largest European continental sands located at the southern ridge of the Pannonian plane in southern Banat. They stretch between the Danube and the slopes of the Carpathian Mountains and characterised by a specific geological composition consisting of eolian silica-carbonate sands from the Pleistocene. Deliblatska Sands represents the largest sandy area in the south east of the Pannonian plain covering 900 km² in altitudes between 75 and 230 m a.s.l. A total of 34,829 ha are protected as nature reserve. Sand-steppe, *Juniperus communis* shrubs and mixed forests with *Tilia tomentosa* and *Quercus pubescens* are present as well as the flooded river islands and marshes of the Danube - the "Labudovo okno" Ramsar site.

Large areas of Deliblatska sands are under cultivation with *Pinus nigra*, *P. sylvestris* and *Robinia pseudoacacia*. Some of the strictly protected species are *Artemisia panicii*, *Astragalus dasyanthus*, *Colchicum arenarium*, *Paeonia tenuifolia* and *Pulsatilla vulgaris* subsp. *grandis*.



Photo 21. Steppe vegetation with *Chrysopogon gryllus* of the Deliblatska sands. Photo: U. Jandt.



Photo 22. Sand steppe vegetation of the Deliblatska sands. Photo: S. Palpurina.



Photo 23. Steppe vegetation of the Deliblatska sands. Photo: U. Jandt.

The Deliblatska sands is the richest part of the Vojvodina province in terms of rare steppic plants such as *Rindera umbellata*, *Iris pumila*, *Adonis vernalis*, *Hesperis tristis*, *Prunus tenella*, *Centaurea sadleriana*, *Peucedanum arenarium*, *Alyssum tortuosum* and *Festuca vaginata*. The main natural vegetation type is the forest-steppe on sandy soils, along with pioneer vegetation on sands, sandy steppe with *Festuca vaginata* and, well developed steppe communities with *Chrysopogon gryllus* on sandy chernozem. Natural forests are restricted to north facing dunes. In the last hundred years, the vegetation coverage has been changed by intensive planting of pine and false acacia forests and the cessation of grazing.

In Deliblatska sands, we sampled 16 biodiversity plots and 11 additional normal plots. The altitudes ranged from 137 to 186 m a.s.l. The sampled vegetation belongs to psammophytic steppe grasslands of the *Festucion vaginatae* alliance dominated by *Fumana procumbens*, *Centaurea arenaria*, *Koeleria glauca*, as well as the endemics *Festuca wagneri* and *Tragopogon floccosus*. We also surveyed stands with dominance of *Chrysopogon gryllus*. We saw infructescences of the very rare steppe species *Rindera umbellata* on the edge of the forest.

Review of current state, threats and necessity of conservation of the original flora and fauna of East Ukraine steppes

Victor Tokarsky*, Nadezda Tokarskaya

V.N. Karazin Kharkiv National University, Svobody sq. 4, 61077, Kharkiv, Ukraine, v.tokarsky@mail.ru

*) Corresponding author

Bulletin of the Eurasian Dry Grassland Group 34 (2017): 32-37

Abstract: On 01/01/2016 the system of protected areas of Ukraine is composed of 8184 areas and facilities comprising a total area of 4.082.780,55 hectares within the national territory of Ukraine. This article provides a brief description of the protected areas in Eastern Ukraine. Subsequent to surveys of the vegetation of the Oskol river valley, in which the regionally typical flora is well preserved, the National Natural Park «Dvorichanskyi» was established in 2009, with an area of 3.131,2 hectares, on the territory of the Dvorichna district of the Kharkiv region. The priority for protection in the National Nature Park (NNP) "Dvorichanskyi" and Botanical National Reserve "Vovchanskyi" are chalky slopes of the River Oskol and River Vovcha valleys with their unique flora. The 28 plant species and 32 animal species included in the Red Data Book of Ukraine, are resident in the NNP "Dvorichanskyi". The vegetation of chalk outcrops is represented by a great number of obligate chalk grassland endemics and relict species. Because of their continual decline, these steppe areas require urgent conservation actions.

Keywords: Cretaceous flora; National Nature Park "Dvorichanskyi"; pasture load; Regional Landscape Park "Velykoburluisky Step"; steppe mammals.

Introduction

The history of Eastern European steppes suggests that the area has always been used for grazing. For many centuries, the steppe zone of Ukraine had been populated by nomads: Scythians, Sarmatians and other pastoral peoples. Later these were replaced by the Huns and Khazars. After the Khazars were defeated by Prince Svyatoslav, the southern steppes were settled by Cumans and Tipchaks. In the early Middle Ages, the steppes were occupied by the tartars, who gradually mixed with the Tipchaks and founded their powerful Khanate "Golden Horde". The Tatars were subsequently replaced by Cossacks. Until that time, the steppes were used only for grazing, as the nomadic peoples did not engage in farming and did not harvest hay. In the mid 17th century, the steppe zone of Ukraine looked like a large desert space, «Loca Deserta». Prior to the 18th century, when farmers replaced the nomads, unpopulated steppes had been at the stage of fallow grassland demutation, called "The Wild Field".

It is important to note, that initially the Russians and Ukrainians, who settled the 'Borderland' steppes, did not engage in arable farming because of the constant raids of the nomads. For a long time, the forest-steppes along the Dnieper and Don Rivers had been devastated by the tartars. Particularly large raids took place during the second half of the 15th and during

the 16th centuries. In this area, steppes and forests dominated over fields even before the Tatar pogroms. The devastation of Russian forest-steppes by nomads increased the area covered with natural vegetation, as the abandoned arable lands turned into steppes or were overgrown by forest (Kirikov 1959).

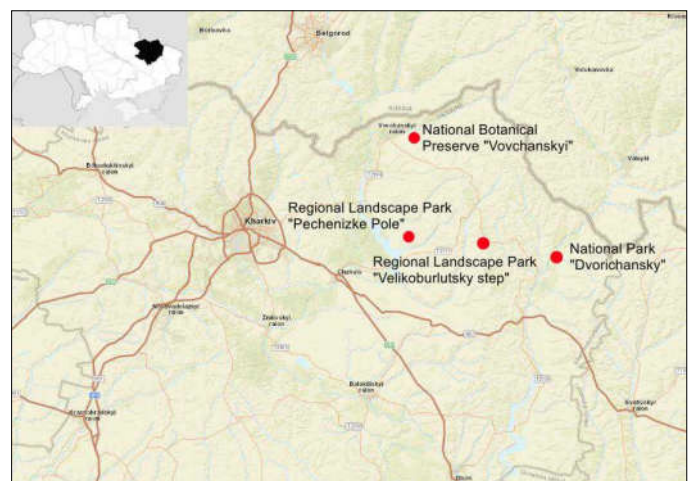


Fig. 1. Territory of nature reserve fund of the Kharkiv region, where the studies were conducted.

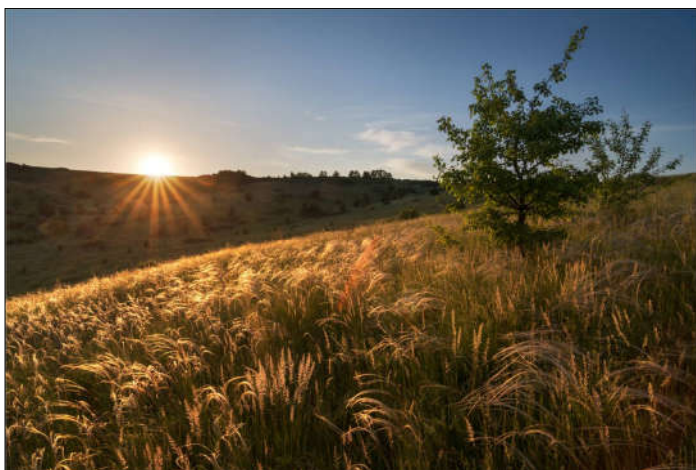


Fig. 2. Regional Landscape Park «Velykoburlukyskyi Steppe».
Photo: V. Tokarsky.

With the development of agriculture and population increase, steppes were gradually turned into farmlands. This process is being observed to date. During the 20-21st centuries, the use of the remaining virgin steppes intensified so much that it affected both plant and animal assemblages.

The structure of the protected areas system in Ukraine includes 11 categories of territories and objects of national and local importance. Of these, numerically the largest part comprises natural monuments, nature reserves and protected woodlands, which constitute about 90% of all existing objects and 80% of protected areas properties account for reserves and national natural landscape and regional parks.

On 01.01.2012 in Ukraine there were 641 protected areas and objects of national importance: 19 natural reserves, four biosphere reserves, 47 national parks, 307 nature reserves, 132 natural monuments, 18 botanical gardens, seven zoological parks, 19 dendrological parks and 88 park-monuments of garden-park art.

Materials and Methods

Kharkiv region is located at the junction of two physiographic regions - steppe and forest-steppe. Its area comprises about 6% of Ukraine and totals 31.415 km². Steppes comprise about two thirds of the region (south and east), forest-steppe about 1/3 of the region territory (mostly in northern and western parts). In addition, the species composition of the regional teriofauna is associated with the basins of the major rivers - the Don (East) and the Dnieper river (western part) (Fig. 1).

Description of sites

Regional Landscape Park “Velykoburlukyskyi Steppe” (total area 2042.6 ha)

Currently there are no steppe sites of considerable area size among the protected sites of the Kharkiv region. Steppe vegetation is preserved only on small fragmented areas. Therefore, with the addition of the Regional Landscape Park “Velykoburlukyskyi Steppe” to the system of protected areas of the region, the representation of forb-bunchgrass steppes in the regional protected areas has increased significantly (Fig. 2).

The park’s territory is characterized by a system of gullies and ravines cut into an elevated plateau, which is a typical landscape pattern in the south of the Central Russian Upland. Prior to the total plowing of the steppes, regional herbaceous vegetation was represented by plant communities of various transitional types, from meadows to the eastern variant of forb-bunchgrass steppes. In the past, forests occupied a considerable area on the right bank of the river Velykyi Burluk but nearly all of these have been cut down since then.

Over 40 species of vascular plants growing in the park require protection. Six of these are on the verge of disappearance: two *Adonis* species (*Adonis vernalis*, *A. wolgensis*), *Veratrum lobelianum*, *Gentiana cruciata*, *Bellevalia sarmatica* and *Ornithogalum boucheanum*.

Nine plant species of steppe sites near Nesterivka are listed in the Red Book of Ukraine: *Pulsatilla pratensis*, *Vinca minor*, *Platanthera bifolia*, *Dactylorhiza incarnata*, three feather-grass species (*Stipa capillata*, *S. lessingiana*, *S. pulcherrima*), *Fritillaria meleagroides* and *Ornithogalum boucheanum* (Fig. 2).

The mammals of the park are represented by the European polecat (*Mustela putorius*), Steppe polecat (*M. eversmanni*), Stoat (*M. erminea*), Least weasel (*M. nivalis*), American mink



Fig. 3. Two red list species are found together in the park: *Adonis vernalis* and *Paeonia officinalis* in NNP «Dvorichanskyi». Photo: V. Tokarsky.



Fig. 4. *Marmota bobak*. Photo: V. Tokarsky.

(*M. vison*), European otter (*Lutra lutra*), European badger (*Meles meles*), Beech marten (*Martes foina*) and European pine marten (*M. martes*), Gray wolf (*Canis lupus*), Red fox (*Vulpes vulpes*) and European hare (*Lepus europaeus*). A very rare species, the European marbled polecat (*Vormela peregusna*) was found in the park. The Raccoon Dog (*Nyctereutes procyonoides*) has been acclimatized in this region. A common sight in the park is the marmot (Fig. 4).

The European bee-eater (*Merops apiaster*) is also found in the park.

Regional Landscape Park “Pechenizke Pole” (total area 4997.6 ha)

The “Pechenizke Pole” Regional Landscape Park is situated in the Martove District of the Kharkiv region. It encompasses the lower part of the gully Hnylytsia, which stretches from east to west for 8 km and runs into the Pechenizke reservoir. The river of the same name flows along the bottom of the gully. The gully bottom is wide (up to 250 m) and swampy, with a system of ponds. Another gully of 3.5 km length, Sulymiv Yar, is located in the southern part of the park. The Hnylytsia gully is lightly sloping while the Sulymiv Yar has steep or sheer slopes. In general, the park is characterized of gentle, rolling relief. The vegetation of the natural sites of the park is dominated by steppe, meadow and marsh communities; anthropogenic forests also occupy a large area.

Characteristic vegetation of meadow steppes is represented on gully slopes by *Festuca valesiaca* communities which alternates with communities of *Poa angustifolia*, *Koeleria cristata*, *Cerasus fruticosa* and *Bromopsis riparia*. One can often see various species of steppe-meadow motley vegetation, such as *Coronilla varia*, two *Achillea* species (*Achillea submillefolium*, *A. setacea*), *Leucanthemum vulgare*, *Plantago media*, *P. lanceolata*, *Campanula sibirica*, etc. On the driest plots, the typical residents of genuine steppes, namely *Goniolimon tataricum* and *Stipa capillata*, can also be found. Shores of water bodies in the gully bottom are covered with dense growth of sedges.

National Nature Park “Dvorichanskyi” (total area 3131.2 ha)

Among the unique natural territories of Ukraine, outcrops of chalk rocks hold a special place. The National Nature Park ‘Dvorichanskyi’ has been created for the protection of the nature communities of chalk lands. It encompasses beautiful spots in the Upper and Middle Oskil river basin in the Kharkiv region. White mountains rise above the river, chalky cliffs and slopes cut down with gullies and are covered with folds, creating a mountain-like landscape in the river valley.

Chalk is an ancient bedrock, usually buried under a thick layer of sediments of subsequent eras. More than 100 million years ago, in the second half of the Cretaceous period, the territory of the Russian platform was covered with a sea of 200 m depth. Chalk was formed in the moderate water depths, from the gradual accumulation of minute calcite plates (coccoliths) shed from micro-organisms called coccolithophores. It is common to find the petrified remains of fossil mollusks as belemnites, some species of cephalopods, oysters etc. embedded in chalk.

The uniqueness of these terrestrial habitats is determined by the physical properties of chalk; in particular, high reflecting capacity, and its existence as a whole unbroken upper layer, without splits. Small fluctuations in seasonal and diurnal temperature and moisture, not only of the chalk bedrock itself but also of the adjacent air layer, result in lower air temperatures near the soil surface. Even on a hot summer day, it does not exceed 12-17°C.

All this creates very specific environmental conditions for the formation of a unique flora and fauna on chalk deposits. Among the plants of chalky slopes, a so-called ‘Hyssop flora’ is the notable. It includes plants that grow exclusively on chalky soils. This is an ancient group of species whose existence dates back to the pre-glacial period. Another group characteristic to this area is the so-called “lower Alpine plants” which are thought to have originated from mountain species. Many of these are also relicts of the pre-glacial era.



Fig. 5. Chalky outcrops on the River Vovcha. Photo: V. Tokarsky.



Fig. 6. European otter (*Lutra lutra*). Photo: V. Tokarsky.

The unique flora of the cretaceous outcrops attracted the attention of researchers for centuries. Already in the eighteenth century, P.S. Pallas recognized its importance. However, the comprehensive description of the chalk flora was first presented much later by the famous botanical geographers A.N. Krasnov (1893), V.I. Taliev (1904) and E.M. Lavrenko (1956).

Since the 1980s, the vegetation on cretaceous outcrops was carefully studied by L.N. Gorelova and co-workers from the Associate Kharkiv National University (Gorelova 1987; Gorelova & Alekhin 1999; Gorelova & Gorelova 2003; Gorelova et al. 2006). Typical plant communities of this area consist of numerous representatives of the “lower alpine plants” such as *Androsace koso-poljanskii* and *Carex humilis*, and many species of the “Hyssop flora”: *Asperula tephrocarpa*, *Diplotaxis cretacea*, *Polygala cretacea*, *Festuca cretacea*, *Koeleria talievii* and others.

Typical steppe grasses also occur on the slopes: *Bromopsis riparia*, *Poa compressa*, *Festuca valesiaca* and *Stipa capillata*. These grow together with forbs: *Reseda lutea*, *Scabiosa ochroleuca* and *Thesium arvense*. Bright colorful plants also adorn chalky slopes such as: *Teucrium polium*, *Bupleurum falcatum*, *Linum ucranicum*, *Salvia nutans* and *Crinitaria villosa*.

Thirty seven plant species found in the park require protection, of which 30 species are listed in the Red Book of Ukraine. Twenty two of these are species which grow only on calcareous soil, so they occur locally only in the chalk lands (Fig. 5).

The mammals of the park are represented by the European polecat (*Mustela putorius*), Steppe polecat (*M. eversmanni*), Stoat (*M. erminea*), Least weasel (*M. nivalis*), American mink (*M. vison*), European otter (*Lutra lutra*), European badger (*Meles meles*), Beech marten (*Martes foina*) and European

pine marten (*M. martes*), Gray wolf (*Canis lupus*), Red fox (*Vulpes vulpes*) and European hare (*Lepus europaeus*) (Fig. 6, 7).

A very rare species of mammal, the European marbled polecat (*Vormela peregusna*), has also been found in the park. The Raccoon Dog (*Nyctereutes procyonoides*) has become acclimatized and thrives in this region.

The Eurasian beaver (*Castor fiber*) appeared in the region in the 1980s, and since that time it has been living in the Oskil and Nyzhnia Dvorichna river valleys. Only two species of ungulates are common in the park, the Wild boar (*Sus scrofa*) and the European roe deer (*Capreolus capreolus*). Migrations of the Eurasian elk (*Alces alces*) have also been recorded in the park.

National Botanical Preserve “Vovchanskyi” (total area 185.0 ha)

The National Botanical Preserve ‘Vovchanskyi’ was established to protect the relic flora and vegetation of the chalk deposits located on the right bank of the Vovcha river, a tributary of the Siverskyi Donets river. This preserve consists of six separate sites (Fig. 8).

Chalk land vegetation is characterized by a large variety of rare, relic and endemic species. The Vovchanskyi preserve is situated on the border between the forest-steppe and steppe natural zones and it belongs to the so-called ‘southern calcareous region of the flora of the Central Russian Upland’. Two vegetation types coexist here: the northern ‘dealpine vegetation’, associated with limestones, and the southern thyme communities, associated with chalks. Such a combination of two plant communities, as well as a rolling relief and peculiarities of chalk deposits, lead to the development of an abundant and diverse local flora.

Chalk outcrops along the Vovcha river are a valuable reserve of rare species. About 60% of chalky plants occurring only in the Siversky Donets basin grow here. All the stages of chalk land plant succession are observable on the slopes, from pioneer species, semi-shrub communities (thymus and sagebrush assemblages) to steppe communities. In general, the

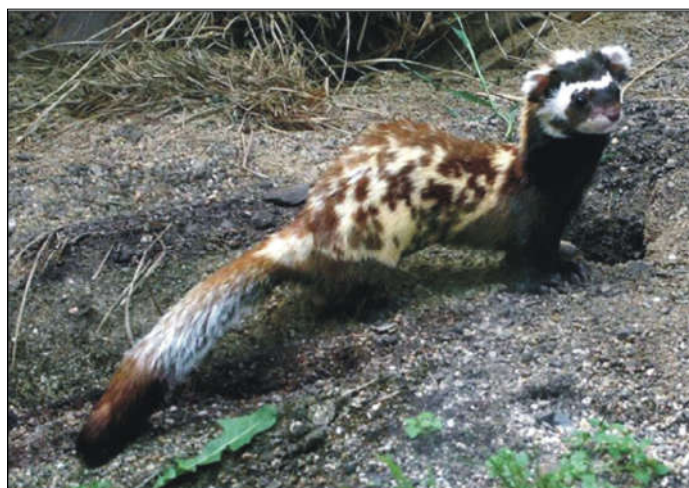


Fig. 7. European polecat (*Mustela putorius*).

Photo: G. Molodan.



Fig. 8. The National Botanical Preserve 'Vovchanskyi'.

Photo: V. Tokarsky.

flora of chalky plots includes more than 500 species of vascular plants.

Associations of the *Artemisia hololeuca* are one of the oldest; they are remnants of plant communities belonging to the late Tertiary (pre-glacial) period.

A more fertile soil layer has accumulated in the lower part of the steep slopes and populated with grasses, forbs and thymus. Some species that are rare for the Kharkiv region and can be found here are *Anemone sylvestris*, *Clematis integrifolia*, *Adonis vernalis* and *Hyacinthella leucophaea*.

The flora at the edges of the oak forest on the northern slopes on the right bank of the Vovcha is more diverse. Some species that are rare in the Kharkiv region and which can be found in this area are *Anemone sylvestris*, *Vinca minor*, *Stipa pennata*, *Ornithogalum gussonei*, and *Iris hungarica*. One very rare plant from the pre-glacial period is *Daphne sophia* (Fig. 9.). Arboreal and shrub vegetation is represented by thickets of *Prunus spinosa* and *Acer tataricum*, as well as by grouped and solitary trees of the species *Ulmus suberosa*.

Currently, scientists from the Kharkiv National University are conducting research aimed at the establishment of a National Nature Park of up to 5.000 ha in the vicinity of the Vovcha river.

Discussion

The Steppe, being the most transformed natural zone in Ukraine, occupies 40% of the country. No more than 3-5% of the territory has remained in its natural state, and only less than 1% of these virgin areas have been included in the network of objects of the Nature Conservation Fund. Despite the great efforts of the scientific community, degradation of the environment, caused by intensive human economic activities, continues to destroy natural ecosystems, which results in a decrease in number or disappearance of many species of animals and plants. Mammal species such as the beaver, marmot, badger, steppe polecat, marbled polecat and great jerboa, used to be common in Eastern Ukraine. By the end of

the 20th century, many of these species had disappeared. Many species which were considered pests, such as the ground squirrel and common hamster, have now been exterminated.

Currently the protected territories of forb-fescue-feather grass steppes in the Kharkiv region comprises 7642,9 hectares (within Regional Landscape Parks "Pechenizke Pole" and "Velykoburlukskyi Steppe"). We are in the process of organizing yet another nature reserve for steppes conservation, the natural steppe park "Skhidnyy steppe" in Volchansk.

The flora of the Velikiy Burluk and Chuguev districts of the Kharkov region, of about 10 thousand hectares, reflects the characteristics of steppes of this region. Meadow steppes of the central part of the Eastern Forest Steppe (on the left bank of Dnieper River) and real steppes of the extreme eastern part of Ukraine (Middle-Russian Forest Steppe sub-province), with abundant groups of low steppe bushes and feather grasses are present here.

The vegetation of chalk outcrops is represented by a great number of obligate chalk grassland endemics and relict species. Recently, because of ongoing reduction of steppe areas located on chalk outcrops, the issue has been raised of the necessity of protecting this relic chalk flora. Subsequent to study of the vegetation of the Oskol river valley, in which a regionally typical flora is well remained, the National Natural Park «Dvorichanskyi» has been established, with an area of 3131.2 hectares (Dvorichna district of the Kharkiv region).



Fig. 9. Very rare relict plant *Daphne sophia*.

Photo: M. Bannik.

Currently, work is underway to expand this to 10000 hectares. There are plans to create a bilateral nature preserve on the border of Ukraine and Russia in the Oskol river valley in the future. Preliminary work on this has already been initiated.

We also propose to recall the Lugansk Nature Reserve with its branches, the "Streltsovskaya steppe", which was organized primarily for the conservation of the steppe marmot, and the "Provalski steppe", in Eastern Ukraine.

In the future we will work towards the establishment of a bilateral nature reserve on the border with Russia, on the Idar river. In this region the Natural Reserve "Belogorie" has already been established on Russian territory.

The wild gregarious ungulates, which comprise integral components of open and semi-open landscape ecosystems, already disappeared from the region in historical time. Over the last (second) Millennium, these ecosystems have been broadly influenced by domestic, rather than wild, ungulates and the effect of grazing has been distributed in varying degrees to all components of the steppe ecosystem.

Significant changes in management regimes, primarily the decline of the livestock sector and grazing, has occurred throughout the steppe zone. In our opinion, cattle grazing combined with ravines and beams is a key factor in forming the environment for many steppe animals. The phenomenon of the revival of the Steppe marmot population highlights the role of large ungulates (in historical time large manage ungulates) in maintaining the stability of steppe ecosystems (Tokarsky 2015; Tokarsky et al. 2011).

Currently prevailing conservation practice results in the complete exclusion of pasture management from protected areas, which is incompatible with the sustainable management of the most prominent representatives of the steppe biota.

References

- Gorelova, L.N. 1987. Flora i rastitel'nost' v rajone srednego techenija reki Sev. Donec. // Vestnik Har'k. - Flora i rastitel'nost' srednego techenija r. Sev. Donec i voprosy ee ohrany [The flora and vegetation in the middle reaches of the River North. Donets. Bulletin of Kharkov. University - Flora and vegetation middle course. North. Donets and questions of its protection] 308: 8-16. [In Russian]
- Gorelova, L.N. & Alekhin, A.A. 1999. Redkie rastenija Har'kovshiny (Sistematicheskij spisok redkih sosudistyh rastenij, voprosy ih ohrany) [Rare plants Kharkiv (Systematic list of rare vascular plants, the issues of their protection)]. – Kharkiv, 52pp. [In Russian]
- Gorelova, L.N., Alekhin, A.A. & Saidahmedova, N.B. 2006. Po rezul'tatam analiza osnovnoj populjacji fitocenotipov redkih sosudistyh rastenij Har'kovskoj oblasti. Issledovanija v prirodnom rezervnom fonde Har'kovskoj oblasti. Sobrannye stat'i [By the analysis of the main population fitotsenotipov rare vascular plants Kharkov region. Research in the natural reserve fund Kharkiv region]. *Collected articles. Kharkov* 2: 31 -356. [In Russian]
- Gorelova, L.N. & Gorelova, E.I. 2003. Rastitel'nyj pokrov na melovyh obnazhenijah gde planiruetsja sozdanie nacional'nogo parka «Dvorichanskij». Nauchnye issledovanija v prirodnom rezervnom fonde Har'kovskoj oblast [Vegetation cover Cretaceous outcrops planned national park "Dvorichanskyi". Scientific research in the natural reserve fund Kharkiv region]. *Collected articles. Kharkov* 1: 23 -287. [In Russian]
- Krasnov, A.N. 1893. Topografija, rastitel'nost' i pochvy Har'kovskoj gubernii [Topography, vegetation and soils of the Kharkov province] Dokl. Har'k. Islands agric. Households Islands, 140 pp. [In Russian]
- Kirikov, S.V. 1959. Izmenenija v zhivotnom mire v prirodnyh rajonah SSSR. Stepnaja zona i lesostep' [Changes in wildlife in natural areas of the USSR. The steppe zone and forest-steppe]. M.: 174 pp. [In Russian]
- Lavrenko, E.M. 1956. Stepi i sel'skohozjajstvennyje zemli na meste stepej. Rastitel'nyj pokrov SSSR [Steppe and agricultural land on the spot steppes // vegetation cover of the USSR]. - Moscow, Leningrad: AN SSSR. T. 2. pp. 595-730. [In Russian]
- Taliev, V.I. 1904. Rastitel'nost' melovyh obnazhenij Juzhnoj Rossii [Cretaceous outcrop vegetation of southern Russia]. P.1. *Tr. Society. Life test. Har'k nature. Univ* 39(1): 81 -238, Part 2, ibid, 1905, p.4, v.1, pp. 1 -282. [In Russian]
- Tokarsky, V.A., Ronkin, V.I. & Savchenko, G.A. 2011. Istorija evropejskogo stepnogo surka i sovremennost' [European steppe marmot history and modernity.] Kharkov: Kharkov im.V.N. Karazina. 256 pp. [In Russian]
- Tokarsky, V.A. 2015. Pastbishhe krupnyh kopytnyh zhivotnyh kak kljuhevoj jekologicheskij faktor, vlijajushhij na kolebanija estestvennoj sredy obitanija stepnyh rastitel'nojadnyh mlekopitajushhij [A pasture of big ungulate animals as key ecological factor influencing on the fluctuation of natural habitat of Steppe herbivorous Mammals]. *Vestnik zoologii. Kiev* 2: 451- 463. [In Russian]

Chronicles of the protection of Tarutyns'kyj Steppe

Oleksiy Vasyliuk

Ukrainian Nature Conservation Group, Environment-People-Law (EPL), Gogol str., 40, 08600 Vasyliukiv, Ukraine; vasyliuk@gmail.com

Bulletin of the Eurasian Dry Grassland Group 34 (2017): 38-41

Abstract: During the last months of 2016, a public campaign began in Ukraine to protect the reserve "Tarutyns'kyj Steppe" from ploughing. It became the largest environmental campaign in 2016. The reason for the ploughing was actions of the Ministry of Defence that were in contravention of the protection statutes¹. The campaign was successful in stopping the destruction of the landscape reserve. Also, a joint working group with members from two ministries (Ministry of Environment and Ministry of Defense) was created. The working group, together with the public, will monitor cases of the negative impact of military activities on the protected areas.

Keywords: Biodiversity; conservation; Emerald Network; environmental impact; Odesa Oblast; protected areas.

In EDGG Bulletin 33, we reported on the imminent threat of ploughing to the landscape reserve "Tarutyns'kyj Steppe" in Ukraine (Odesa Oblast) at the end of 2016 (Vasyliuk et al. 2017). Within a few days after the news emerged of ploughing at the Tarutyns'kyj Steppe, this turned into the major environmental topic of 2016 and has evolved into the largest environmental campaign in Ukraine for the entire year. The campaign quickly attracted attention abroad and soon yielded positive results. However, the future of the reserve remains uncertain. We consider it necessary to elaborate on the events in the Odesa Oblast that occurred so rapidly almost overnight, at the end of 2016.

The "Tarutyns'kyj Steppe" is a landscape reserve of local importance and was created by the decision of the Odesa Regional Council No. 445-V on 26th April 2012 and covered an area of 5200 hectares. The territory of the reserve is the central part of the former Tarutyns'kyj military ground (24,500 hectares, existed from 1945 to 2004). The main value of the reserve is ecosystems of forb-fescue-feather grass and fescue-feather grass of virgin and secondary steppes, with domination of feather grass (*Stipa capillata*, *S. lessingiana*, etc.), fescue and bluegrass. Among the animals that are abundant in the area are almost 40 species that are listed in the Ukrainian Red book. The population of steppe birch mice is one of the last in Ukraine. The Tarutyns'kyj Steppe is particularly valuable for the preservation of rare species of steppe birds.

Since the area used to be part of the military training ground (former Tarutyns'kyj military ground), it remained almost unaffected by human activities for many decades. In Soviet period, a polygon was located on the border of Ukrainian and Moldavian SSR which did not clear boundaries. After the collapse of the Soviet Union, the polygon was just a few kilometres away from the national border and could not continue to

operate any longer because the polygon was originally intended for artillery and, accordingly, implies the presence of the military contingent and heavy weapons. Military trainings near the state border and deployment of armed units could become a factors of social tension in Moldova.

After the dissolution of the military polygon, a large part of its territory was distributed rapidly for cultivation such as the establishment of vineyards. In total, about 18,000 hectares of the steppe were lost. However, even the 20% of the territory that was protected make "Tarutyns'kyj Steppe" the second largest area of protected steppe in Ukraine (after Askaniya-Nova).

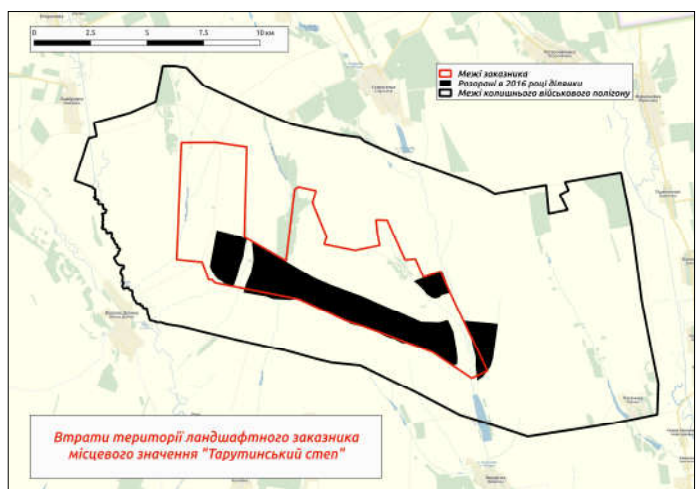


Fig. 1. Loss of territory of the landscape reserve of local importance "Tarutyns'kyj Steppe" (red line-borders of the reserve, black line-borders of the former military training ground, black area-ploughed in 2016).



Fig. 2. *The colors of the Tarutyns'kyj steppe. Photo: I. Rusev.*

Due to the large size of the area that requires management, it was originally planned to create the regional landscape park (RLP) "Tarutyns'kyj Steppe" on the entire area of the polygon. In 2006, a project for the development of such a park was financed by the regional fund for environmental protection. Veselodolinskii village council agreed on the creation of the RLP. However, the district council rejected the application. The initiators of the proposal to establish a conservation area reconfigured the application from RLP to landscape reserve, and managed to achieve the decision-making. In the form of a landscape reserve, the territory gained protected status in 2012. During a hearing of the Committee on environmental policy of the Supreme Council of Ukraine under the title "Protected areas: problems and solutions" on 18th November 2013, there were also suggestions to proclaim Tarutyns'kyj Steppe a national nature park.

The territory of the reserve was included in the Emerald network in November 2016 by the Secretariat of the Berne Convention.

In 2007, the Military Prosecutor's office began to fight in court for the decision of the Tarutyns'kyj District Administration, under which farmers were given land, and the land, according to the Ministry of Defence, had to be transferred to their possession. Seeking to reverse a decision of the administration in court, the Ministry of Defence stated that it "returns" the land at its disposal, and not just in the composition of the landscape reserve of the district.

The question remains open regarding to whom the areas should "return" in accordance with the decisions of the courts. However, environmentalists can not be parties to a land dispute between the Ministry of Defence and the Tarutyns'kyj District Administration, as this question does not apply to protected areas.

However, the decision of Tarutyns'kyj District Administration on the confirmation of the reserve of 24.09.2012 was subsequently cancelled by the court. During the next stage, the Military Prosecutor's attempted to cancel this decision in the regional Council on the establishment of the landscape reserve. However, it should be noted that bodies of the Prose-

cutor's office can only protect the public interest and not the interests of other agencies.

Therefore, a conflict started at the beginning of October 2016, when the ploughing started in the reserve. The ploughing was conducted by LLC "Chance 2016" under a contract (No. 5-2016 of 13th July 2016), concluded with the Belgorod-Dnestrovsky Management Unit of the Ministry of Defence. The contract between the Belgorod-Dnestrovsky Management Unit of the Ministry of Defence and the farmers was concluded with violation of procedure, as law does not envisage the form of the document "agreement on joint cultivation of agricultural products".

However, the land belongs to neither one nor the other side, as neither of them possess documents relating to land rights. Finally, the contract was never registered, and neither environmentalists, nor even local officials knew about it before the commencement of ploughing.

On 21st October, the Tarutyns'kyj District Council appealed to the Prime Minister, Minister of Ecology and Natural Resources, Minister of Defence, the Chairman of the Odesa Regional State Administration and the Chairman of Odesa Regional Council, with a request to stop the ploughing of the reserve. However, there was no reaction. Legal action hurriedly filed by the Tarutyns'kyj District Administration for the protection of the reserve did not make proper impression on farmers as well.

However, news about the ploughing had rapidly spread and became the major ecological theme at the end of the year. One of the decisive factors in the indignation of the public was the public statements of the adviser to the President of Ukraine on questions of defence, S. Biryukov, about the inappropriate existence of the reserve.

A large number of Ukrainian organizations, the European offices of WWF, the Eurasian Dry Grassland Group (EDGG) and others appealed to the Prosecutor General of Ukraine and the President of Ukraine with requests to stop the destruction of the reserve. The central and local mass media of



Fig. 3. *Ploughing of the Tarutyns'kyj steppe. Photo: I. Rusev.*



Fig. 4. Feather-grass sea of the Tarutyns'kyj steppe. Photo: I. Rusev.



Fig. 5. Ploughing of the Tarutyns'kyj steppe. Photo: I. Rusev.

the Odesa Oblast also supported the defenders of the reserve.

On 6-10th November, Odesa environmentalists visited the site of the ploughing and witnessed the detonation by soldiers of ammunitions collected by farmers. During this incident, led by the leaders of the national park "Tuzlovsky Limans", I. Ruseva and I. Vykhristiuk, the ploughing was successfully stopped. A video of the environmentalists stopping a huge tractor with their bodies achieved much coverage in both Ukrainian and European media.

On 10th November, two press conferences were held by the defenders of Tarutyns'kyj steppe, one in Kiev and the other in Odesa. The expert in botany (PhD) of the Odessa University, E. Popova, estimated economic losses resulting from this unauthorized activity in the at 2 million Euro. Experts from ELP and WWF estimated the damage to biodiversity of the reserve at 13 billion UAH. These press conferences and their reports of such extensive amounts of damage resulted in the activation of the local and national media, which unanimously took the side of saving the reserve.

On 11th November, the Ministry of Natural Resources of Ukraine held a working meeting on the Tarutyns'kyj steppe. The representatives of the Ministry of Natural Resources, Ministry of Defence, the Odesa Regional State Administration, the State Ecological Inspection, International Charitable Organisation "Ecology-Law-People", WWF, National Ecological Centre of Ukraine, Centre for Regional Studies, Odessa University and the Institute of Botany named after M. Kholodny and other institutions and organizations attended the meeting. The main points included in the minutes of the meeting were: the adoption of urgent measures to stop illegal activities, such as ploughing, in the Reserve. In addition, instruction of Odessa Ecological Inspection to estimate the damages caused by these activities.

On 12th November, a meeting of International Charitable Organisation "Ecology-Law-People" with defence Minister S. Poltorak (initiated by the Minister) took place, with the result that agreements were reached on the cessation of ploughing and even possible actions on restoration of steppe natural complexes.

On 21st November, 2016 in the Odesa Regional Administration, a meeting dedicated to the preservation of the unique Tarutyns'kyj steppe was held. A number of key figures, such as the head of the Environmental Department of the Regional State Administration and the head of the Ecoinspection did not attend the meeting, and the leader, executive governor S. Bobrovskaya, arrived 1.5 hours late. On 25th November, a Commission of the Ministry of Defence arrived in Odesa to investigate the situation regarding the lands of the Ministry. With high probability, the tasks of the Commission was to find a way out of a very awkward situation in which the Belgorod-Dnestrovsky apartment management unit has put the leadership of the Ministry. On the same day, activists of the Regional Studies Centre gathered journalists in the complex "Frumuschika-Nova" to discuss the future of Tarutyns'kyj steppe. On the same day, after the departure of the reporters, the "tenant" of the reserve, the entrepreneur "Mikhailenko", resumed ploughing the reserve at nightfall.

On 28th November, a meeting was held at the level of the Ministries of Environment and Defence.

On 29th November, the OSCE representatives held consultations in Odesa Oblast with the defenders of Tarutyns'kyj steppe.

On 12th December, the Odesa economic court, under the claim of International charitable organization "Ecology-Law-People" against PE "Chance-2016", which had been responsible for the ploughing, granted the petition and delivered a judgment, which stated: "With the purpose of preventing the destruction of the unique landscape of the reserve, to accept the petition on the claim by prohibiting PE "Chance 2016" or any other person, to plough the land or carry out any other excavation work".

After the court decision, the position of the local Prosecutor's office has changed significantly. The acting Military Prosecutor of the southern region of Ukraine, P. Vizniuk, announced on 16th December that the contracts which violate the Land code of Ukraine, law of Ukraine "About use of lands of defence" were concluded by Belgorod-Dniestrovsky apartment operational unit. At the same time, the Belgorod-Dniestrovsky apartment management unit sent letters to PE

"Chance 2016" and to physical person - entrepreneur A.V. Mikhailenko about the necessity to cease agricultural work in the reserve.

On December 19, the court upheld the previous decision, that till the end of the trial all works must be stopped..

On 22nd December, in the building of the Supreme Council of Ukraine, a presentation of the anti-ecological prize "Beastliness of the year" ("Svynstvo roku") was held. Environmentalists, journalists and politicians proposed "awards" to those who in 2016 should be remembered for their unfulfilled commitments and promises in the field of environmental protection and the protection of the environmental rights of citizens. The People's Deputy of Ukraine, Ostap Yednak, in the nomination "The Destroyer of the Natural Heritage" has announced the winner as the Minister of Defence, S. Poltorak, for the destruction of the reserve "Tarutynskiy Steppe".

On 23rd December, during the "government question time", Ostap Yednak presented a certificate and a medal with the image of a pig's snout to the Minister.

As a result of these events, on 6th January 2017, the Ministry of Ecology issued order No 1 on the establishment of a joint working group composed, in addition to the two ministries, of members of the ELP, NECU and other public organizations. The objectives of the campaign in defence of Tarutynskiy Steppe remain:

1. To break the illegal contracts on leases in the territory of reserve;
2. To calculate and claim the compensation of losses caused to the state by the ploughing of the reserve;

3. The punishment of those responsible;
4. Restoration of the disturbed areas;
5. The extension of the reserve, as a compensatory measure;
6. Warning of similar violations in other protected areas;
7. coordinate the establishment of new protected areas in the lands of the Ministry of Defence.

References

- Vakarenko, L.P. & Dubyna, D.V. 2013. The vegetation of Tarutyns'kyj steppe (Odessa oblast') and problems of its protection. *Chornomors'kyj botanical journal*, 9 (2): 283-291. [In Ukrainian] URL: http://nbuv.gov.ua/UJRN/Chbj_2013_9_2_15
- Vakarenko, L.P. 2009. Perspectives for creation a regional landscape parks in Odeska oblast (Ukraine). *Steppe Bulletin* 26: 15-18. [In Russian]
- Parnikoza, I. & Boreiko, V. 2012. One of the largest fragments of the Ponto-Caspian steppe plains in Ukraine taken under protection. *Steppe Bulletin* 35. [In Russian]
- Popova, E.N. & Rusev, I.T. 2010. Creation of the regional landscape park "Tarutynskiy steppe" - a way to protect the biodiversity of steppe ecosystems and of the development of recreation. *Ecology of cities and recreation zones*: 281-288. [In Russian]
- Rusev, I.T. 2011. Rare birds of "Tarutynskiy steppe" . *Rare and endangered birds of the Northwestern Black Sea Region*: 75-80. [In Russian].
- Rusev, I. T., Zakusilo, V. N. & Radkov, D. V. 2012. Small mammals of virgin steppe and anthropogenic coenoses on the territory of the Tarutynskiy polygon. *Optimization and Protection of Ecosystems* 6 (25): 2. [In Russian].
- Vasyliuk, O., Shyriaieva, D., Kolomytsev, G. & Spinova, J. 2017. Steppe protected areas on the territory of Ukraine in the context of the armed conflict in the Donbas region and Russian annexation of the Crimean Peninsula. *Bulletin of the Eurasian Dry Grassland Group* 33: 15-23.



Fig. 6. The Tarutyns'kyj steppe. Photo: I. Rusev.

Short contributions**National Scientific Conference "Nature protection in the steppe zone of Ukraine", dedicated to the 90th anniversary of the "Nadmors'ki" reserves**

The National Scientific Conference "Nature protection in the steppe zone of Ukraine", dedicated to the 90th anniversary of the valley of the "over marine" reserves, was held on 14th-16th March 2017, in the Urzuf village (Donetsk region), in the National Nature Park (NNP) "Meotida". The state "Nadmors'ki" reserves were established in 1927 and on the whole they were the largest by length protected area in the history of Ukraine. They cover steppe and coastal ecosystems of the northern coast of the Black and Azov seas, from the Kinburn Spit in the west to the Bilosarayska spit in the east (about 600 km length in total). These "Reserves" had existed for only three years, after which they were included in the "Askania Nova" Reserve and in 1932 completely rescinded. However, to the present day, they remain an unsurpassed example of the unprecedented success in the field of nature protection. Nowadays the areas that once formed the "over marine" reserves are part of the Black Sea Biosphere Reserve and the national parks "Dzharylgachsky", "Meotida", "Priazovsky" and "Azov-Sivash".

It is symbolic that the conference was held in the Urzuf village, the location of the administration of the "Meotida" NNP. The event caused a resonance in the region and has raised attention of the village, district councils, regional administration and deputies. More than 80 researchers and nature conservationists participated in the conference, as well as officials of the Ministry of Ecology and Natural Resources of Ukraine. The collected scientific papers of the conference, published in two volumes, include 151 articles on Protected Areas in the steppe zone of Ukraine. The published papers covered 53 environmental institutions and collected in one edition the work of 184 authors. This compendium includes works on history, research and the expansion

of institutions the Natural Reserve Fund in the steppe zone of Ukraine.

In the past, some conceptual conferences on the protection of steppe in Ukraine: "Saving the Last Remnants of Steppe Vegetation of Ukraine through Conservation and a Regime of Protection" (15 articles, 14 authors) was held in 2002 and "Problems of Conservation, Restoration and Stabilization of Steppe Ecosystems" (30 articles, 54 authors) in 2011. Thus, this third conference was the largest in the history of Ukrainian meetings of scientists dedicated to the protection of the steppe. Furthermore, it was the largest conference convened on environmental issues for both botanists and zoologists.

The conference was held in support the NGO "Feather grass steppe", under the project "Conservation of Landscapes of Coastal National Parks of Ukraine", supported by the Small Grants Program of the Global Environment Facility, implemented by the UNDP.

In 2018, it is planned to hold another conference on protected areas in the steppe zone of Ukraine, to coincide with the 90th anniversary of the creation of the «State Sand Reserve of the Dnieper lower reaches» (1928), in place of which the current Black Sea Biosphere Reserve and «Oleshkivski Sands» NNP were established.

Oleksij Vasyliuk, Vasylikiv, Ukraine

vasyliuk@gmail.com

Julia Spinova, Kyiv, Ukraine

juliaspinova@gmail.com

Anna Kuzemko, Uman, Ukraine,

anameadow.ak@gmail.com



The conference participants at the Azov Sea coast. Photo: D. Shyriaieva.

Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES)



The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) is preparing a thematic assessment report on land degradation and

restoration, and four regional assessments (Africa, Asia-Pacific, Americas, and Europe and Central Asia) of biodiversity and ecosystem services, as well as the first order drafts of their Summaries for Policymakers. The next stage in the process of developing these reports involves an external review during a period of eight weeks from 1st May until 26th June 2017 for the land degradation and restoration, Africa, Asia-Pacific and Europe and Central Asia assessments; and from 29th May until 24th July for the Americas. The draft chapters of these assessments, as well as their

draft Summaries for Policymakers, will be made available online for review during this time.

These peer-reviews and Governments' comments are critical to ensure the quality, credibility and policy relevance of the IPBES assessments, and thus their future use. The review process will incorporate, amongst other activities, webinars on the content of the Summaries for Policymakers. These reports contain sections on grasslands of the regions covered and also a section on urban ecosystems. We now hope to receive input from as many people as possible with relevant knowledge to help refine and improve the content of the reports. If you are interested to participate in this review process, then please follow the IPBES site <http://www.ipbes.net/regional-global-assessments> where further information will soon be available.

Stephen Venn, Helsinki, Finland

Stephen.Venn@Helsinki.Fi



Crocus reticulatus in the local botanical reserve "Valley of the Nicholas the Wonderworker", Cherkasy region, Ukraine.
Photo: A. Kuzemko.

DOI: 10.21570/EDGG.Bull.34.44-45

Book Review

Here we present recently published books that might be relevant for grassland scientists and conservationists, both specific grassland titles and faunas, floras or general books on ecology and conservation biology. If you (as an author, editor or publisher) would like to propose a certain title for review, or if you (as an EDGG member) would like to write a certain review (or reviews in general), please contact the Book Review Editor (anyameadow.ak@gmail.com).

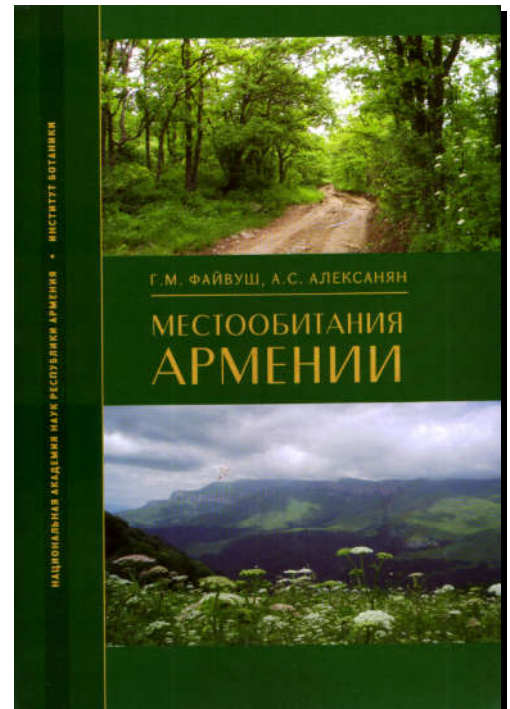
Fayvush, G.M. & Aleksanyan, A.S. 2016. Habitats of Armenia. - 360 pp., National Academy of Sciences of the Republic of Armenia, Institute of Botany, Yerevan, ISBN: 978-9939-1-0347-1

The Convention on the conservation of European wildlife and natural habitats, better known as the Bern Convention (adopted in 1979 in Bern, Switzerland), opened up new prospects for the protection of biodiversity on a supra-organismal level that has value on a European scale. At present this Convention has been signed by 40 states. One of these countries is Armenia, despite the fact that geographically it is located in Asia, but politically it is close to Europe. The signing and ratification of the Bern Convention by Armenia has set the task of habitat inventory before Armenian biologists. It should be noted that this country, with its very small area (less than 30,000 km²), is characterized by an extremely high level of biodiversity. In this area, about half of all the species of vascular plants of the Caucasus (about 3,800), 428 species of algae, 399 bryophytes, 4,207 fungi, 464 lichens, 549 species of vertebrates and a number of invertebrate species estimated at about 17,200, have been recorded. The flora and fauna of the country have very high levels of endemism (142 narrowly local endemic species of plants and 479 species of invertebrates). The level of endemism is quite comparable with that of islands, although Armenia is not an island and generally there are no barriers that could restrict the distribution of narrowly local species. In Armenia, all the main ecosystem types of the Caucasus are represented (excluding humid subtropics) - deserts and semi-deserts, steppes, meadow steppes, forests and woodlands, subalpine and alpine vegetation and intrazonal ecosystems. The study of Armenian habitats had not been undertaken until recently and actually started after the signing and ratification of the Bern Convention, according to which the country made a commitment to the development of the Emerald Network, which should be based on the most valuable habitats themselves, as the habitats of rare flora and fauna species. As the authors note, initially they faced difficulties because the classification of habitats in Europe is based on the principles of the French-Swiss (phytosociological) school, while Armenian vegetation has been studied mainly according to the Soviet school. Therefore, as a basis for developing habitat classification, they

chose the EUNIS classification, which is generally accepted in Europe. In the introductory section, the authors give information about the natural conditions of Armenia: orography and geomorphology, climate, hydrography, soil, vegetation and floristic zoning. A

separate chapter is devoted to a brief overview of the history of research and classification of vegetation of natural ecosystems of the country. Then the principles of the EUNIS classification are considered with an explanation of basic concepts such as "habitat", "habitats of species", "biotope" and "ecosystem." The classification itself and description of habitat types is constructed so that they first provide the overall characteristics of the EUNIS habitats classification at the first level, including those that are absent in Armenia. For the categories of classification levels 1-3, the graphical keys are provided. In these keys, which were proposed by European specialists, all types of European habitats are indicated, including those missing in Armenia, though these are not mentioned in the following texts. Instead, the classification included a number of habitats that do not occur in Europe, but are represented in Armenia (which are indicated by the addition of the letters "AM" to the habitat code).

A detailed explanation is provided for each graphic key. The book presents about 750 habitats of different levels, 228 of which are new to science, occur in Armenia only and are lacking in the original EUNIS classification scheme.



The final part of the book provides information on how this refined habitat classification is used for the protection of biodiversity of Armenia. The key botanical areas, that have been identified based on GIS maps showing the largest concentration of narrowly local endemics and species listed in the Red Book of Armenia with the categories CR, EN and VU, are characterized separately. This indicated 29 key botanical areas of Armenia, of which eight are unprotected. Eighteen key ornithological areas, based on inventories of nesting and rest areas of migratory birds, were also identified. All the data were used in the development of the Emerald Network of Armenia. Armenia now has eight species of plants, 129 species of vertebrates and 9 species of invertebrates that are listed in Resolution 6 of the Berne Convention, and 26 habitat types listed in Resolution 4 of the convention. Currently Armenia has selected 31 areas (sites) for the Emerald Network that significantly overlap with the previously selected key botanical and ornithological areas. The book gives maps of all such networks.

It should be noted that this peer-reviewed book differs from many similar publications by the clarity of it's methodical

approach to the selection and identification of habitat types, including graphical keys and detailed explanations of them and thus provides a high level of objectivity and impartiality in determining the major habitat types.

The book is made attractive by it's high-quality printing and beautiful illustrations. Overall, the book is written in Russian, but most of the information is duplicated in English, as a result of which it is also useful for English-speaking readers.

I believe that this book adds much knowledge about the diversity of habitats of the Caucasus and may be of interest not only for specialists involved in the development of the habitat classification, working to develop the Emerald Network, but also to everyone interested in biological and landscape diversity.

Anna Kuzemko, Uman, Ukraine

anyameadow.ak@gmail.com



Pulsatilla pratensis at "Skalka" Reserve, Kirovohrad region, Ukraine. Photo: A. Kuzemko.

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 Europe and to improve their accessibility. You are invited to send lists of such papers from the last three years following the format below to anyameadow.ak@gmail.com and didem.ambarli@gmail.com. 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. As we plan to publish a book about the Palearctic dry grasslands at some point in the future, under the auspices of the EDGG, we would appreciate if you could send a pdf (or offprint) of each of your grassland publications to juergen.dengler@uni-bayreuth.de.

Biodiversity

Hülber, K., Moser, D., Sauberer, N., Maas, B., Staudinger, M., Grass, V., Wrbka, T. & Willner, W. 2017. Plant species richness decreased in semi-natural grasslands in the Biosphere Reserve Wienerwald, Austria, over the past two decades, despite agri-environmental measures. *Agriculture, Ecosystems & Environment* 243: 10–18. <https://doi.org/10.1016/j.agee.2017.04.002>

Ecology

Dawson, M.N., Axmacher, J.C., Beierkuhnlein, C., Blois, J., Bradley, B.A., Cord, A.F., Dengler, J., He, K.S., Heaney, L.R., Jansson, R., Mahecha, M.D., Myers, C., Nogués-Bravo, D., Papadopoulou, A., Reu, B., Rodríguez-Sánchez, F., Steinbauer, M.J., Stigall, A., Tuanmu, M.-N. & Gavin, D.G. 2016. A second horizon scan of biogeography: golden ages, Midas touches and the Red Queen. *Frontiers of Biogeography* 8(4): e29770

Management

Fournier, B., Mouly, A. & Gillet, F. 2016. Multiple assembly rules drive the co-occurrence of orthopteran and plant species in grasslands: combining network, functional and phylogenetic approaches. *Frontiers in Plant Science* 7: 1224. DOI:10.3389/fpls.2016.01224 <http://journal.frontiersin.org/article/10.3389/fpls.2016.01224>

Peringer, A., Gillet, F., Rosenthal, G., Stoicescu, I., Pătru-Stupariu, I., Stupariu, M.S. & Buttler, A. 2016. Landscape-scale simulation experiments test Romanian and Swiss management guidelines for mountain pasture-woodland habitat diversity. *Ecological Modelling* 330: 41-49. DOI:10.1016/j.ecolmodel.2016.03.013

Gillet, F., Mauchamp, L., Badot, P.M. & Mouly, A. 2016. Recent changes in mountain grasslands: a vegetation resampling study. *Ecology and Evolution* 6: 2333-2345. DOI:10.1002/ece3.1987 <http://onlinelibrary.wiley.com/doi/10.1002/ece3.1987/full>

Mauchamp, L., Mouly, A., Badot, P.M. & Gillet, F. 2016. Impact of nitrogen inputs on multiple facets of plant biodiversity in mountain grasslands: does nutrient source matter? *Applied Vegetation Science* 19: 206-217. DOI:10.1111/avsc.12214

Peringer, A., Schulze, K.A., Stupariu, I., Stupariu, M.S., Rosenthal, G., Buttler, A. & Gillet, F. 2016. Multi-scale feedbacks between tree regeneration traits and herbivore behavior explain the structure of pasture-woodland mosaics. *Landscape Ecology* 31: 913-927. DOI:10.1007/s10980-015-0308-z

Methods

Dengler, J. 2017. Phytosociology. In: Richardson, D., Castree, N., Goodchild, M.F., Kobayashi, A.L., Liu, W. & Marston, R.A. (eds.) *The international encyclopedia of geography*. Wiley-Blackwell, Chichester. DOI: 10.1002/9781118786352.wbieg0136

Population biology of grassland species

Janišová, M., Škodová, I., Hegedúšová, K. & Kochjarová, J. 2016. Seed bank and seedling recruitment of endangered *Tephrosieris longifolia* subsp. *moravica* (Asteraceae). *Folia Geobotanica*. DOI: 10.1007/s12224-016-9275-7

Vegetation/syntaxomy

Dengler, J., Bergmeier, E., Jansen, F. & Willner, W. 2017. Phytocoenologia: the leading journal with a focus on vegetation classification. *Phytocoenologia* 47. DOI: 10.1127/phyto/2017/0209

Lysenko T.M. 2016. *Vegetation of saline soils of the Volga region within the forest-steppe and steppe zones*. KMK, Moscow: 329 pp., ill., ISBN 978-5-9908587-0-1 [In Russian]. Available at http://www.rfbr.ru/rffi/ru/books/o_1966250

Contact to the authors:

François Gillet: francois.gillet@univ-fcomte.fr

Monika Janišová: monika.janisova@gmail.com

Tatiana Lysenko: ltm2000@mail.ru

Jürgen Dengler: juergen.dengler@uni-bayreuth.de

Wolfgang Willner: wolfgang.willner@vinca.at

Forthcoming events

8th Planta Europa conference “Save Plants for Earth’s Future”

22-26 May 2017, Kyiv, Ukraine

Host organizations will be the O.V. Fomin Botanical Garden of the Taras Shevchenko National University of Kyiv, M.G. Kholodny Institute of Botany of the National Academy of Sciences of Ukraine and M.M. Gryshko National Botanical Garden of the National Academy of Sciences of Ukraine.

The conference webpage <http://8peconference.in.ua>

10th EDGG Field Workshop

3-11 June 2017, Central Apennine Mts., Italy

More information in the EDGG Bulletin 33, pp. 3-12

60th Symposium of the International Association for Vegetation Science (IAVS)

20-25 June 2017, Palermo, Italy

The meeting webpage <http://iavs.org/2017-Annual-Symposium/Home.aspx>.

The theme will be “Vegetation patterns in natural and cultural landscapes”. The pre-symposium excursion will be from June 11-18 (Sunday-Sunday). The focus will be on coastal landscapes of Sicily: Along the Sicilian coast, from Capo San Vito (NW Sicily) to Capo Passero (SE Sicily), including two days on the Island of Marettimo (max 30 participants). The post-symposium excursion will be from June 25-July 1 (Sunday-Sunday) and will visit the Sicilian Mountains (for well-trained hikers): Etna, Nebrodi, Madonie (max. 30 participants). The symposium venue will be the Palermo Botanical Garden.

14th Eurasian Grassland Conference

4-9 July 2017, Latvia/Lithuania

The meeting webpage <https://egc2017.namupro.de/>.

More information in this Bulletin at the pages 4-13.

37th Eastern Alpine and Dinaric Society for Vegetation Ecology Meeting

13-16 July 2017, Prizren, Kosovo

The symposium is organised by the Eastern Alpine and Dinaric Society in collaboration with: University “Haxhi Zeka” of Peja, Republic of Kosovo (<http://unhz.eu/>), University “Ukshin Hoti” of Prizren, Prizren, Republic of Kosovo (<http://uni-prizren.com/>)

The meeting webpage <http://www.eadsve.org/>

26th European Vegetation Survey Meeting

13-16 September 2017, Bilbao, Spain

The meeting will be hosted by the University of the Basque Country (Javier Loidi and colleagues).

The meeting webpage <http://ehu.eu/evs2017>

Second Interdisciplinary Symposium “Biogeography of the Carpathians”

27-30 September 2017, Cluj-Napoca, Romania

The symposium webpage is not yet available

ComEc -the First Conference on Community Ecology

28-29 September 2017, Budapest, Hungary

The First Conference on Community Ecology is the opening of a conference series accompanying the journal Community Ecology. The scientific focus is quite wide, presenting all aspects of community ecology and its connections to landscape ecology, multivariate statistics, systems ecology, vegetation science, macroecology and many other fields.

The conference webpage <https://e-conf.com/comec2017/registration/>

27th European Vegetation Survey Meeting

spring 2018, Wrocław, Poland

The meeting will be hosted by the University of Wrocław (Zygmunt Kącki and colleagues).

61th Symposium of the International Association for Vegetation Science (IAVS)

23-27 July 2018, Bozeman (Montana), U.S.A.

The meeting webpage is not yet available.

The Bulletin is published quarterly from the Biocentre Klein Flottbek, University of Hamburg, c/o Jürgen Dengler, Ohnhorststr. 18, 22609 Hamburg, Germany. It is sent to all members of the group (1184 members from 67 countries as of 30th April 2017) and together with all previous issues, it is also freely available at <http://www.edgg.org/publications.htm>. Bulletin 34 (2017) of the EDGG was published on 30 April 2017.

Editors-in-Chief: Anna Kuzemko (Uman', Ukraine, anyameadow.ak@gmail.com), Idoia Biurrun (Bilbao, Spain, idoia.biurrun@ehu.eus)

Members of the Editorial Board: Didem Ambarlı (Düzce, Turkey), Jürgen Dengler (Bayreuth, Germany), Monika Janišová (Banská Bystrica, Slovak Republic), Laura Sutcliffe (Göttingen, Germany), Péter Török (Debrecen, Hungary), Stephen Venn (Helsinki, Finland), Michael Vrahnakis (Karditsa, Greece)

The copyright of the included texts, photographs, and other figures remains with their authors. If you wish to re-use them or parts of them, please, obtain the written consent of the authors first.

Important dates: The deadline for Bulletin 35 is 15 July 2017

Bulletin 35 to appear: Summer 2017

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

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



Anemone sylvestris at steppe slope in "Skalka" Reserve, Kirovohrad region, Ukraine. Photo: A. Kuzemko.