

22nd EVS International Workshop

BOOK OF ABSTRACTS

Rome, 2013, April 9-11

“Sapienza” University of Rome, Botanic Garden



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ORAL PRESENTATIONS

Class *Thero-Salicornietea* in Transbaikalia, Eastern Siberia [S1D]

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Eastern edge of the class *Thero-Salicornietea* in Russia is located in Transbaikalia. This area is characterized by the sharply continental climate and mountainous relief. The salinization process is confined to depressed sites in the bottom of valleys. During the last decade halophytic communities have been explored and syntaxonomy of the class *Thero-Salicornietea* has been developed. Sufficient discrepancy in species composition between halophytic communities along the area of distribution was taken into account. Within the Eurasian steppe domain a border between two subdomains, namely Black Sea-Kazakhstan and Central Asia, is distinctly apparent. The border lies along longitude of approximately 88°E. Significant role of taxa formerly recognized as *Suaeda corniculata* is the common feature of *Thero-Salicornietea* in Siberian halophytic vegetation. Those taxa are clearly separated between the subdomains. In Western Siberia *Suaeda kulundensis* and *S. corniculata* s. str. are widely distributed. Additionally, *Suaeda salsa* and *S. prostrata*, which are not related to the *S. corniculata* s.l. complex, are also abundant in salty habitats there. Within the Central Asian domain several *Suaeda* taxa (*S. sibirica*, *S. corniculata* s. str., *S. corniculata* ssp. *mongolica*) are common. Many other plants from the Chenopod family also have the edge of distribution near the border between two subdomains. Based on significant floristic differences, the new order *Suaedetalia sibiricae* (prov.) and alliances *Suaedion sibiricae* (prov.), *Artemision anethifoliae* (prov.) are being proposed. Such decision also contributes to understanding originality of Transbaikalian annual halophyte communities. Species restricted by the territory of Asia have been selected as diagnostic taxa for the newly proposed order and alliances. Such species as *Suaeda sibirica*, *S. heteroptera*, *S. corniculata* ssp. *mongolica*, *Atriplex fera*, and *Artemisia anethifolia* are among them.

The study is granted by RFBR № 12-04-00746.

The rare ecosystems in the alpine belt of the Greater Caucasus and problem of their conservation [S2A]

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The treeless alpine belt along the Greater Caucasus is situated above the absolute heights of 2500-2800 m. The alpine plant communities' physiognomic diversity is limited by four main types: alpine meadows or heaths on the steep, convex slopes; carpet-like alpine meadows or carpets on the gentle, concave slopes; plant communities on the screes and rocks. The diversity of alpine vegetation phytosociologic units is higher. According to the completed syntaxonomic

classification there are 8 associations of the alpine meadows or heaths (Cl. *Juncetea trifidi*), 6 associations of the alpine carpets-like meadows (Cl. *Salicetea herbaceae*), 6 associations of the plant groupings on screes (Cl. *Veronico telephiifoliae-Lamietea tomentosii*) and 3 ones of the plant groupings on rock crevices. These plant communities are characterized by exclusive species abundance and specificity. Among 807 vascular plant species of the Caucasian alpine flora belt there are 423 endemics and lot of rare and endangered species from regional Red books and Red book of Russian Federation. For determining the zoogeographic status of the alpine communities the following criteria were used: locality, habitat's naturalness and diversity's parameters. According to these criteria the endangered plant communities were determined: heaths – ass. *Nardo-Geranietum*, *Alopecuro-Asteretum*, *Hedysaro-Campanuletum*, *Alchemillo-Caricetum*; carpets – ass. *Taraxaco-Geranietum*, *Minuartio-Agrostietum*, *Gageo-Dichodontetum* and all of screes and rocks syntaxa. All these communities are protected in the 6 reserves, 3 national parks and several sanctuaries which could be considered as the potential territories of the Emerald network.

Annual vegetation of coastal habitats in the South Aegean [S1A]

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Coastal ephemeral vegetation in the Mediterranean comprises plant communities of saline and dune habitats, respectively. In the South Aegean, both habitat types are pronouncedly thermophytic and phytogeographical relations exist to North Africa and the Near East. We classified about 200 unpublished relevés and distinguished four community types (plus a few rare ones) of saline habitats (classified within *Frankenietalia pulverulentae*, *Saginetalia maritima*) and two community types of dune habitats (*Alkanno tinctoriae-Maresion nanae*, *Cutandietalia maritima*). The species richness and the groupings of character and diagnostic species are compared with those of other Mediterranean regions. It is further asked whether the number of plant communities accepted at association or alliance rank that have been allocated to the orders *Frankenietalia* and *Cutandietalia*, respectively, in different regions may be correlated with the regional species pools or the length of coastline or the research intensity.

Syntaxonomical approach to Italian coastal saline vegetation [S1B]

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A concise overview of the phytosociological analysis conducted on the coastal hyperhalophilous brackish vegetation in the Italian coast is presented. Despite the enormous changes that coasts have endured over the years there are still a

significant presence in terms of biogeographic and phytocoenosis relevance, nevertheless these habitats are highly fragmented. A framework about these vegetation types is provided for the most important vegetation classes: *Saginetea maritimae*, *Thero-Suaedetea*, *Salicornietea fruticosae*, *Spartinetea maritimae*, *Crithmo maritimi-Staticetea*, *Asteretea tripolii* and *Juncetea maritimi*. The presentation ends with the overall syntaxonomical scheme and it also shows published and unedited data. These are derived from analyses that the authors have carried out particularly in the southern Italian Adriatic coast.

In the conclusions the importance of hyperhalophilous vegetation of the Italian coast is underlined, highlighting the need for an accurate census of the habitats (in the sense of Directive 92/43/EEC).

Sediment and plant dynamics in salt-marsh pioneer zone: *Puccinellia maritima* as a key species? [S1B]

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Plant colonisation on salt marshes mud flats is one of the most wild spread primary succession observed nowadays. In such halophytic habitat, the main challenges for plant to get established consist to (i) reach the new habitat by mean of sexual or vegetative propagules and (ii) find suitable conditions to get established and manage to growth. In low salt marshes and particularly in pioneer zone, the habitat could be characterised as harsh relatively to soil salinity, disturbance intensity by wave and current, the erosion and/or sediment accretion, and the variability and unpredictability intensity of such disturbances.

We hypothesis that any process by which sediment stability will be improved would present important consequences for plant establishment and then succession pattern. This work then intended to test the limiting character of the sediment stability for plant success and vegetation succession. Three main species or species groups may be candidates for playing a key role in such halophytic and disturbed habitats for plant succession: *Salicornia* group *fragilis*, *Spartina anglica* and *Puccinellia maritima*. *Puccinellia* effect on sediment dynamics had been only poorly studied in the current literature while noticed by Jakobsen 1954 while *Spartina anglica* is commonly reported as playing a predominant role in sediment accretion.

We investigated the interaction between sediment dynamics patterns, thus stability and instability of the sediment and plant species development. The establishment of a micro-topography was monitored regarding plant structure and topography in the pioneer zones of lower salt-marshes. Looking for underlying process, the propagules' availability for plant colonisation on mud flats and establishment success was investigated in three different locations characterized by different disturbance level.

We then conclude on the key role of *Puccinellia maritima* for sediment accretion and plant succession especially in highly disturbed habitats. We found that despite poor recruitment success in the pioneer zone, this species showed an efficient growth and sediment stabilization and effectively shaped salt marsh by speeding up plant succession.

Cluster validation methods: what is the question answered by them? [OSB]

Botta-Dukát Z.

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Numerical clustering algorithms are widely used in vegetation science for objective classification of vegetation plots. Due to the huge number of possible algorithms (including using different data standardizations/transformations and resemblance functions), there is no unique objective classification of a real dataset. Theoretical recommendations are scarce, thus users often subjectively choose the algorithm that contradict to the aim of objective classification.

Cluster validation methods can help us to choose the best algorithm and optimal number of clusters. Different criteria can be used when classifications are evaluated:

- preserving the information content of the input distance matrix
- compactness, connectedness and separation of clusters
- robustness
- stability
- repetitiveness
- easy interpretation

Since each cluster validation method considers only one of them, the user has to decide what is the most relevant in her/his study. In my lecture I will overview the meaning of these criteria and show the available cluster validation methods.

Biodiversity patterns in coastal dunes of northern Iberian Peninsula [S1A]

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Coastal dune ecosystems house a great diversity of species and habitats, showing a high conservation interest. In fact, the European Habitats Directive (92/43 EEC) lists several dune habitats because of their scarcity in Europe. In this work we have analyzed the structure and diversity of dune plant communities along the Cantabrian coastline of the Iberian Peninsula, focusing on the relation of community types with species traits.

A floristic matrix with 1992 plots of dune vegetation all over the Cantabrian coastline was constructed using the information stored in the Information System of Iberian and Macaronesian Vegetation (SIVIM). In order to reduce the spatial pseudoreplication a geographical stratified resampling was conducted, randomly choosing a maximum of 5 plots of each community type for 1 square km. In this way we obtained a matrix with 487 plots and 220 species, that was submitted to agglomerative clustering. Plots were classified in four main groups which matched the four community types previously recognized in the study area: *Atriplici-Cakiletum integrifoliae* (Cod UE 1210), *Euphorbio paraliae-Elytrigietum boreoatlanticae* (Cod UE 2110), *Otantho maritimi-Anmophiletum australis* (Cod UE 2120) and *Helichryso maritimi-Koelerietum albescentis* (Cod UE 2130), belonging to four different alliances.

On a local scale, according to our results, the strong ecological coast-inland gradient drives an increase towards the fixed dunes of species and families richness and also in the proportion and cover of Mediterranean species. Similarly, there is an increase in the proportion of hemicryptophytes and in the cover of chamaephytes, and a decrease in the relative importance of anemophilous species. On a broader

geographical scale, some of these variables show differences along the east-west gradient in some habitats. Furthermore, our results support the differentiation of habitats 1210 and 2110, although they often show a spatial mosaic.

Inland saline vegetation in the Southern Balkan (Republic of Macedonia) [S1C]

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The research is based on vegetation elaboration in the central part of the Republic of Macedonia. In the triangle between Veles, Štip and Negotino, there is a special region different from the neighboring regions, which is used to be called “steppe” or “semi-desert”. The bedrock is composed mostly of Paleogenic sediments. As these sediments are of marine origin and therefore salt-rich, the ground consequently becomes white from the salt which has crystallized in a thin layer. The soil in small depressions is even more salinised, because it is carried here from slopes during rainfall. Special, halophytic vegetation develops on such sites. Climatic conditions are rather unfavorable, as the annual precipitation is about 460 mm and mean annual temperature is 13,3°C. However, this is not a real, zonal steppe appearing in regions with small quantity of precipitation constraining the development of forest vegetation. The vegetation under consideration is result of the degradation, that have started very early in the region, also due to the vicinity of Stobi, former capital city and the center of the Roman province of Macedonia Salutaris. The high population in the region, in antiquity and early Middle ages, intensively changed the landscape, mostly by deforestation. Currently the region itself is bleak and sparsely populated. During the Ottoman empire, there used to be some settlements from Turks from the Asia Minor. Turks moved away after the Balkan wars and in the period between 1950 and 1960. In recent past, nomadic shepherds wintered in the area due to the relatively favorable winter temperatures, and they further cut out the few forest “oasis” left. The vegetation which develops on these salinised sites is classified within *Eurotietum ceratoides* and *Artemisio-Camphorosmetum monspeliacea* (*Festuco-Pucinellietea*). In transitional zone to non-salinised surfaces appear communities of the *Hedysaro-Convolutetum holosericeae* (*Festuco-Brometea*).

IUCN Red List of Ecosystems, risk assessment of ecosystem collapse – Concept and application to some French wetland ecosystems [S2A]

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With the success of the Red List of Threatened Species, this IUCN concept is now extending to ecosystems. This concept, presented and validated at the World

Nature Congresses of 2008 and 2012, the final version is expected for 2015, world widely applied by 2025.

It refers to ecosystem collapse, using disruption of key processes and loss in functionality. The practical impossibility to assessing all species extinction risks and the divergences in species needs that can hardly be integrated into the decision-making process are the two main reasons for this new concept.

The first (Rodriguez *et al.*, 2011 – *Conservation biology* 25: 21-29) and second (Keith *et al.*, submitted) versions of this concept are inspired from the species red list criteria, based on : decline in spatial distribution, restricted distribution or few locations combined to a decline, degradation of the abiotic environment and disruption in biotic interactions. The role of keystone species predominates over their conservation value (rarity, threats).

The relevancy of the proposed criteria and their threshold are being tested through case studies carried out throughout the world. In France, four wetland ecosystems were assessed within the frame of an initiative led by the IUCN French committee and the Tour du Valat. These are: Mediterranean lagoons, lakes and ponds of the Aquitaine coast, the Arcachon Bay and the coastal marshes of the Atlantic coast.

A major issue is about ecosystem classification. Is it necessary to use a standardized global system? Should this classification rely on geomorphologic or phytosociological criteria? Should EUNIS classification be used? And at what level, for European and national assessments?

As the international working group works on the global Red List, IUCN national committees and members had to promote the methodology for local evaluations such as national/regional Red Lists of habitats, and even the European one, for their results to be comparable.

Assessing vegetation change using vegetation-plot databases: a risky business [OSB]

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Data from vegetation plots can be used for assessment of past or recent vegetation change in three ways: (1) comparison of old and new records from permanent plots; (2) revisitation of historical phytosociological plots; (3) comparison of large sets of old and new phytosociological plots from the same area but different sites. Option (3) would be cheapest and fastest in many regions where vegetation-plot databases are available, however, there is a risk of erroneous result due to mismatch in spatial position of the old and new plots. Here we assess potential errors of such analyses. We used data sets from permanent plots and revisitation studies to quantify the real vegetation change using ordination. Then we randomly divided each data set into halves, taking old records from one half and new ones from the other half to simulate a vegetation-plot database. The real change was compared with the change detected from the simulated databases. If the real vegetation change was large, it was correctly detected using a simulated database. However, if the change was moderate, some simulated databases detected it correctly but others suggested a change of different magnitude or direction, and in some cases even of opposite direction than was the direction of real change. Assessment of vegetation change using the vegetation-plot databases should be avoided or interpreted with extreme caution because of the risk of erroneous result. Such analyses may be used to propose hypotheses about past vegetation change,

but their results should not be considered as true unless confirmed using more reliable data. In many contexts, revisitation studies of historical vegetation plots may be the best strategy to assess past vegetation change more reliably.

Vascular plant communities in Portugal (Continental, Azores and Madeira) [OSA]

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In this work we propose a syntaxonomic scheme, according to the Code of Phytosociological Nomenclature for the vegetation of Portugal: continental and the Azores and Madeira archipelagos. The scheme encompasses 827 associations (4 communities), 245 alliances, 116 orders, and 64 vegetation classes. The 58 suballiances, 2 suborders and 4 subclasses, are also mentioned, as auxiliary ranks. For the higher syntaxa down to suballiance level, succinct ecological, physiognomic and chorological diagnosis has been made, and the characteristic species are related. New syntaxa names and corrections are described and listed in Annex I. It is also presented a floristic catalogue sheet with the syntaxonomic optimal for each taxon (Annex III). This list contains 2930 taxa.

Consistent large-scale vegetation classifications: what are the problems and how can we overcome them? [OSB]

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Consistent large-scale vegetation classifications are urgently needed for Europe - which so far faces many incompatible classification schemes in different countries - both for conservation planning and for fundamental ecological research. Numerical methods and computational power have improved dramatically during the last decade so that it basically should be possible to develop plot-based classifications of major vegetation types across Europe. Moreover, the availability of vegetation-plot data has also much increased during the last years, with national databases now existing or emerging in many European countries and the European Vegetation Archive (EVA) recently being announced.

However, when classifying a major vegetation type across Europe based on tens

or hundreds of thousands of relevés from multiple countries many problems arise that were not so evident at smaller spatial scales (e.g. countries). In my talk, I will highlight some of them and propose solutions to overcome them. Most important are the following points:

- The definition of diagnostic species via phi-values as it has become standard during the last decade neglects the essentially hierarchical structure of vegetation classification schemes.
- The sole reference to diagnostic species neglects that widespread typical vegetation types are characterised by the lack of diagnostic species of lower syntaxonomic ranks.
- The change of ecological prevalences of species across biogeographic regions might render an approach unfeasible that relies on character species.

Quantifying the habitat requirements of red-listed plant species - a prerequisite for species re-introductions [S2B]

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In most regions of Central Europe the number of red-listed plant species is increasing. One way of mitigating the loss of plant species is the re-introduction of threatened taxa. However, re-introductions make sense only where the habitat requirements of species are fulfilled. For most rare plant species we know in which plant communities they are commonly found, at the same time we often lack detailed data about the environmental conditions under which these species are able to maintain viable populations, or can be re-introduced with good prospects for long-term success.

In this study we present approaches for quantifying the habitat requirements of rare and red-listed plant species, based on phytosociological and ecological data in North-western Germany and with a focus on woodland and grassland species. The presentation is also a plea for collecting more and better environmental data especially concerning threatened species in order to allow for more targeted species conservation measures.

Assessing the conservation status of habitat types in Greece: methodological issues and links to the Red List evaluation of ecological communities [S2A]

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We propose a methodology aiming to establish a monitoring network of permanent plots for surveillance and overall conservation status (CS) assessment of the Annex I habitat types at national scale, as well as to meet requirements to fulfil

the Article 17 of the Habitats Directive reporting obligations. Methodologically, we follow a bottom-up procedure, i.e. from the local level (site) to the national level, within and outside the Natura 2000 network. At local scale we assess the conservation degree (CD) of each habitat type implementing a specific protocol, which comprises the following parameters: (a) typical species (record of their presence, abundance and vitality), (b) specific structure and functions for the assessment of their CD, and (c) pressures and threats to predict the future prospects of structure and functions. The protocol was designed to reflect the ecological as well as geographical differentiation of the communities assigned to each habitat type, since different combinations of typical species are used for the geographical and ecological habitat subtypes. Following the guidelines of the European Topic Centre on Biological Diversity, another important parameter for the CS assessment of habitat types is their area of occupancy (AOO). The AOO will be measured using field data and/or modelled data sets. The extent (range) of occurrence (EOO), the trends of both distribution parameters (AOO and EOO), as well as their favourable reference values will be estimated. The above-mentioned parameters and the overall CS of habitat types are used to build a threat status assessment of the communities-syntaxa assigned to certain habitat types according to the concept and the criteria of IUCN. These criteria include: (a) decline in geographic distribution (with subcriteria for long-term and short-term decline), (b) restricted geographic distribution (extent of occurrence, number of occurrences, area of occupancy), and (c) the changes in ecological function (composition, structure). To demonstrate our approach, we selected one beech forest habitat type (9110) and an endemic type of Aegean phrygana (5430). The results are discussed from the perspective of linking the conservation status assessment with the threat status assessment of ecological communities and habitats in Greece.

Habitat Red Lists – Context & Use [S2A]

Evans D.

European Topic Centre on Biological Diversity, Paris

The concept of 'red listing' threatened species was first proposed in the 1960s and red lists and red books have been considered to be important tools in biodiversity conservation for many decades. The first publications were global but national publications soon followed. They provide a means of identifying, in a standardised way, species threatened with extinction. Both the production and use of red lists have often been criticised but adoption of IUCN guidelines in 2001 (global) and 2003 (regional) addressed many of these issues.

Although initially red lists were only for species, red listing plant communities, habitats, biotopes and ecosystems is a logical extension of the concept and in Europe national and regional red lists for plant communities, habitats, etc began appearing in the 1980s and continue to be published. A wide variety of criteria have been used but most use the threat classes used for species. Recently IUCN have proposed criteria for red list assessments of ecosystems but are still under development.

Habitat red lists potentially have the same uses as species red lists such as raising awareness of conservation issues, identifying conservation priorities and informing policy & legislation. A European list would allow the conservation status of habitats to be compared – at present there are many studies showing declines or threats but for single habitats or single countries. Compiling the data necessary to produce a European red list will also highlight gaps in our knowledge.

Species red lists have often informed the selection of species to be protected by legislation, and this was the case, at least for some species groups, for the Bern Convention and the EU Habitats Directive. A European habitat red list would be an important source of information for any future revision of Annex I of the Habitats Directive or Resolution 4 of the Bern Convention.

The EU 2020 biodiversity strategy has a series of targets and indicators are being developed to measure progress. A red list index was developed for measuring progress towards the 2010 target as part of the SEBI 2010 indicator set and is likely to be used for 2020, this would be much improved if it also included habitats.

Temperate trees at their hot and dry margins [OSA]

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Under climate change, environmental limits of tree species are a key question for forestry. Thus, reduced vitality, mortality and extinction are expected at the driest and warmest edges of present distribution, which may serve as a template for changes expected in the centre under warming scenarios. The Margins project aims to define this critical zone for five important temperate tree species (*Abies alba*, *Fagus sylvatica*, *Picea abies*, *Pinus sylvestris*, *Quercus petraea*) and study vegetation, growth and genetics of representative stands.

Our searching strategy involves Bohn et al.'s vegetation map of Europe, European forest monitoring data and species distribution modeling (SDM).

Based on interpolated climate data (WorldClim), inventory plots (level I monitoring plots) and regression (GAMs), SDM map probabilities of occurrence. We define the margin of distribution as the descending limb of the response curve below a favourability threshold of 0.5, with mean annual temperature and drought (hydrological water balance) as alternate predictors.

We can now select focal vegetation units for each tree species by intersecting the Bohn map with marginal SDMs and climate data, identify areas of high favourability outside natural ranges (plantations) and compare marginal patterns of the five tree species.

Starting from this coarse scale search raster, local experts will help us find suitable sampling sites. To complement field sampling, we are building reference databases for forest vegetation and dendroecological data from the marginal regions. We consider building of the reference database a trial for the European Vegetation Archive (EVA).

Crucial points for a Habitat Red List in Italy [S2B]

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Sound assessment criteria, processes and thresholds are crucial tools for habitat conservation strategies and management decision making. Recently a number of scientists started to shift red-listing criteria, based on IUCN approach, from species to ecosystems. Unfortunately a remarkable heterogeneity still persists in the different approaches, mostly concerning the units to be assessed. In order to focus on a wide-scale accepted habitat classification, we concentrated on the Italian Habitats (H) included in 43/92/EEU Directive's Annex I. The phytosociological basis of H's descriptions, supported in Italy by the Italian Habitat Manual, offers a sharable interpretation tool and creates a useful link with the European and national biodiversity conservation strategies. Besides, the plant community concept adopted by Annex I agrees with EUNIS and Corine Biotopes, thus allowing future evaluations of all the habitats and not only those of Community interest.

We performed some national scale assessments (H with restricted/localized, restricted/widespread, large/widespread distribution), emphasizing the weak points deriving from an unsuited use of EOO/AOO. Different H types show notable dissimilarities in spatial arrangement, due to H-specific structure and ecology, which deeply affect the identification of proper thresholds. New reading keys are suggested to evaluate the distribution decline, i.e. the H's potential distribution, linked to the Natural Potential Vegetation concept, and the H's successional stage, to provide specific attributes for threats evaluation. One of the weakest points remains the quantitative evaluation of H's quality, bringing back to H definition. Almost each H type requires *ad hoc* criteria (vegetation cover/structure, averaged floristic composition and relative acceptable thresholds) and quality evaluation seems to be profitably performed only at a regional/local scale.

Evaluating the conservation status of the Sicilian salt marshes: an integrated approach [S1B]

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Coastal salt marshes are one of the most threatened environments of the Mediterranean region. The ever increasing human pressure, mainly due to grazing, husbandry, farming, tourist over-exploitation, etc., is causing the loss of suitable surfaces, as well a dramatic fragmentation of the natural habitats. The Sicilian coastal salt marshes have been largely reclaimed, and currently are highly localized, occupying only small scattered areas. Aim of our research is to provide an updated inventory of the Sicilian coastal salt marshes using an integrated approach: GIS tools, in order to quantify their total area/habitats, implemented with phytosociological methodology for analyzing structure, floristic composition, and distribution pattern of the surveyed vegetation.

A total of 141 relevés, according to the standard procedures of the Braun-Blanquet method, were processed. All the relevés were classified using classification and ordination methods. The cluster obtained mostly correspond to the specific associations, even confirming the traditional vegetation arrangement. According to the DCA, the spatial distribution of plant communities follow an ecological gradient, strongly related to the soil salinity and flooding time. Overall, the most widespread salt marsh communities of Sicily are those ones dominated by *Sarcocornia alpini*, *Arthrocnemum macrostachyum*, *Limbarda crithmoides*, *Suaeda vera*, *Juncus acutus*, and *J. maritimus*. Whereas, the most threatened salt marsh communities are the followings: *Halocnemum strobilaceum*-dominated, *Sarcocornia*

fruticosa-dominated, *Limoniastrum monopetalum*-dominated, *Spartina versicolor*-dominated, and *Plantago crassifolia*-dominated. The GIS analyses show that the total area of the Sicilian coastal salt marshes is about 3000 ha. In particular, 1650 ha (54%) are occupied by halo-hydrophilous plant communities (*Ruppiaetea maritimae*), while only 857 ha (28%) are occupied by halophilous perennial plant communities (*Sarcocornietea fruticosae*) and 199 ha (7%) by sub-halophilous plant communities (*Juncetea maritimae*). Moreover, the alarming data is represented by the invasive occurrence of *Phragmites communis* with 337 ha (11%). In conclusion, our analyses suggest the urgent need of implementing actions aiming at stopping the inexorable destruction of these sensitive and important coastal brackish environments, as well as to develop effective plans for their restoration.

Some thoughts on Red Lists of plant communities [S2B]

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The availability of large databases with historical as well as recent vegetation plot data gives us the opportunity to draft Red Lists of plant communities on a scientific basis. There are several practical problems to overcome before such Red Lists can be established, e.g. the scarcity and fragmental distribution of historical data. A more fundamental problem however, is the incongruence of phytosociological types (the *phytocoenon*) and Red Lists. Unlike species, phytocoenons as end-terms of our phytosociological classifications are abstract constructs of our minds, without general (let alone absolute) tenability. This makes Red Lists of plant communities dependent on our conception of classifications, which will be shown by examples from various classifications from North-western Europe. It is concluded that, if Red Lists of plant communities want to have any (scientific) meaning, it must be stated on which classification they are based. A general Red List of plant communities without reference to any concrete classification may be useless, and could lead to practical and legislative confusion.

Associations of lowland woodland in the Czech Republic: is there an evidence for a long-term change from thermophilous oakwoods to mesic forests? [OSA]

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Changes in species composition leading to shifts between community types are commonly observed in vegetation. The twentieth century was a period of considerable environmental changes, often caused by changes in human impact. Communities of European temperate lowland woodlands are one of the most conspicuous examples of this process. Management is of the particular importance for the maintenance of light, thermophilous lowland woodlands, rich in species and dominated with oak. This vegetation has encountered substantial compositional changes since about the first half of the twentieth century. It has been hypothesized and documented with a number of case studies that the open oak woodlands have shifted to mesic, species poorer communities. So far, no systematic attempt was undertaken to analyze this shift from the point of view of phytosociological associations. Theoretically, associations of thermophilous oakwoods (*Quercetalia pubescentis*) should have retreated in favour of mesic oak-hornbeam woods (*Carpinion betuli*). We examined this hypothesis with phytosociological relevés resurveyed after three to six decades, systematically sampled in eight regions in the Czech Republic. In total, 665 pairs of relevés have been compared. For relevé assignment into phytosociological association, we employed supervised classification system. This enabled us to classify the relevés specifically in the studied associations and interpret the assumed shift in the eye of a phytosociologist.

Red List of plant communities in Europe and halting the loss of biodiversity [S2B]

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How can barriers and drivers affect the value of a Red List of plant communities in Europe? The goal of a Red List is to bridge from science to policy and to indicate problems in the management of nature and biodiversity. What is the difference between a Red List of plant communities in Europe and the Interpretation Manual of European Union Habitats? The difficulties with the application of the Manual should not be repeated by the use of a Red List.

The IUCN Red List criteria and categories can be applied to species or any taxonomic unit below the species level. Is it possible to use the IUCN system also for evaluating a European Red List of plant communities? How can we use the system in practise? Must we or how should we reduce the scientific information about plant communities of Europe? How can we translate the scientific information into a non-scientific language to promote the communication with decision makers?

Halting the loss of biodiversity is the main target of the CBD and of the nature conservation policy in Europe. A Red List of plant communities will support this goal if scientific knowledge and non-scientific processes and facts are respected.

Case studies from different landscapes and vegetation units show how scientific knowledge and uncertainties (e.g. of distribution patterns) can be considered to get an effective Red List of plant communities in Europe. The meaning of relevant sources and parameters is discussed.

Plant communities can be grouped e.g. according to their synsystematic position and the type of use. Because of practical reasons it is very important not to rank

every syntaxon according to the IUCN criteria or to analyze the frequency of every taxon in all plant communities where it occurs.

Beside others, the focus on threatened plant taxa and their affinity to one or more plant communities might be an important component of an indicator system that allows to rank plant communities of a Red List at different syntaxonomic levels.

Methodological recommendations for Red Lists of Plant Communities [S2B]

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Plant communities as objects of red Lists were established much later than those for species, i.e. in the 1980ties. Since syntaxa are even more abstract, and arbitrary then taxa, red lists of plant communities require special methodological considerations. Whereas vulnerability can be argued as the risk of extinction within an area or as the short- and long-term trend, we need additional ethical considerations about the value of plant communities in order to set conservation priorities. Here we present experiences from our two-volume edition "Plant Communities of Mecklenburg-West Pomerania and their Vulnerability".

A) The vulnerability categories can be based on reproducible criteria in comparison of (1) past, (2) present and (3) future developments. (1) For the past we used an estimate of the quantitative development since 1960, i.e. within the last 50 years. (2) The current distribution has been derived from the proportional area covered by a plant community, modified by the spatial distribution, i.e. the geographical clustering, within the area. (3) The foreseeable threat from human activities within the next 10 years has been estimated in 5 categories.

Vulnerability is categorised by a decision matrix of the three criteria and ranges from 0 (vanished), through 1 (critical) and 2 (endangered), to 3 (threatened).

B) Our concept of conservation value for plant communities is based on three criteria of assessment. (1) The content of threat represents the average number of threatened plant taxa occurring within a single plot multiplied by a weighting-factor depending on Red List categories. (2) The degree of naturalness is judged from nearly natural to artificial in 5 categories. (3) The responsibility for the preservation of a plant is based on the proportion of the area covered in the area under consideration to the communities' global area. The combination of these three criteria to a total category of conservation value is again done by a decision matrix.

Patterns of vegetation diversity among European countries [OSA]

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Despite increasing interest in unifying and analyzing plot-based vegetation data in Europe, we have little information about the patterns of vegetation diversity across different regions. This information is essential for understanding the vegetation of a territory and for assessing the similarities between national classification systems. Here we compare phytosociological classes and alliances described in the syntaxonomical schemes of 21 European countries. We compiled syntaxon lists for countries from national literature and standardized them in a database according to EuroVegChecklist. Generalized Linear Models (GLM) were used to test the influence of vascular plant species richness, area, sampling effort, climate and geology in the number of vegetation types. The highest numbers of classes and alliances were found in the Iberian Peninsula, France and Italy, and the lowest numbers in the Netherlands and Denmark. The number of classes was only predicted by plant species richness. The number of alliances was mainly predicted by species richness, but also by the range of temperature, geological diversity, mean annual precipitation and the range of Potential Evapotranspiration. Our results suggest that, at large scales, the number of major vegetation types can be predicted by species richness. Although low-rank vegetation types are mainly influenced by species richness, they can also reflect environmental heterogeneity. Furthermore, our study provides a guide for estimating the number of vegetation types that may be expected in less explored areas of temperate regions.

Defining a role of vegetation databases in Red List assessments of plant communities: a preliminary study using Polish Vegetation Database [S2A]

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The red lists of threatened species are created on the basis of criteria and categories of threat proposed by the IUCN. The same principles are now very often used to assess the status of threatened plant communities. According to IUCN reports, extinctions of plant and animal species are caused by habitats loss due to environment exploitation and anthropogenic landscape change. Phytosociological databases are useful tools in defining the area of occupancy, diversity and species composition changes of plant communities in a wide spatial and temporal gradients. Can the phytosociological relevés stored in databases be also used in assessment of plant communities threat? The present study shows the possibilities of using data from Polish Vegetation Database in the Red List assessment of plant communities on a regional scale. In the territory of Lower Silesia (SW Poland), 12 squares of an area of 100 km² were randomly selected. For each square phytosociological relevés from the Polish Vegetation Database were assigned. The relevés represent plant communities from classes *Querco-Fagetea*, *Molinio-Arrhenatheretea*, *Festuco-Brometea* and provide information on how these vegetation types are distributed within the entire region. Additionally, we used ATPOL database from which we obtained information about native and alien species reported from analyzed squares. For each square, with GIS software we assessed number and cover of urban areas, arable lands as well as areas with forest and grassland vegetation. The main criteria used in the study are following: differentiation of landscape and its fragmentation, occurrence of endangered, diagnostic and alien species in

evaluated plant communities as well as decline in the quality of habitat or species composition sustainability. On the basis of adopted criteria and biocenotic indices we prepared local list of threatened plant communities.

Is coastal halophyte vegetation threatened by the sea level rise? A vegetation transition model [S1B]

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Climate change-driven sea level rise in the Northern Adriatic is predicted on 14 mm/year according to the present trends (last 15 years). Thus, the sea level rise represents - beside tourism, agriculture and urbanization - one the most serious threat to coastal wetlands. Within the Slovenian shallow sedimentary seacoast, which is very suitable for halophyte vegetation, almost all vegetation types are defined as Natura 2000 habitats. The most important coastal wetlands in Slovenia are two protected areas – Sečovlje saline and Škocjan inlet, where halophyte vegetation was mapped in fine resolution of 50 cm. The syntaxonomic resolution was tuned on the level of alliances (Sarcocornion fruticosi, Junciaion maritima, Salicornion patulae, Spartinion maritima and Phragmition australis). The micro-elevation ranges of each vegetation type were obtained by matching the vegetation map and digital micro-elevation model. A high positive correlation between the micro-elevation levels (measured with LiDAR technology, calibrated with high resolution geodetic measurements) and vegetation types were found. Different scenarios ranged from 5 to 30 cm of sea level rise were considered. Vegetation transitions were predicted for all future scenarios. However, the overall reduction of halophyte vegetation is foreseen. In all scenarios, especially vegetation of Sarcocornion fruticosae will decrease substantially, followed by Salicornion patulae. The overall reduction by 2060 will reach 67% in Škocjan inlet nature reserve. It could be concluded that the s.c. “coastal squeeze”, also due to anthropogenic barriers as dykes, channels, roads, or settlements will decrease halophyte vegetation substantially and countermeasures should be planned well in advance.

Halophyte vegetation of Western Siberia [S1D]

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The West Siberian plain is among of the greatest in the world. Due to remarkable environmental variability high diversity of vegetation and soil patterns is inherent for steppe and forest-steppe zones. Under fluctuation of moisture the salted soils are developed. Salty habitats are occupied by communities of halophyte and salt-tolerant plants. Plant communities of six classes listed below have been registered in the area.

Thero-Salicornietea (S. Pignatti 1953) R. Tx. in R. Tx. et Oberd. 1958 - communities dominated by annual halophytes: *Camphorosma songorica*, *Salicornia perennans*, *Suaeda* species.

Salicornietea fruticosae Br.-Bl. et R. Tx. ex A. de Bolòs y Vayreda 1950 is characterized by prevalence of halophyte perennial scrubs and subscrubs: *Kalidium foliatum*, *Halimione verrucifera*, *Halocnemum strobilaceum*.

Bolboschoenetea maritimi Vicherek et Tüxen 1969 ex Tüxen & Hüllbusch 1971 - salt marsh vegetation dominated by *Bolboschoenus*.

Crypsidetea aculeatae Vicherek 1973 - communities of annual plants, mainly *Crypsis aculeata*, developed in little ephemeral pools normally surrounded by combination of steppe and halophyte communities.

Scorzonero-Juncetea gerardii Golub et al. 2001 - wet meadows formed by perennial herbaceous salt-tolerant plants: *Alopecurus arundinaceus*, *Hordeum brevisubulatum*.

Festuco-Puccinellietea Soó ex Vicherek 1973 - dry meadows and steppes on solonetz dominated by perennials: *Artemisia nitrosa*, *Festuca valesiaca*, *Puccinellia tenuissima*.

Distribution of halophytic vegetation is briefly outlined. Communities of *Crypsidetea aculeatae* are seldom and have the eastern border of distribution in the plain. These communities together with *Salicornietea fruticosae* communities could be found within the steppe zone only. Communities related to the other classes are very common in steppe as well as forest-steppe zone. Ordination showed the leading role of moisture and salinity in forming of halophyte vegetation.

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Saline vegetation of forest-steppe and steppe zones in Volga area: diversity, distribution, ecology and protection [S1D]

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The diversity and distribution of saline vegetation in the Volga area are determined by the climate, zonal location, soils and relief. Halophytic communities are small and rare in the forest-steppe zone. The communities of the class *Festuco-Puccinellietea* are distributed on floodplains having solonchak-like and solonets-like soils. The coenoses of the classes *Thero-Salicornietea*, *Festuco-Puccinellietea* occur on the depressions of river terraces with solonchaks, solonets and solonets-like soils. In addition, the widespread communities of the class *Festuco-Brometea* are found on level and elevated areas, river terraces and watersheds with chernozems solonets-like, prone-governmental grazing. Halophytic vegetation of the steppe zone has a high diversity and it is widespread on the Volga Left Bank. The communities of the classes *Thero-Salicornietea* and *Festuco-Puccinellietea* are distributed on the river valleys where the alluvial meadows with saline and solonets-like soils are present. The coenoses of the classes *Thero-Salicornietea* and *Petrosimonia oppositifoliae*-*Kalidietea caspici* are found in the depressions of the Obschij Syrt Elevation, northern part of the Caspian Lowland characterized by the solonchaks and solonets, in the saline lake on solonchaks. The coenoses of the class *Festuco-Puccinellietea* are distributed in the shallow depressions, banks of channels with solonets-like and solonchak-like soils, in lake depressions on solonets and on the slopes of watersheds on solonets-like solonchak and solonets-like solonchak. Besides these coenoses, the communities of the class *Festuco-Brometea* on flat or elevated areas such as the river terraces, slopes of ridges and upland areas with solonets-like chernozems and kastanozem solonets-like soils penetrate into the steppe zone. The analysis of the diversity of halophytic communities in the Volga area has shown that 12 coenoses are rare and they can be recommended for conservation.

Species richness and plant functional traits in the vegetation of saline habitats in different phytogeographic regions [S1C]

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Saline habitats are generally known as ecosystems connected with saltwater whether it is related to sea water or salt lakes and dry basins. They occur in coastal and inland sands and associated salt marshes. Vegetation distribution in these stress-prone habitats is strongly connected to habitat. Specific adaptation of plant species to stress and disturbance resulted in different plant physiognomy, species composition and species richness. We have studied habitat specific species richness of sandy areas in the Mediterranean, Hyrcanian and Irano-Turanian phytogeographic regions. Furthermore the recorded plant species were classified based on functional traits such as life form, photosynthetic type and chorological type, and their distribution in different habitats and regions were compared. The study areas were NE Greece along the Aegean coast, the coast of the Caspian Sea in NE Iran and inland sands of Central Iran. During field studies in summer 2011 and 2012, a total of 310 phytosociological relevés were collected. The species richness of four habitat types comprising mobile dunes, fixed dunes, salt marshes and disturbed habitats were calculated for each region. The highest species richness occurred in fixed dune habitats while salt marshes were the poorest habitat in all regions. Mean values of species richness in the Mediterranean region — 15.5 for fixed dunes, 12 for mobile dunes and 5.5 in salt marshes — are significantly higher (ca. 2 times) than in the two other regions. Among the functional traits, C_4 photosynthesis type has an important role in the vegetation of sandy areas in the Hyrcanian and Irano-Turanian regions. The cover percentage value of C_4 species is significantly higher than of C_3 species although the proportion of C_4 species is lower in both areas.

Long-term dynamics of the threat to habitats posed by non-native species: Shift from anthropogenic to natural habitats [OSA]

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The assessment of vulnerability of plant communities should account for the threat of invasion by non-native plants. Numerous studies have shown that non-native species may represent severe threat to native species, ecosystems and even biodiversity as a whole. Here, we assess a 50-year trend in level of invasion across 45 EUNIS habitats in Slovakia. Apparently, there is a decreasing tendency in the level of invasion in most of anthropogenic habitats, as concluded from the significant decrease in the proportion and total cover of archaeophytes and neophytes. In contrast, the relative proportion and cover of both alien groups increases significantly in the semi-natural and natural types of habitats. Since several large-scale studies reported that anthropogenic habitats are among the

most invaded, long-term decrease in their level of invasion and shift of non-native species to more natural habitats represent rather unexpected and novel result. Our results reveal vulnerability of some of the semi-natural and natural habitats to invasion by alien species. Moreover, it may also indicate more complex changes in the invaded habitats and may represent early warning signs for ecological degradation of these habitats. This research was funded by VEGA 2/0098/11.

Environmental factors determining threatened aquatic plant-communities [S2B]

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Freshwater ecosystems are among the most endangered by global change. The Habitats Directive identify 19 freshwater-habitats type –10 corresponding to standing waters and nine to running waters– of European Community concern. Three of them are of priority conservation –Mediterranean temporary ponds, Turloughs and Transylvanian hot-spring lotus beds–. After a first review, some inconsistencies can be seen: (i) absence of habitat types with interest, (ii) habitat type referring to different ecological requirements, and (iii) characteristic species not corresponding to their designed habitat type. Furthermore, to design appropriate conservation policies it is essential to ascertain which are the most vulnerable freshwater habitats.

We focused our attention on Iberian freshwater habitats, since (i) the Iberian Peninsula has contrasting climates and lithologies where geochemical gradients can be studied, (ii) it is home to many freshwater habitat types, and (iii) it hosts the highest densities of aquatic plants endemic to Europe and the Mediterranean. Based on both own and bibliographic data, we examined some study cases along water physical-chemical gradients –mineralization, eutrophication, and flow– as well as along climatic gradients –temperature, and rainfall–.

Rainfall/temperature ratio, alkalinity, and eutrophication shape the vegetation composition in freshwater habitats. In view of this results, some gaps were found in the European Habitats Directive with regard to Atlantic and oligotrophic base-poor freshwater habitats.

Syntaxonomy and phytogeographical differentiation of inland salt marsh vegetation in Central Europe [S1C]

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Inland salt marshes in humid climate of Central Europe are rare habitats, very often limited to small areas affected by salt springs or saline groundwater. Their presence is connected with salt deposits uplifted to the surface in the form of salt domes, salt pillows or others and with development of salt industry. Inland salt meadows (*Glauco-Puccinellietalia*, inland part) are included into Natura 2000 network as endangered and priority important with the code 1340*. Syntaxonomical position of many patches is not clear until now as they are relatively small and are strongly affected by vegetation of adjacent non saline areas and management type. Therefore

ca. 560 phytosociological relevés with 340 species from natural and anthropogenic inland saline habitats from Poland and Germany were collected based on the own research and literature. They were classified by hierarchical agglomerative and divisive (TWINSPAN) classification methods. The crispness of classification was checked. Indirect (CA, DCA) and partly direct (CCA) ordination were applied. The vegetation changed along the salinity gradient from sub halophytic grasslands from *Molinio-Arrhenatheretea* class and reed beds from *Phragmitetea* class to halophytic vegetation from *Asteretea tripolii* (= *Juncetea maritimi*) class and extreme halophytic vegetation from *Thero-Salicornietea* class. The second gradients were the organic matter and related moisture content. *Triglochino-Glaucetum maritimae* association were identified as connected with high values of this gradients. Inland salt marshes in Germany were richer in halophytic species than that located in Poland. *Suaeda maritima*, *Spergularia media*, *Plantago maritima*, *Hordeum secalinum*, *Artemisia maritima*, *Halimione pedunculata* were noted there and absent on Polish saline sites. Our relatively large scale analysis of the floristic variation of inland saline habitats might be useful for the unification of classification systems of the country involved.

Predicting future changes in Italian coastal dune habitats [S1A]

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Coastal dunes worldwide harbor threatened habitats characterized by high diversity in terms of plant communities. In Italy, recent assessments have highlighted the bad or unsuitable state of conservation of these habitats as defined by the EU Habitats Directive. The effects of predicted climate change could have dramatic consequences for coastal environments in the near future. An assessment of the efficacy of protection measures under climate change is thus a priority. Here, we have developed environmental envelope models for the most widespread dune habitats in Italy (sensu 92/43/EEC Habitats Directive) using VegDunes (GIVD ID EU-IT-005), a vegetation database of Italian coastal dune EU habitats. We followed two complementary approaches: an “indirect” plant-species-based one and a simple “direct” one. We analyzed how habitat distribution will be altered under the effects of two climate change scenarios and evaluated if the current Italian protected areas network will be effective in the future after distribution shifts. We used two well-known different emission scenarios (A2 -high emissions- and B2 -intermediate emissions-) available from WorldClim dataset of the Intergovernmental Panel on Climate Change (IPCC). While modeling dune habitats with the “direct” approach was not satisfactory, “indirect” models had a good predictive performance, highlighting the importance of using species’ responses to climate change for modeling these habitats. The results showed that habitats closer to the sea may even increase their geographical distribution in the near future. The transition dune habitat is projected to remain stable, although mobile and fixed dune habitats are projected to lose most of their actual geographical distribution. A relevant proportion of current habitats’ distribution is covered by protected areas, but the level of protection for mobile and fixed dune habitats will drop drastically under the examined climate change scenarios. Our results provide a useful indicator for setting management priorities and better addressing conservation efforts to preserve these threatened habitats in the future.

Red List evaluation of European biotopes [S2K]

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Over the past 30 years, phytosociologists have pioneered the application of Red List assessment to vegetation types in Europe. More recently, IUCN have begun a global programme to produce a Red List of world ecosystems. Now, in a feasibility study for DG(Environment) of terrestrial, freshwater and marine habitats in Europe (EU and beyond), we have reviewed (1) which typology (plant associations, habitats, ecosystems) is best for evaluation, (2) what assessment criteria should be used and with what threshold levels and (3) at what spatial and temporal scales such assessments should be made. Any proposed methodology has to take account of species Red Lists, allow effective reporting under Article 17 of the Habitats Directive and the Marine Strategy Framework Directive, help signal future threats to biotopes and help scope possibilities for restoration under the EU Biodiversity Strategy. This paper will outline our preferred methodology and show what role vegetation scientists might play in a programme of Red List assessment for Europe.

Kalidietea foliati - new class of inland halophytic vegetation of Eurasia [S1D]

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In 2001 a group of authors studied hyper-halophytic communities of the class *Salicornietea fruticosae* in Eurasia. As a result the authors suggested relating floristically poor plant communities with the dominance of perennial low shrub and dwarf-semishrub succulent hyper-halophytes to the class *Salicornietea fruticosae*.

As part of the class *Salicornietea fruticosae* the authors selected two subclasses: *Arthrocnemenea* Golub et al. 2001 and *Kalidienea* Golub et al. 2001.

We decided to split 2 subclasses into 2 different classes of vegetation for a number of reasons (primarily because of the significant differences in the species composition of communities). New class of the inland halophytic vegetation (*Kalidietea foliati* Rukhlenko 2013) stands out due to the rank change of the subclass *Kalidienea* Golub et al. 2001 to a higher rank. The new class of vegetation is the geographical and ecological (inland) analog of the class *Salicornietea fruticosae*.

Diagnostic taxons of the new class: species of genera *Kalidium* (*K. caspicum*, *K. foliatum*, *K. gracile*), *Salsola* (*S. aralensis*, *S. crassa*, *S. lanata*, *S. transoxana*, *S. turcomanica*, *S. acutifolia*, *S. arbuscula*, *S. dendroides*, *S. foliosa*, *S. kali*, *S. nitraria*, *S. orientalis*, *S. passerina*, *S. paulsenii*, *S. soda*), *Petrosimonia* (*P. brachiata*, *P. glauca*, *P. oppositifolia*, *P. sibirica*, *P. triandra*) and *Halocnemum strobilaceum*.

These are mainly inland communities of perennial succulent hyperhalophytes of the south of Eastern Europe, Kazakhstan, the Middle Asia, Iran and Mongolia

which occur in different types of salty marshes.

The class consists of 3 orders (*Halimionietalia verruciferae*, *Kalidietalia caspici*, *Kalidietalia gracilis*), 6 alliances (*Artemisio santonici*-Puccinellion, *Artemisio nitrosae*-Puccinellion *tenuissimae*, *Kalidion caspici*, *Climacopteron lanatae*, *Aeluropodion littoralis*, *Kalidion gracilis*), 47 associations and 2 communities.

Influence of environmental factors on Mediterranean coastal dune vegetation: a case study in central Italy (Tuscany) [S1A]

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Coastal dune habitats are undeniably important ecosystems in Europe, as they contain a high ecological diversity in terms of environmental heterogeneity and variability of species composition. They are characterized by a close interaction between abiotic and biotic components along a complex coast-to-inland environmental gradient, which determines a characteristic vegetation zonation. The aim of the present work is to define which are the abiotic factors that mostly affect distribution and composition of Mediterranean plant dune communities in regard to dune morphology, sedimentological and geopedological features. The study was carried out within two protected areas of the Tuscan coast (central Italy): Migliarino – San Rossore – Massaciuccoli Regional Park and Maremma Regional Park, which are characterized by the presence of the most well-preserved dune systems of Tuscany. Topographic surveys along eleven randomly positioned transects perpendicular to the shoreline were performed on coastal systems, starting from the beach face up to the plant communities of the back dunes. Along all transects 75 plots were positioned, and then floristic and geomorphological data (such as distance to the coastline, plot altitude, slope, grain-size, sorting, pH, conductivity) were collected. The analyses revealed differences at the morpho-sedimentological and geopedological levels. Relationships between vegetation composition and geomorphological characteristics were investigated through Canonical Correspondence Analysis (CCA). In particular, three factors - distance from the sea, grain size and pH - were found to be closely correlated with the floristic composition of plant communities along the environmental gradient. These results may be useful for management and conservation actions.

***Sarcocornia* plant communities from Western Mediterranean area: a synthetic review [S1B]**

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Western Mediterranean halophytic communities structured by succulent suffruticose and fruticose chamaephytes (*Arthrocnemum macrostachyum*, *Sarcocornia* sp. pl.) are included in the *Salicornietea fruticosae* phytosociological class.

Recently, a taxonomic revision of the *Sarcocornia* species through the Iberian Peninsula allow us to recognized several new taxa of this genus: *Sarcocornia hispanica*, *S. pruinosa* and *S. alpini* subsp. *carinata*, in addition to the well known *S. fruticosa*, *S. alpini* and *S. perennis*.

In view of these new data we carried out a synthetic overview of the *Sarcocornia* plant communities framed into the order *Salicornietalia fruticosae* that have been reported for both coastal and inland saline territories of the Iberian Peninsula and neighboring areas.

The German Data Book of Biotopes, adapted criteria and preparation of a 3rd edition [S2A]

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Germany has a long tradition of different biotope (habitat) mapping schemes in its 16 Federal States (Bundesländer) since the 1970's as well as vegetation mapping based on syntaxa since the 1940's up to the recently published pNV (2010) map at the scale of 1:500.000. In 1993 a first German Standard-list of biotope types was published. Based on this list in 1994 a first edition and in 2006 a second edition of a Red Data Book of German biotope types was compiled. Currently a third edition is scheduled for 2016, backed up by a research project. Experiences, methodology and criteria for the German Red Data Book of biotope types will be presented, as well as results and lessons learnt from the previous two editions. German Biotope types were essentially assessed for their loss of area and their loss in quality, resulting in regional threat status over eight landscape regions. In addition the ability for regeneration was assessed. Links to vegetation units, to EUNIS, to the EU-Habitats Directive, the Water Framework-Directive, the German National Nature Legislation (legal protected biotope types §30) and additional descriptive features will be discussed. The Red Data Book of biotope types, together with biotope mapping schemes of the Bundesländer, nowadays constitutes important scientific independent policy information for nature conservation, planning and management of protected areas. For impact assessments and recently for the assessment of possible biodiversity damage they are major background information. EU-reporting needs for the Habitats-Directive (Art. 17) has enforced the need of regular remapping of biotopes as the principal data source for Red Data Books.

Finally an outlook will be given, considering recent developments of a global approach for IUCN Red List of Ecosystems based on the World Conservation Congress resolutions in 2008 and 2012.

Semi-supervised classification: a progress in clustering of vegetation data [OSB]

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Unsupervised classifications applied to vegetation-plot data tend to yield unstable

results. The stability of results can be increased by some kind of supervision. In the last two decades, several supervised classification algorithms were tested in the context of vegetation classification. They may be divided into two categories: Methods with (1) definition of species and species groups as decision rules and (2) matching vegetation plots to some examples representing the groups. However, all of these methods are strictly limited by the ultimate number clusters, which must be defined before classification. Therefore, we searched for a modification of a simple and well known classification method which would combine advantages of both supervised and unsupervised classifications – i.e. stability of clustering algorithm and flexibility in the number of resulting clusters. This new method was tested with some artificial and real data sets of vegetation plots and gave very promising results.

Different ecological behavior of *Camphorosma monspeliaca* dominated communities - two cases from Bulgaria and Russia [S1C]

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The species *Camphorosma monspeliaca* has a wide geographical range of distribution – from Western Mediterranean parts of Europe to Western Asia and Southern Siberia. In terms of the ecology, *Camphorosma monspeliaca* is known mainly as halophytic species. The dominated from the species halophytic communities are found in the saline plains and river lowlands on more or less saline soils. But in many places - from North Bulgaria to the hills near the Volga River, it participates in the floristic composition of the steppe vegetation, often on steep and dry stony terrains. The aim of this study was to compare the floristic composition and ecological characteristics of both communities in Bulgaria and Russia in which *Camphorosma monspeliaca* dominates – the halophytic and steppe ones. The comparison of the floristic and ecological structure aims to explain the main factor for the dominance of the species. Possible explanations for this specific ecology are not so the strictly halophytic preferences of the species. Probably its toughness and the lesser competitiveness with the tufted perennial grasses are the ecological reasons for these differences and the specific ecological behavior.

Assessment of conservation status of beech forest communities in Slovakia [S2A]

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Attempts to find objective quantitative criteria and thresholds to assess a threat of habitat types have been made recently (IUCN criteria, Red lists of habitats). Following criteria are stressed: area loss, temporal decline, few localities, small

extent, regional threat, decreasing habitat quality, regenerability. Methodology for Red list of forest habitats have been prepared by National Forest Centre using data from vegetation mapping and forest inventory in Slovakia.

We compared effects of hierarchic classification levels on the threat assessment of the beech forest communities using both spatial and plot data. Our criteria were: species pool, species richness, species composition and age of tree layer, actual and potential area of distribution (forested land). Species richness and species pools were extracted from the Twinspan classification of forests dominated by *Fagus sylvatica*. Tree species proportions (inventory data) were compared with natural tree-species composition.

Species-pool of beech forests in Slovakia is built by 781 vascular species. 64 % from potential distribution of *Fagion* alliance is formed by natural stands. Species-pool/richness vary from 204/21.4 in *Luzulo-Fagenion* to 552/42.6 in *Cephalanthero-Fagenion*. Actual proportion of all natural/old natural (> 80 yrs) stands varies from 56/15 (*Luzulo-Fagenion*) to 79/35 % (*Acerenion*). Total area of the natural stands ranges from 84 (*Acerenion*) to 6629 km² (*Eu-Fagenion*).

Values of the assessment criteria showed similar variability on the association level. It means that alliance and suballiance levels are not sufficient to protect complete diversity of beech forests in Slovakia. Moreover, overall diversity of communities is conserved only in the rare old natural stands actually threatened by harvesting and introducing of spruce.

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POSTERS

Occurrence of thermophilous grass species *Chrysopogon gryllus* in grassland communities of Serbia [OP1]

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Ecology and occurrence of grass species the *Chrysopogon gryllus* within the various grassland communities of Serbia was analyzed. The species inhabits different habitats, in range of geological bedrocks and soil types, occurring mostly in dry, semi-dry, sandy and even in mesophilous grassland communities. Distribution of species is mainly centered in the Mediterranean region and Southeast Europe extending eastwards to northern Iraq, the Caucasus Mountains and India.

Relevés were collected from the Phytosociological Database of Grassland Vegetation of Serbia containing the total of 4252 relevés from classes *Molinio-Arrhenatheretea*, *Festuco-Brometea* and *Festucetea vaginatae* and 879 relevés (with total of 907 species recorded) characterized by the presence of *Ch. gryllus* were processed and analyzed. The cluster analysis was performed of the extracted dataset in the program Pc-Ord 5 using Sorensen as a distance measure and Ward's method algorithm for dendrogram construction.

The cluster analysis of the final dataset indicated 6 interpretable clusters. Cluster analysis indicated clearly separation of the relevés corresponding to grassland vegetation of Balkan's alliance *Chrysopogono-Danthonion calycinae* from the large group of relevés of other alliances and orders of grassland vegetation of Serbia. This large heterogenous group of relevés was further divided into cluster gathering dry steppic grasslands of the submontane and montane belt of the south-central Balkans, the *Astragalo-Potentilletalia* and group of clusters referring mainly north Serbian grasslands (*Festucion valesiacae*, *Festucion rupicolae*) and steppic vegetation developed on serpentine of the Balkan order *Halacsyetalia sendtneri*.

Our results shows that *Chrysopogon gryllus* is species with wide ecological niche that occurs or even dominates in different grassland communities that develop on the limestone, dolomite rocks, the serpentines, sandstone, loess plains and even in slightly saline habitats.

Materials and some results from communities hierarchical classification of submediterranean oak deciduous forest and temperate deciduous forest in Italian Peninsula [OP1]

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Aims of this research group are the establishment and participation to a federated database of Italian vegetation. This is done in order to evaluate the "real existence" of plant communities dominated by *Quercus* sp.pl. and *Fagus sylvatica*, investigate about how these communities are distinguished on the base of macroecological factors and/or floristic composition. An attempt to parameterize these units in order to verify their biogeographical robustness and adaptation to current

classifications in EU (EUNIS, Corine Biotopes classification) for the Mediterranean region is here proposed.

From a wide database of published and certified phytosociological relevés of broadleaved deciduous submediterranean and temperate deciduous forests, about 3500 relevés have been selected. The vegetation plots corresponds to the communities at the level of association ranked into the class of *Quercus-Fagetea*, specifically dominated by oaks and beech, recorded in the territories south of the watershed of Apennines (italian peninsula).

Some preliminary results from divisive cluster analysis (modified TWINSpan) and formalized classification (Cocktail method), show patterns of similarity among the distribution of different units (chorological groups), patterns of geographic changes in community distribution along ecological gradients. Moreover we have obtained a different insight in the coenological patterns of this plant communities and a reassessment of these groups on the basis of a "biogeographical and ecological definition".

A basic idea of the research is to identify a set of parameters to improve the interpretation of habitat of EUNIS classification system for Italy, at least down the third level. The correspondence as much as objective as possible between communities identified through parameterization and EUNIS habitats will allow a clear identification also of the correspondences with legal instruments such the EU Habitats Directive Annex I and the Bern Convention Resolution No. 4.

This would help in overcoming the difficulties in formal applying EU directives at local scale, due to the fact they all build upon the CORINE/Palaeartic Habitat classification, but because of the fixed place in legal frameworks, the EU Habitats and the Bern Convention Lists have not continued to evolve, while their parent classifications have developed further.

Exotic plants and their impact on the flora of Southwestern region in Saudi Arabia [OP2]

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A primary evaluation on the spread of invasive species and their impact on the flora of southwestern region including Farasan Archipelago have been carried out. Invasive species, particularly *Opuntia* spp. and *Nicotiana glauca* have been invaded and established into the habitats of some of the vegetation-rich areas of high altitude mountains. The study showed that the invasive/exotic species have taken up the positions of the dominant components of the pristine habitats and thereby threatened the existence of the native flora including the endangered/endemic plants to the brink of extinction. The objective of the research is to provide a means that makes the process of collecting, identifying nonnative plants that cause destructive impacts to the biodiversity. The results could be used by researchers, land managers or conservationists. The protocol was designed to distinguish between species that cause high, medium, low, or insignificant negative impacts to native biodiversity within region or the country as a whole.

Data have been collected from 66 relevé in 13 locations from mountains, escarpments, wadis, coastal lands and islands. 18 vegetation units have been identified from these relevés, each represented by a group of significant associations of plants. 355 species belonging to 211 genera have been recorded from these relevés. Among these, 45 species belonged to tree category, 111 shrubs, 139 subshrubs, 33 perennial grasses and 27 herbs. Rida escarpments, one of the plant diversity hot-spots

and a nature reserve, is the most affected area in the Kingdom, followed by the mountains of Taif and Jazan Provinces. The most important invasive species from the surveyed area, so far, are *Prosopis juliflora*, *Nicotiana glauca*, *Opuntia dellenii*, *Opuntia ficus-indica*, *Argemone ochroleuca* and *A. mexicana*. Among these *Prosopis juliflora* is recorded in vegetation groups 11, dominated by *Capparis sinaica*-*Abutilon pannosum* community and 14 dominated by *Salvadora persica*-*Acacia ehrenbergiana* community; *Nicotiana glauca* in VG-3 dominated by *Rumex nervosus*-*Lavandula dentata*-*Dodonaea angustifolia* community and in VG-9 dominated by *Acacia ehrenbergiana*-*Anisotes trisulcus* community; *Argemone ochroleuca* and *A. mexicana* and *Opuntia ficus-indica* were found in VG-3 & VG-4 dominated by *Rumex nervosus*-*Lavandula dentata* community and *Juniperus procera*-*Acacia origina* community respectively; and finally *O. dellenii* in vegetation groups such as 3, 6, 7, 8, 9 and 10, dominated by some of the characteristic species of the climax vegetation such as *Rumex nervosus*, *Juniperus procera*, *Acacia asak*, *Anisotes trisulcus*, etc.

Habitat loss on Don Močvar – the largest pit bog in Croatia - due to depopulation and abandonment of traditional land use [OP1]

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Don močvar (situated in central Croatia, 170 m a.s., in *Quercus petraea*-*Carpinus betulus* vegetation zone) represents the oldest (preboreal origin) and, with area of 11 ha, the largest peat bog not only in Croatia, but in broader Southeast European area. It is composed of a mosaic of different vegetation types – from typical transitional peat bog vegetation (ass. *Drosero*-*Caricetum stellulate*) and some elements of raised bog communities (*Sphagnum capillifolium*-*Polytrichum longisetum*), to the well developed ass. *Rhynchosporietum albae*, which was thought to be extinct in Croatia. With the richest flora of *Sphagnum* mosses (eight species) it represents the centre of diversity of this group in Croatia. Vascular flora is represented with many rare and Red listed species (27% of its total flora). However, the area is under strong pressure of vegetation succession and overgrowing by *Molinia caerulea*, *Betula pubescens* and *Frangula alnus* and consequently by several herbaceous species due to changed water regime and deposition of litter. To trace changes in vegetation during the time, we analysed aerial photographs from the period 1959-2004. The first major step in vegetation change occurred between 1976 and 1990, when farm households in vicinity disappeared, and surface of wet meadows decreased from 35.3% to 3.5%. In the next period (1990-2000) forests had spread from 17.4% to 40.1% and than to 46.1% in 2004. However, surface of *Rhynchosporietum albae* had been decreasing from 5.7% in 1959 to 4.2% in 1990 and finally to 3.9% in 2004. Habitats with open water surface have almost disappeared, since they cover 11.6% in 1959 and only 0.12% in 2004. Since 1990 meadows overgrown by shrubberies occurred as new habitat type, represented by 5.7% in 1990 and by 11.5% in 2004. These processes are mainly caused by intensive depopulation of the region, followed by abandonment of traditional land use enabling rapid development of stands dominated by mentioned fast growing tree species.

Priority habitat 1510 “mediterranean salt steppes (*Limonietalia*)” within the Parc naturel régional de la Narbonnaise en Méditerranée’s territory. Floristic definition [P1]

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Within the frame of a study on the priority habitat 1510 “Mediterranean salt steppes (*Limonietalia*)” conducted on the behalf of the Parc naturel régional de la Narbonnaise en Méditerranée (Aude department, France), 174 vegetation *relevés* have been done in areas previously mapped as « salt steppes » according to various cartographers. During this field work, it quickly became clear that there had been some confusion between this habitat and two others Directive habitats: the 1410, “Mediterranean salt meadows (*Juncetalia maritimi*)”, and the 1420, “Mediterranean and thermo-atlantic halophilous scrubs (*Sarcocornetea fruticosi*)”.

In order to clarify things, we will test the efficiency of the diagnostic species given by several bibliographic sources, and then make a new proposition more suited to the local context. Finally, to get a better understanding of the differences between the 1510 and 1410 habitat, we will consider the ecological and floristic features of those two habitats.

Alien plants of coastal sand dune habitats in Southern Spain [P1]

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The coastal ecosystems of Southern Spain have been submitted for more than fifty years to a strong pressure (tourism, urbanism, alien plants, etc.) that have modified the structure and functionality. The psammophilous habitats of various natural spaces in Southern Spain, from the Guadiana mouth (Huelva) up to Cabo de Gata (Almería) have been studied in order to know the alien plants and the degree of invasion of each species in the respective syntaxonomic unit.

How do even common alpine communities can affect distribution of the rare endemic marmot species (*Marmota marmota latirostris*) burrows in the Tatras? [OP1]

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Function of Tatra marmot burrows and factors influencing their distribution were studied from summer to autumn 2010 on the seventeen sites in the Tatry Mts (Western Carpathians, Slovakia). All factors expected to influence the location of Tatra marmot burrows were recorded. Collected data were analyzed by multivariate analysis (DCA, CCA).

The output analysis and field observations show that environmental factors does not determine the functional differentiation of Tatra marmot burrows directly; but affect the structure and location of burrows in respect to their regular function. Vegetation patterns influence the location of different types of marmot territories

in terms of their functional differentiation.

Tatra marmot communication links (migratory paths) associated with the emergency shelters are bound to the plant communities of the alliance *Juncion trifidi* – alpine siliceous grasslands of wind-exposed habitats. The centres of the marmot colonies with the main burrow systems are often located within the plant communities of the alliance *Juncion trifidi* and chionophilous grassland communities of fixed screes on siliceous bedrock (alliance *Festucion picturatae*). Marmots avoid trophically least attractive and the most extreme locations within low-stem, mat-grass communities (alliance *Nardion strictae*), dense stands of dwarf pine (alliance *Pinion mugo*) and dwarf shrubs with lichens (class *Loiseleurio-Vaccinietae*). That is the way even why relatively common vegetation types are really important to preserve biodiversity in mountain regions.

Foraging areas are very important part of marmot colonies and have an important role in the localization of all types of family territories. The most preferred habitats for pastures are grasslands and tall-herb plant communities. Foraging areas and communication links are associated with the location of emergency shelters.

Montane grasslands of the Northern Apennine: syntaxonomy, synchorology and synecology [OP1]

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Semi-natural dry and mesophilous grasslands are among the most species-rich plant communities in Europe and contain a large number of rare and endangered species listed in Red Data Books. A phytosociological study on the montane grasslands of the Western portion of the Northern Apennine was carried out in order to fill the gaps in the floristic and syntaxonomical knowledge. 96 phytosociological relevés were collected and 40 literature relevés were considered in order to establish if these grasslands can be classified in *syntaxa* already described for the Alps or the Apennine or if they represent independent *syntaxa*. Original and literature relevés were performed producing two cluster analysis. CA, PCA and Kruskal-Wallis test were also carried out taking into consideration biological forms, chorological groups and Ellenberg indicator values. The studied coenoses can be attributed to two associations described for the Northern Apennine: *Festuco inopsis-Brometum erecti* Castelli, Biondi & Balelli 2001 nom. corr., including high altitude grasslands of the montane belt, and *Salvio-Dactyletum arrhenatheretosum* Ubaldi, Zanotti & Corticelli 1990, including low altitude grasslands of the montane belt. The floristic autonomy of the Northern Apennine grasslands if compared to the Central Apennine ones is also confirmed from the chorological point of view, given the dominance of European species. SE-Europeans and Paleotemperate characterize the low-altitude grasslands, while W-Medit-Subtropicals colonize the high-altitude coenoses. The studied grasslands have an important floristic, ecological and phytogeographical value. *Festuco-Brometum* communities correspond to the Habitat 6210 but only a limited portion of them are included in Sites of Community Importance (SCI). *Salvio-Dactyletum* grasslands correspond to the Habitat 6520 but none of them is included in SCI or other protected areas. Due to their lack, such grasslands are neither monitored nor checked; thus they are vulnerable.

Causes and effects of disturbances in estuarine vegetation [OP1]

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The Elbe River Estuary is the largest estuary which empties into the German part of the North Sea. It is a highly dynamic system characterized by both natural and anthropogenic disturbances. The estuary harbors a number of protected habitats as well as endangered plant species and comprises important resting and breeding grounds for endangered birds.

Due to agricultural use and river training the tidal marsh areas have been reduced considerably and the natural dynamics have been constrained. Nevertheless there are still near-natural marsh areas where the response of the reed-dominated vegetation to a changing disturbance regime can be observed.

Based on permanent plots, hydrological data, hyperspectral and multispectral images as well as digital elevation models we've studied disturbance patterns arising in winter like the removal of aboveground biomass along the river or wrack (mats of dead plant material) further inland, their potential causes and resulting vegetation changes. *Phragmites australis* stands show a high tolerance against different types of disturbance including wrack. Reed beds of the same species, of *Scirpus maritimus* or of *Scirpus tabernaemontani*, respectively have been found to tolerate repeated removal of their aboveground biomass. Succession after disturbance is affected by the size of the disturbed area and by neighboring plant communities. Anticipated effects of the ongoing climate change are discussed and conclusions are drawn concerning waterway management, land use, and nature conservation.

The study is part of the research programme KLIWAS (Impacts of Climate Change on Waterways and Navigation) initiated by the Federal Ministry of Transport, Building and Urban Affairs.

Zonation of the french atlantic coastal vegetation: typology and bioevaluation of geopermaseries and geocurtaseries [P1]

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Coastal vegetations are spatially organized in parallel belts, according to sea influence gradient which dominant parameters are salt, wind, and for saltmarshes submersion regime.

- Along the french atlantic coasts, a recent research programme is dedicated to the dynamico-catenal phytosociology approach of coastal vegetations. These vegetations can be characterised by :permanent vegetations corresponding to permaseries (Rivas-Martínez, 2005; Lazare, 2009);
- vegetation series which ultimate stage is a heathland or a shrubland community, corresponding to curtaseries (Lazare, 2009).
- complete vegetation series which mature stage is represented by a woodland community.

Permaseries and curtaseries occuring within homogeneous geomorphological units are listed in geosynrelevés which can be gathered in respectively geopermaseries and geocurtaseries.

This work is focusing on the geopermaseries and geocurtaseries typification and bioevaluation. Geosynrelevés realised on the study sites are analysed by comparison to theoretical « complete » relevés, in order to assess the level of completeness of the zonation and the state of conservation of the vegetation.

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The chern forests of West Sayan mountains – unique natural ecosystems of Siberia [OP1]

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Chern taiga as an analog of mountain nemoral forests (Kuminova, 1960; Nazimova, 1975) represents specific phenomenon in the mountains of South Siberia. P. N. Krylov (1891) described for the first time in details a linden habitat in chern forests of Kuznetsky Alatau, carrying an origin of this broad-leaved tree species in mountains of South Siberia to a tertiary (pliocene) complex. At the present time a favorable bioclimatic situation: small absolute heights (400-800 m), high humidity of air and heat enough ($Q = 1000-1600$ mm, $\Sigma t > 10^\circ = 1100-1800^\circ \text{C}$) and also lack of long-term permafrost cause possibility of existence complexes of boreal and nemoral species in the chern forests. These complexes existed together in the mountains of South Siberia during holocene.

The chern forests of the West Sayan are distinguished by high efficiency of siberian pine and fir tree layer (*Pinus sibirica*, *Abies sibirica*) with participation of an aspen (*Populus tremula*), a birch (*Betula pendula*) and mountain ash (*Sorbus sibirica*) in indigenous and derivative types of the forests. Shrub layer (*Padus avium*, *Sambucus sibirica*, *Ribes atropurpureum*) is well developed. Herb layer is characterized by a high species diversity. The special group is formed by a complex of nemoral species. Species with mainly Eurasian and Euro-Siberian disjunctive distribution concern to them (*Galium odoratum*, *Dryopteris filix-mas*, *Festuca sylvatica*, *F. gigantea*, *Epilobium montanum*, *Stachys sylvatica*). Also some south siberian species belong to nemoral complex (*Brunnera sibirica*, *Arsenjevia baikalensis*, *Anemone altaica*). They play essential coenotic role in a vegetation cover.

Due to the identity of the chern forests, measures for their protection are necessary. In the central part of West Sayan the chern forests are protected in the territory of natural park of Ergaki. Scientific ground of value of the chern forests – one of the most important aspects of practical realization of their protection.

Assessment of Natura 2000 habitats in the Western Bug basin (Ukraine) [P2]

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Western Bug is the biggest river of the lowland part of Western Ukraine, which belongs to the Baltic Sea basin and is a transboundary watercourse (363 km) within the territory of three countries: Ukraine, Poland and Belarus. Length of the river is 772 km (on the territory of Ukraine – 401 km). About 27,4% of the total area of the basin ($S=73470 \text{ km}^2$) is situated within territory of Ukraine. The river valley is located in one of the most western regions of Ukraine, bordering with the European Union and plays the role of an ecological corridor of the international level. According to the physical and geographical zoning of our country, the Ukrainian territory of the Western Bug basin is located in two physiographic zones – the broadleaved-forest and the mixed-forest zone.

Up to now habitat typification has only been initiated in Ukraine. Taking into consideration the distinctly directed European trend of the development of Ukraine, its participation in many pan-European programs, including ecological ones, this work is particularly urgent in the sense of creating the global European network “NATURA 2000”.

According to the BBI-MATRA project “Integration of the Western Bug Basin in the Pan-european Econet “NATURA 2000” the aim of our research was to make an inventory and mapping of rare and endangered habitats occurring in the basin. As a result we have detected 26 natural habitat types of community interest on the investigated territory whose conservation requires the designation of special areas of conservation. In particular, we have established their phytosociologic, floristic, ecological characteristics and conservation status according to the Directive of European Union 92/43/ECC. It was determined that one of the habitats belongs to coastal sand dunes and inland dunes type, 6 – to freshwater habitats, 5 – to natural and semi-natural grassland formations, 8 – to raised bogs and mires and fens and 6 – to the forests type. Five of them belong to priority habitat types.

Endo- and epizoochorous dispersal of higher plants by the European bison (*Bison bonasus*) in Central Europe [OP1]

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During the Holocene populations of the European bison were widely distributed throughout Central and Eastern Europe, the area ranging from Spain, France and England over Denmark, Germany, Italy and Greece to large parts of Eastern Europe incl. the western regions of Russia. Bisons live in semi-open landscapes, which consist of deciduous or mixed forests and open grassland habitats. As megaherbivores bisons are observed to settle in large habitats (of about 70 qkm), therefore they might effectively disperse the diaspores of higher plants over large distances. We studied the endo-and epizoochorous dispersal of higher plants in two separated studies.

In 1996, we collected 22 dung samples from the Bialowieza National Park (Poland), as well as 17 from the Eleonorenwald (western Lower Saxony, Germany). We dried the samples and observed the germination in the greenhouse. In total, we found 83 plant taxa (78 species, 5 genus) and 15.908 seedlings, from these 3.506 seedlings and 69 taxa from Bialowieza, and 12.402 seedlings and 58 taxa from Eleonorenwald. 90% of all individuals belong to 11 taxa, among these *Rumex acetosella*, *Urtica dioica*, *Agrostis capillaris* and three *Poa* species. We found particularly great numbers of small, light seeds of openland species, which have low nutritional values and medium to high Ellenberg N-values.

In 2011, we collected 100 dung samples from the Coastal Heaths near Cuxhaven

(northern Lower Saxony, Germany). 518 seeds germinated, belonging to 30 species, from these *Agrostis capillaris*, *Festuca rubra*, *Poa trivialis*, *Juncus conglomeratus/effusus* and *Veronica officinalis* the most frequent ones. Approximately 75% of the germinated seeds were very light and very small in a long seed shape. Furthermore, in order to study the epizoochorous dispersal, we collected 1375,9 g dry mass from the bison's claw material, containing a mean number of 79 diaspores per 100 g dry mass. We detected 32 plant species in 1082 diaspores, from these ca. 85% belonging to only six taxa (*Polygonum aviculare*, *Agrostis* spp., *Betula pendula et pubescens*, *Juncus tenuis*, *Poa annua*). Most species that were dispersed by epizoochory, have very small and light seeds in round shape.

As summarized, the European bison is assumed to be an effective disperser of many plant species; most of these species are found in open habitats (grassland, also heath and ruderal vegetation), to a smaller degree in wet habitats or forests (clearing, edge). In order to protect and develop large open areas (National Parks, Biosphere Reserves, (former) military training areas) the European bison as a large grazer and effective disperser should be introduced all over Western, Central and Eastern Europe, maybe together with other herbivores as deers or Konik horses.

Habitat monitoring: from indicators selection to conservation status assessment [P2]

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Here we present the results of a PhD aimed at assessing the conservation status of most spread Natura2000 habitats in Molise (Central Italy): 9210*, 92A0, 6210(*). We selected and adapted procedures and indicators already being used in other member states to our study area.

The aim of the PhD project was to propose and test on real data appropriate methodology to assess the conservation status of the habitats. The assessment has been carried out for each site by estimating the characteristics of the habitat. We used floristic and vegetation indicators, that we obtained from unpublished phytosociological relevés carried out between 2010 and 2011 in the study area. The relevés carried out in the study area were compared with the bibliography to evaluate if the communities detected were consistent with those of reference.

Floristic and vegetation indicators allow to assess: (i) the consistency of the populations detected with the vegetation of reference; (ii) the peculiarity of the site; (iii) the decay of naturalness. We selected different structure indicators for forest and grasslands. Regarding the forests, we selected indicators that allow to point out a natural forest management. As regards grasslands, we selected the percentage of non-graminoids per relevé as structure indicator for the naturalness, and the shrub cover as surrogate of the evolution of the vegetation stages.

From our findings, the habitat 9210* have favourable conservation status when tree species richness and the forest stratification are well preserved; for the habitat 6210(*) the most important factor is the floristic peculiarity; while the conservation of 92A0 seems to be particularly related to the canopy structure.

Seminatural meadows in vicinity of biological station "Clean forest" (Russia): classification and protection [OP1]

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The aim of our investigation is to reveal a community diversity and analyze the factors determining the structure of meadow communities using syntaxonomical and ordination approaches; and in addition, to assess the successional status and conservation value of the communities. We used 60 relevés of seminatural meadows with various moisture conditions at abandoned agricultural lands (Russia, Tver province, Toropets district, biological station "Clean forest"). Syntaxonomical analysis was carried out using Braun-Blanquet approach. For ordination we ran Detrended Correspondence Analysis (DCA).

As a result of the syntaxonomical analysis, a classification scheme is given. Three associations and two communities have been classified into four alliances: *Cynosurion*, *Festucion pratensis*, *Filipendulion ulmariae* and *Hyperico-Scleranthion*, representing two classes, *Molinio-Arrhenatheretea* and *Koelerio-Corynephoretea*. The ordination of relevés along the first two axes of DCA has shown a strong gradient of two main factors (moisture and nitrogen supply) along the first axis, and only one factor (light) along the second one.

Formation of new tree canopy was observed in the communities of the *Cynosurion* (*Betula* spp., *Alnus incana* (L.) Moench, *Picea abies* (L.) H. Karst.) and *Hyperico-Scleranthion* (*Pinus sylvestris* L.) alliances. Growing in the meadows, we found the following protected species: *Helichrysum arenarium* (L.) Moench, *Gentiana cruciata* L., *Gentiana pneumonanthe* L.; and some invasive species: *Heracleum sosnowskyi* Manden., *Lupinus polyphyllus* Lindl., *Festuca arundinacea* Schreb., *Amelanchier spicata* (Lam.) K. Koch.

Numerical analysis of the Mediterranean sclerophyllous forests of *Quercenion ilicis* in the Iberian Peninsula [OP1]

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Suballiance *Quercenion ilicis* Rivas Goday 1960 (*Quercetea ilicis* Br.-Bl. ex A. & O. Bolòs 1950) includes in Spain several associations of sclerophyllous forests dominated by *Quercus ilex* or *Q. suber* and distributed mainly in NE (Catalonia, Provence and Balearic Islands) and N (Cantabrian littoral) of the Iberian Peninsula. Although several revisions of the classification using classical methods were made, a comprehensive numerical analyses of the relevés currently available for these associations had not been carried out. Now this task can be tackled thanks to the compilation work of SIVIM (Iberian and Macaronesian Vegetation Information System, www.sivim.info).

This study reviews by means of numerical analysis the internal syntaxonomy of the suballiance and its floristic relationships with geographically closed associations of *Quercus rotundifolia* forests belonging to the related suballiance *Quercion rotundifoliae* Rivas Goday 1960. The revision is based on 1500 floristic relevés

from the Iberian and southern French areas of the associations. Classification was performed with the divisive hierarchical method ISOPAM, which establishes the number and delimitation of the clusters considering both the quantity and quality of diagnostic species. Gradients of floristic variation were studied by ordination methods (NMDS, ISOMAP). To mitigate sampling biases of different kinds, previous geographical stratifications with local selection of relevés by Heterogeneity Constrained Resampling (HCR) were carried out. To evaluate the influence of the dominant species and the whole floristic composition, different transformations of the Braun-Blanquet abundance scale were applied to the data. The results obtained show a clear separation of the Cantabrian holm oak forests against the NE Iberian and Balearic associations. The reciprocal delimitation of the latter is more complex but their positions in the environmental gradients seem fairly clear. The discrimination among holm oak and cork oak forests, sometimes questioned, shows a floristic support, although the analysis of its differential species suggests an important influence of land use and forestry management.

Influence of alien species on biodiversity of mesic-meadows in Sudeten Mts. [OP1]

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The expansion of non-native species is one of the most important ecological problems relating to the conservation of biodiversity. Relations between the occurrence of alien species and the species composition of meadows are one of the poorly known aspects of these valuable plant communities. The expansion of non-native species in the meadows has clear correlation with change of land use. The primary objective of the study is to understand: (1) the frequency of non-native species occurrence in the meadow communities in Sudeten mountains, (2) the importance of alien species in shaping the floristic diversity of meadows, (3) differences in species richness between plots with and without alien species, (4) the gradient variation of meadows and native species habitat preferences. Phytosociological data were collected using nested plot method. Selection of plots was done on the basis of the numerical terrain model made in GIS software using vector layers including information on where grassland areas occur in the Sudeten mountains. In order to obtain sample plots a grid squares of a side length 10km was applied. From each square, five point locations in meadow areas were randomly selected. Around each point we built buffer in the shape of a circle with a radius of 250m. Within these buffers, two nested plots were established from where phytosociological data could be collected. Additionally, description of habitat were gathered as well as information referring occurrence to presence trees, roads and other elements of landscape. According to the preliminary results of the present study we can assume that *Solidago canadensis*, *Solidago gigantea* and *Lupinus polyphyllus* are most widely distributed alien species in meadow communities of Sudeten Mts. Second conclusion is that there are differences in species richness in the plots with and without alien species and the presence of alien species is affected by as land use type and meadows' surroundings.

Seed introduction and gap creation facilitate restoration of *Malcolmia littorea* (L.) R.Br. [P1]

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Malcolmia littorea (L.) R.Br. is a suffruticous chamaephytes belonging to Brassicaceae. It usually grows between foredunes and fixed dunes, habitats particularly subjected to human disturb. Nowadays in Italy there are just three small (< 500) populations, all standing inside disturbed sites near Circeo National Park.

We are carrying out a conservation project involving also its reintroduction inside the Park to avoid its extinction in Italy, but this could not be possible without preliminary ecological and reproductive studies to elaborate the better strategy.

In situ sowing experiments in the population site are used to understand if a species' occurrence is limited by the lack of propagules or of suitable microsites for seeds germination, giving help in assessing the status of living populations. Instead, carrying out sowing experiments in new sites, where the species does not live, is useful to understand if there are suitable and free patches at regional scale. We sowed 100 seeds in 10 plots (50 cm Ø) near the mother plants and then we monitored monthly the recruitment in these plots and in control ones where we did not sow. Moreover, we sowed seeds in 48 plots in another coastal site where the species did not live: in treatment plots we sowed taking off all plants and debris while in control plots we just sowed without altering anything.

In these seed/site limitation experiments the significantly higher germination and development percentages in the treatment plots highlight that in the wild populations the recruitment could be limited by the plants themselves both 1) by an inadequate production of seeds (treatment vs control: $t = 3.096$, $P = 0.017$), maybe due to the high disturb level in that site, and 2) by a low competitive ability (treatment vs control: $t = -2.65$, $P = 0.014$).

It seems that *M. littorea* is suffering in the natural site because its reproductive strategy is not adequate to colonize the available microsites in a disturbed habitat.

A multi-temporal analysis of coastal dune habitats across the last twenty years [P1]

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We performed a multi-temporal analysis of the vegetation of sandy dunes along the central and southern Adriatic coasts, where a long term ecological monitoring is on going (LTER Italy www.lteritalia.it). We focused on five coastal SCIs: Marina di Vasto (IT7140109), Foce Trigno - Marina di Petacciato (IT7228221), Foce Biferno - Litorale di Campomarino (IT7222216), Foce Saccione - Bonifica Ramitelli (IT7222217) and Dune e Lago di Lesina - Foce del Fortore (IT9110015). We collected phytosociological relevés carried out in 1989-1990 from literature (Taffetani, Biondi 1989; Stanisci, Conti 1990). During 2010-2012 we carried out new phytosociological relevés in the same areas. Then we assigned to both groups of relevés (past and current) to the EC habitat categories, as described in the Habitats

Directive 92/43 CEE (EEC, 1992) and in the Italian Habitat Manual (Biondi et al. 2010), identifying the EU habitats 1210, 2110, 2120, 2230, 2250, 2260. We obtained a matrix of 131 species $\times$ 168 relevés. We investigated shifts in floristic composition by multivariate techniques, using species as explanatory variables (DCA). Also, we compared species richness and cover by a null model approach, using Monte Carlo F-test for two groups and performing 3×10^4 random permutations (EcoSim 7.0, Gotelli and Entsminger, 2004). Furthermore, we analysed the differences in the Ellenberg indicator values of Temperature and Moisture and the chorological spectrum of data set across the last twenty years.

We found an increase in species richness and cover, as well as an increment of Ellenberg indicator values for Temperature, in the most recent relevés. Conversely, the Ellenberg indicator values for Moisture decremented. The analysis of chorological spectrum revealed an increment in Cosmopolitan species in all the studied habitats, whereas an increase of termophilous species was recorded in *Ammophila* community (2120), *Malcolmietalia* grasslands (2230) and *Cistus* garrigue (2260).

Results of the red list evaluation of plant communities in Mecklenburg-Vorpommern (NE Germany) [P2]

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The monograph of the plant communities of the federal state Mecklenburg-Vorpommern (NE Germany; Berg et al. 2004) comprises an extensive conservation evaluation of all distinguished 285 associations. For this evaluation, we applied a consistent, transparent approach that combined different criteria into categories of vulnerability and conservation value (see oral contribution by Jansen et al. on that topic). On the poster we present a summarizing overview of our assessment: Among the distinguished associations, only 42% are considered as not endangered. Two associations have already vanished from the territory of the state (*Isoeto lacustris*-*Lobelietum dortmanniae*, *Quercu*-*Ulm*etum), while 19% are critically endangered. The highest fractions of critically endangered associations (> 50%) are found among the *Isoeto*-*Nano-Junceta*, *Parvo-Caricetea*, *Vaccinio uliginosi*-*Pinet*ea and *Vaccinio-Piceetea*.

When evaluating the conservation value, two thirds of associations fall in the medium to high level of value. One particularly interesting partial criterion of the conservation value is the mean number of red-listed plants found in a plot of that association. Here the highest values were exclusively found in fen communities, inter alia *Schoenetum ferruginei*, *Betuletum humilis*, *Paludello palustris*-*Caricetum* and *Juncetum subnodulosi*. The global responsibility of Mecklenburg-Vorpommern for conserving a certain association was generally low to moderate, with the highest

value for *Charetum horrido-balticae*.

The “need for action” combines both vulnerability and conservation value into a higher-level evaluation tool for conservation planning. A current need for action exists from the conservation point of view for 60% of the associations. We see a very high need for immediate and effective protection is for 47 associations, mostly occurring in bogs and wet heaths, nutrient-poor lakes and shores, at the Baltic Sea coast, in semi-natural grasslands, forest edges and forests.

Berg, C., Dengler, J., Abdank, A., Isermann, M. (2004) [Eds.]: *Die Pflanzengesellschaften Mecklenburg-Vorpommerns und ihre Gefährdung – Textband.* – 606 pp., Weissdorn, Jena.

Red List of Plant Communities of Ukraine [P2]

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Ukraine has some traditions as for the environment protection. As early as 1987 *Green Data Book of Ukraine* was published, where 127 plant communities of different syntaxonomic rank were characterized distinguished on the dominant basis. *Green Data Book of Ukraine* obtained the status of the official state document approved by Resolution of The Cabinet of Ministers of Ukraine from 29.08.2002. The second edition of *Green Data Book of Ukraine* published in 2009 contains detailed information of the previous one and it was prepared on the same principles. It provides information about rare, endangered and typical nature communities which are subjected to protection and are the basis for creating protected objects.

Red List Evaluation of Plant Communities of Ukraine needs to be prepared on different basis including previous experience and further components. Plant classification of Ukraine is the basis for the list, based on the principles of Braun-Blanquet Montpellier School, which is not finished yet. *Green Data Book of Ukraine* (2009), which represents different types of rare plant communities, *Red Data Book of Ukraine* (2009) where the information about distribution, ecocoenotic features of rare species as the component elements of the communities that need protection, and the List of Habitats (biotopes) that need protection (Natura-2000, Directive 92/43) will be an informative component. While *Red List of Plant Communities of Ukraine* preparing other aspects will be also taken into consideration, e.g. distribution and confinedness of the endemic species etc.

Along with categorization of communities will be developed on the basis of the analysis of the further features (characteristics): vulnerability to violation of anthropogenic influence and regeneration capacity, representativity and distributional pattern in the region, environmental conditions of existence, rare, endemic, invasive species availability, conservation status of communities and biotopes etc. Regional and state *Red Lists* and their content will become the basis for preparing *Red List of Plant Communities of Europe*.

Coastal halophytic vegetation of Ukraine [P1]

Dubyna D., Dziuba T., Iemelianova S.

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Coastal halophytic vegetation of Ukraine occupies seashore ecotopes of the Black

and Azov Seas and represented by syntaxa of ten classes. Correlation and intensity of accumulative, deflation and erosion processes, humidification, substratum composition, and also salification degree and anthropogenic pressure are the principal factors of territorial differentiation of coenoses. Communities *Potametea*, *Ruppietea maritima* and *Zosteretea* are formed in the shallow water of slightly bracken closed and running coastal reservoirs, coastal parts of watercourse riverbeds. Coenoses *Bolboschoenetea maritimi* are in the depressed long inundated maritime territories with meadow and paludous slimy soils around estuaries, in river valleys and in spits. Communities *Scorzonero-Juncetea gerardii* occupy coastal parts of reservoirs with humid soils, depressions of sand dunes, and also short inundated maritime flat parts. Coenoses *Festuco-Puccinellietea* are formed in short, middle and non-inundated flat saline parts of river valleys and banks of salt lakes of the seashore, and also in saline steppe meadows. Pioneer ephemeral floristically poor obligate halophytic and slightly nitrophilous maritime communities unified into the class *Crypsidetea aculeatae*. Depressed humid saline parts with slimy shell and sand soils in the maritime belt are occupied by *Juncetea maritimi* communities. In flat parts with slimy soils, depressed territories around estuaries, lakes, coves, bottoms, lakes became dry, saline parts of lower river flood plain and pedestals of fuzzy isles coenoses *Thero-Salicornietea* are extended. Salines are occupied mainly by communities *Salicornietea fruticosae*. Coenotic peculiarities of maritime halophytic vegetation of Ukraine on the whole are caused by location of country in the moderate latitudes and interim position of its territory between Atlantic and Mediterranean regions of Europe and continental Eurasian ones.

Rare plant communities of higher aquatic and halophytic vegetation of Ukraine: criteria of selection and results [P1]

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On the basis of suggested criteria for identifying rare communities (Dubyna, Dziuba, 2007) synphytosozological categorization of higher water syntaxa and halophytic vegetation of Ukraine was carried out. It is proposed to refer to rare communities those, in which: 1) rare and vanishing species (first of all, the relic and endemic) listed in the International Red List (IUCN, Europe, etc..) and the Red Data Book of Ukraine acting as specific or differential (category I of protection); 2) communities, diagnostic species of which are on the border of its geographical area (category II); 3) communities, accompanying species of associations and subassociations of which, are rare (relics, endemic species or others listed in the Red Lists of different grade), and are noted by high constancy degree (III, IV, V class, describing their affinity exactly to this syntaxon) (category III); 4) communities typical for Ukraine (IV category). The associations of halophytic vegetation *Puccinellietum syvaschicae*, *Artemisietum tauricae*, *Scorzonero parviflorae-Taraxacetum bessarabici*, *Puccinellietum fominii*, *Puccinellio fominii-Aeluropetum littoralis*, *Juncetum acuti-maritimi*, *Ofaisto monandri-Salicornietum*, *Limonio caspii-Salicornietum*, *Halocnemo-Limonietum caspii*, *Puccinellio fominii-Limonietum suffruticosi*, *Suaedo-Frankenietum*, *Suaedo-Petrosimonetum* et al. are included, in particular, in the first category. Associations *Wolffio-Lemnetum gibbae*, *Lemno-Salvinietum natantis*, *Spirodelo polyrrhizae-Salvinietum natantis*, *Myriophylletum alterniflori*, *Batrachietum fluitantis*, *Batrachietum rionii*, *Ceratophylletum tanaitici*, *Nymphaeetum candidae*, *Potameto natantis-Nymphaeetum candidae*, *Nymphoidetum peltatae*, *Trapo-Nymphoidetum*

peltatae, *Hydrocharito-Nymphoidetum peltatae*, *Potametum alpini*, *Aldrovandetum vesiculosae*, *Spirodelo-Aldrovandetum*, *Cladietum marisci* et al. are referred to the highest category of higher aquatic vegetation. Protection of the named syntaxa is accomplished within the network of the nature conservation fund. Measures for its optimization are suggested.

Green Data Book of Ukraine: experience and prospects [P2]

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The Green Data Book of Ukraine (further GDBU) (445 pages volume) edited in Ukraine in 2009 is official national document, where the data about contemporary state of rare, endangered and typical natural plant communities subjected to protect at the national level was compiled. This book is a basis for development of protected measures concerned the conservation, restoration and use of communities listed in it. Inclusion of plant communities in the GDBU was accomplished using the sozological analysis of coenotic diversity on the dominant basis. Choice of plant classification was caused by availability of full list of sintaxa and drive of suitable community discovery in the nature. The last is especially important for practical use of the GDBU by experts on management of nature and biodiversity protection. Sozologically assessing communities there was taken into account phytocoenotic, phytocozological and botany-geographical importance of syntaxa, their regional representativeness, ecology-coenotic range and expansion compactness, and also character of area changes, position in succession row and potential of renewal. 800 plant associations were listed in the GDBU including rare (347), endangered (354) and typical subjected to protect (99). Method development of sozological assessment of coenotic diversity picked out on the floristic basis and creation of the Red List of associations subjected to protect has to get the next step. Sozologically analyzing syntaxa of floristic classification there should be accounted the presence of diagnostic or constant species listed in the national and international Red Lists, endemic and relic ones in groups. Communities with species of different chorological groups and those being on the border of geographical area have to occupy the peculiar place. Moreover, the typical zone communities were threatened with direct extinction owing to economic activity should be put into the list.

Inland saline vegetation of Ukraine [P1]

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Inland saline vegetation of Ukraine is mainly extended in the territory of the Dnieper Left Bank, considerably less is in the lower mountain part of the Carpathian Region and in front of the Carpathians, in the Siversky Donets Left Bank and the Right Bank of the Dnieper. Communities of the class *Bolboschoenetea maritimi* are represented by associations *Bolboschoenetum maritimi*, *Bolboschoeno-Phragmitetum*, *Tripolio vulgaris-Bolboschoenetum maritimi*, *Scirpetum tabernaemontani*, which occupy the depressed inundated parts of former reservoirs in floods and parts around bench lakes with saline soils in the river valleys of the Left

Bank of the Dnieper (rr. Trubizh, Khorol, Sula, Psel, Vorskla) and the Left Bank tributaries of the Siversky Donets. Coenoses *Scorzonero-Juncetea gerardii* are represented by associations *Scorzonero parviflorae-Juncetum gerardii*, *Festucetum regelianae*, *Triglochino-Glaucetum maritimi*, *Junco gerardii-Triglochinietum maritimi*, *Plantagini cornuti-juncetum gerardii*, *Agrostidetum stoloniferae* and located in places with humid slightly saline and moderate saline soils in floods and depressions of loess valley terraces of afore named rivers. Communities *Festuco-Puccinellietea* (*Puccinellietum distantis*, *Camphorosmo-Puccinellietum distantis*, *Limonio alutacei-Elytrigietum elongatae*, *Limonio tomentelli-Festucetum pseudodalmaticae*) occur in moderate inundated flat parts of loess terraces with saline meadow soils. In depressed parts between the Sula and Psel with saline soils there have been formed communities *Thero-Salicornietea* – *Salicornietum prostratae*, *Suaedetum salsae*, *Suaedo salsae-Salicornietum prostratae*. In the Carpathians (NNP Hutsulschyna) near the salt springs, the association *Puccinellio distantis-Spergularietum salinae* is distincted. In the Carpathians (Lviv and Ivano-Frankivsk Regions) communities *Bolboschoenetea maritimi* occur sporadically. Close by the output of potash salt phytocoenoses *Ruppietea maritimae* (*Ruppietum maritimae*), *Festuco-Puccinellietea*, *Thero-Salicornietea*, *Potametea* (*Potameto-Zannichellietum palustris*) are described here.

Variations in vegetation and phenology in the desert landscape habitat types after 30 years conservation from human impacts of Thumamah Nature Park, Saudi Arabia [OP2]

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Thumamah Nature Park is located at about 100 km north of Riyadh, having an area of 170 km². The Park was established since 30 years ago. The aim of this study is to analyze the vegetation structure, phonological activities of dominant species and the environmental factors of different habitat types in an attempt to generate a possible trend or model explaining the patterns of the progressive succession of desert vegetation recovery after prolongs conservation from human impacts. 119 species were identified (51 annuals and 68 perennials) after 30 years of exclusive human impacts. Plant populations showed interspecific variations in their relative timing of phonological phases with reproductive activity period ranged between 3 to 6 months with unimodal flowering peak. Three flowering/fruiting activities were recorded during late winter-spring, summer and late autumn-early winter. The TWINSPAN, DCA and CCA analysis separated seven vegetation groups. The first two groups dominated by psamophytic species, which occupy the lower sandy plain group I with *Rhanterium epaposium-Rhazya stricta*, and group II with *Pennisetum divisium-Haloxylon salicornicum*. The escarpment habitat was dominated by group III with *Acacia gerrardii-Panicum turgidum*, group IV with *Panicum turgidum* and group V with *Acacia ehrenbergiana-Lasiurus scindicus*. The remaining two groups occupied the upland plateau group VI with *Helianthemum lippii* and group VII with *Helianthemum kahiricum*. The environmental variables seem to affect the species distribution and diversity in the park includes altitude, soil texture, pH, EC, Ca, Mg and Mn. The increase in plant species richness, turnover, evenness and cover were mostly due to the increase of herbaceous species, especially the

palatable species. The common stages of the progressive succession reflect the relation between altitude, edaphic factors and the type of vegetation units in each habitat type after exclusion of the human impacts from the park

Conservation of the western, isolated populations of *Vicia biennis* L. [OP1]

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Conservation of populations is usually not important when the species is not globally endangered but in some cases its significance can be great. For example the populations on the edge of the distribution area can be important to protect because the changes of the area (expansion, extinction) start here. Furthermore, the genetic diversity of these populations is smaller than it can be in the inner ones so they are more vulnerable to environmental changes. Because of these, observation of these populations can be useful to predict the distribution's dynamics in the future.

Vicia biennis is a poorly known plant having endangered status just in Hungary. It has a large area from here to Kazakhstan but the populations are isolated being far from each other. The western edge of this area is in Hungary where the size of the populations dramatically changes year by year.

The aims of this study were to develop an ex-situ conservation method to this plant in Hungary, maintain the size of the local populations by reintroduction and collect some data from the germination and lifecycle of the plant to understand the behaviour of the populations.

We found that the seeds have physical dormancy but ex-situ propagation can be easily solved: scarification of the seeds raised germination from 1% to 97% and in the ex-situ population 88% of the plants survived until the yielding season.

The reintroduction to the natural habitat by seeds was unsuccessful and however by seedlings we could raise the population size significantly in the year of the plantation, it not seems to have impact on the population size of the next years.

We observed that the plant – in contrast of its name – is not biennial but annual. This can play a role in the immediate changes of the populations and the early unsuccessfulness of the reintroduction but the long-term germination dynamics, the natural seed bank and the ecological needs can also have an impact on it so the examination of these are in progress.

Red Data Book steppe plant communities in satellite images of high resolution [P2]

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A special type of cryophytic-steppes represents a Red Data Book community occurring in local sites in South Siberian Mountains. They contain a remarkable combination of relic alpine plants and widespread thermophilous xeric steppe species. Besides, a set of endemic, rare and endangered plant species occurs there. Unique vegetation complexes of meadow steppes and relic cryophytic steppes in Minusinskaya intermountain basin was studied and mapped using high resolution satellite images. Occurrence of the ecologically different communities

in the same site is conditioned by influence of local ultracontinental climate and topography of micro-relief. Cryophytic steppes occupy summits of small knolls (elevation 8-11 cm) and meadow steppes occupy shallow depressions between these knolls. This type of vegetation spatial structure has polygonal landform and it is conditioned by differentiation of snow layer during winter period. Knoll tops are characterized by absence of snow cover and cryolitic processes in soil are seen there. The study of cryophytic-steppe vegetation complexes is important for understanding vegetation ecology and genesis. However, they are not clear visible in field (because of small knolls elevations) and in satellite images of middle resolution (Landsat-7). The spatial structure of these vegetation complexes and location of Red Data Book communities was identified on satellite images WorldView-2 with high resolution (2 m).

Interpretation and recording Habitat 2270* wooded dunes with *Pinus pinea* and/or *Pinus pinaster* in South Italy (Calabria and Basilicata) [OP1]

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In the updated (2012) Italian Interpretation Manual of the 92/43/EEC Directive habitats, new regional distribution data (Marche, Calabria and Basilicata) are reported for habitat 2270* Wooded dunes with *Pinus pinea* and/or *Pinus pinaster*. So, now this habitat type is considered to be present in all coastal regions of Italy. Previous nonappearance of the habitat was not due to lack of information on pine plantations in the three regions but to a restrictive interpretation of the habitat description in the Interpretation manual of European Union Habitats (2007): “(4) long-established plantations of these pines, within their natural area of occurrence, and with an undergrowth basically similar to that of paraclimatic formations, are included in this habitat type”. Most of pine plantations of in Basilicata and Calabria were planted about between 1920's and 1960's in order to “stabilize the dunes” and to protect cultivations from sea action. In these two regions, *P. pinaster* and *P. pinea* can be considered as alloctone species and *P. halepensis* could be considered apophytic species on sandy dunes as it is spontaneous in South Italy only on rocky and calcareous places.

Following the Italian Interpretation Manual some coastal pine plantations in Calabria and Basilicata could be included in the 2270* habitat with special attention directed to dynamics, contacts and substitution relations within psammophilic series, especially in connection with management and conservation measures. In this sense, attributing *Pinus sp.* plantations (and often associated *Eucalyptus sp.* and *Acacia sp.*) to 2270*habitat can become a very delicate work (especially where invasion processes are present) with important repercussions on management choices. In order to follow a common approach in the interpretation of this habitat, some aspects of distribution and status of pine plantation at local level are analyzed and an update of the coastal Natura 2000 network in Calabria and Basilicata is proposed.

Vegetation and soil desalinization in the Volga river delta [P1]

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For the last two decades the mowing area and cattle in the Volga river delta have considerably decreased. Uncut herbage is usually burnt. The rainfall and the volume of spring-summer high waters have increased. In 2011 in the middle part of the Volga river delta the geobotanical transects researches, established in 1979–1981, were conducted. Some significant vegetation changes were discovered, which indicate the increase of moisture of this region, the soil salinity diminution, the decrease of economic exploitation of the territory, the increase of the role of the pirogenic factor. The representation of the halophytic communities of class *Cryptsidetea aculeatae* Vicherek 1973 with a predominance of annual plants has significantly decreased. At the same time the areas occupied by communities with dominate of rough-stemmed tall perennial herbs increased which are of *Phragmito-Magno-Caricetea* Klika in Klika et Novák 1941 class and *Glycyrrhizetalia glabrae* Golub et Mirkin in Golub 1995 order. The distribution of these phytocoenosis, along with the increase of soil washing with precipitation and flood waters, is additional reason of soil salinity decrease. Dense cover of tall grasses protects the soil during summer from direct moisture evaporation off its surface that leads to the decrease of salts concentration in the upper layers. The additional reason of soil salinity diminution is the reduction of compaction by grazing farm animals and with the agricultural machines during harvesting, that has worsened pulling of underground waters (often, highly mineralized) to the surface of soil. One of reason of the decrease of communities representation consisting of annual plants is the death of plant diaspores during fires. In our opinion, the results of the research can be also extrapolated to the lower surface of seaside part of the Volga river delta. Reed harvesting for Astrakhan pulp and paper mill has been stopped, uncut herbage is also often destroyed by fires here.

The plant landscape of an interesting stretch of coastline in southern Sicily: the area between Punta Grande and Capo Rossello (Realmonte, Agrigento), biotope worthy of preservation [P1]

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The coastal areas of southern Sicily are largely altered by human activities that have led to profound changes in the landscape over time, in addition to the depletion of the environmental resources. The most intact biotopes are largely subject to restrictions of protection, through the establishment of nature reserves and other types of protected areas resulting from implementation of the Habitats Directive (SCIs, SPAs). However, these protected areas do not include the stretch of coast between Punta Grande and Capo Rossello (Realmonte, Agrigento province), in which the “Scala dei Turchi” falls. This is a site of particular naturalistic-environmental and landscape significance, exposed to considerable human pressure, gradually widened in recent years. This study aims to provide the

first scientific data on the plant landscape of the biotope, precisely directed to its inclusion in a protected area. The landscape is characterized by the alternation of high rocky coasts and small beaches, placed close to the hilly high grounds which break off abruptly towards the sea, in which plant aspects are strongly influenced by the peculiarity of the substrates, with different concentrations of salinity. The geomorphological nature of the area gives rise to a myriad of microenvironments, such as the typical dune formations, the rocky expressions of the "Trubi", and other habitats which originate as a consequence of: 1. landslides with detachment of clayey boulders; b. gully erosion processes or caused by small rivulets with brackish water; c. undercutting at the slope foot, with subsequent falls. Several phytocoenoses are present, in turn constituted by the typical expressions of the dune complexes (*Cakiletea maritimae*, *Ammophiletea*), hygro-subhalophilous associations (*Phragmito-Magnocaricetea*), herbaceous coenoses of more or less salty clayey substrates (*Lygeo-Stipetea*), halo-nitrophilous shrub formations (*Pegano-Salsoletea*), maquis communities (*Quercetea ilicis*), etc.

Sub-halophytic vegetation of the West-Pontic forest-steppe (Prut river basin) [P1]

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The first phytosociological survey of the halophytic vegetation in the region was conducted by Romanian researchers (Țopa, 1939). Later data were scarce and mainly floristical than ecological. This study compared 59 recent relevés from Ukraine (unpublished) and Romania (Ștefan, Sârbu, Oprea, 2008; Sîrbu, Oprea, 2009) classified using modified TWINSpan (Roleček et al., 2009). Studied communities were compared with Pontic (Voytiuk, 2005; Dubyna et al., 2007), Pannonic and Balkanic sub-halophytic and halophytic steppes (Eliáš et al., 2012). Four groups were distinguished and corresponds to four associations. The most interesting are the sub-halophytic species-rich steppe communities dominated by *Festuca pseudovina* Hack. ex Wiesb., riched in dry grassland and fringe species, mesic pastures species, and ruderal species, on intermittently wet slightly saline soils. We suggest this is new association within the alliance *Festucion pseudovinae* Soó in Máthé 1933 with western-pontic range (South-Western Ukraine, Moldova, and North-Eastern Romania). The DCA ordination confirms salinity and moisture gradients as the most important for this vegetation.

Halophyte vegetation development across primary succession on recreated mudflat islets in the Škocjan inlet (Slovenia, Northern Adriatic) [P1]

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Approximately 50% of saltmarsh area worldwide has already been lost or degraded. Thus, the restoration or recreation of habitats lost, destroyed or substantially changed has become a challenge and there is a considerable interest in re-establishing or creating saltmarshes covering the full range of endangered habitats. It is possible to simulate any kind of physical designs, including hydrogeomorphological features, but biological components take a long time frame to respond. However, halophytic vegetation consists of only a few highly specialized species, which make the community assemblage processes much simpler. Species turnover of halophytes during the first six years of primary succession was studied on the created artificial mudflat islets, made on different micro-altitudes in the Škocjan inlet nature reserve near Koper in Slovenia. The succession was studied by yearly vegetation mapping (resolution 0.5m) mainly on the level of alliances: *Sarcocornion fruticosi*, *Juncion maritime*, *Salicornion patulae*, *Phragmition australis* and *Salsola soda* stands. The results were expected: initially newly established mudflats were dominated by pioneer *Suaeda maritime*, regardless to the micro altitude. Then, after increase of *Salicornion* and *Suaeda* stands in the first years, these stands declined in the following years, along with increase of *Sarcocornion* stands. 9% of the total surface changed in only 1 year; furthermore, in two years, the proportion of habitat types changed for 16% due to primary succession processes. Already in the fourth year the vegetation of *Sarcocornion* began to establish at sites of appropriate micro elevations, which were designed for that vegetation type. *Phragmition* stands remain rather stable across the succession and no new stands of *Juncion maritima* has been established so far. It could be concluded that due to strong environmental filter (moisture and salinity!) the number of species was very low and thus species turnover rather predictable, which enable us to create at least two endangered saltmarsh plant communities from the *Sarcocornion fruticosi* and *Salicornion patulae* alliances.

A coastal vegetation database of Europe [P1]

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By cooperation with people from different countries and by digitizing data from literature we are building a digital database of relevés of coastal vegetation across Europe, covering salt-marshes (classes *Zosteretea*, *Halodulo-Thalassietea*, *Spartinetea maritimae*, *Thero-Salicornietea*, *Juncetea maritimi*, *Saginetea maritimae* and *Salicornietea fruticosae*), coastal dunes (classes *Cakiletea maritimae*, *Ammophiletea* and different shrub and grassland classes) and coastal rocky shores (class *Crithmo-Staticetea*). The database will serve two applications: (1) the development of methods and theory for analysing vegetation gradients and changes using large vegetation database, and (2) contributing to case-studies for pan-European projects on biodiversity and land use. In a poster we will present state-of-the-art of the database, the people who contributed to it, some methodological issues of combining datasets of different countries, and some first applications. The database will be added to the European Vegetation Archive (EVA), as far as relevés are not represented yet by other databases.

Mapping of conservation value habitats in marble north part of Pirin National Park (Bulgaria) - UNESCO Heritage Site [OP1]

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The Pirin National Park is found in 1962. From 1983 it is a part of UNESCO – world heretige. The mapping area, include one natural reserved – Bayovi dupki-Djindjirica, situated in north slopes of the mountain. All mapping territory covers all marble north slopes between 1000 and 2914 m. above see level, and south slopes above 2000 m. above see level (only they are marbles).

Here are distributed 34 EUNIS habitats. There diversity is huge even if they are only calcareous. There are forests - pines and deciduous, rocks, grasslands, caves, scrubs.

The gradient of the altitude is almost 2000 meters and include north, south, east and west slopes.

The territory is part of Natura 2000 network. In some of the habitats participation of endemic, relict and rare species is very high and they are dominants or co-dominants. This are the *Pinus heldreichii* and *Pinus nigra* ssp. *pallasiana* forests, grasslands with *Drias octopetala*, *Salix reticulata* and great number of local endemics.

Wetlands vegetation for nutrients and heavy metals accumulation [OP2]

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Vegetation is a dominant feature of wetland systems and plays an important role in these treatment processes, including filtration of particles, reduction of turbulence, stabilization of sediments and provision of increased surface area for biofilm growth (Greenway, 2005). Wetlands vegetation stabilize water supplies and water balance of a catchment, thus minimising both floods and droughts risk. At present, the management of wetlands vegetation focuses on the protection of biodiversity, and many natural habitats are protected e.g. under the Natura 2000 network and a lot of plant species are mentioned in national red books. However, in the 21 century the management of wetlands vegetation should also be based on the sustainable use of the water and soil purification potential of some common plant species. Some of them are so resistant to contamination and have such a great biological potential for assimilation and accumulation of nutrients and heavy metals (Kiedrzyńska et al, 2008) that could be used in constructed wetlands for water and wastewater treatment.

This study presents the ecohydrological approach to analysis of macrophytes potential for purification of wastewater in the constructed wetland located in Rozprza Town (Central Poland). The accumulation of phosphorus, nitrogen and heavy metals, including Pb, Cd, Cr, Ni, Cu, Zn, Mn, Fe, Hg were measured in the plant tissues of *Glycera maxima*, *Acorus calamus*, *Typha latifolia* and *Phragmites australis*. At the same time concentration of chlorophyll that indicates the condition of a plant and the occurrence of pollution related stress was analyzed in the plants tissues.

The research was supported by the Polish Ministry of Science and Higher Education, Project: N N305 365738 "Analysis of point sources pollution of nutrients, dioxins and dioxin-like compounds in the Pilica River catchment and draw up of reclamation methods".

Diversity and habitat modeling of forests with thermophilous flora in Poland [OP2]

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In Poland forests with thermophilous flora are habitats for many rare and endangered species, and are one of the most species-rich forest ecosystems. In the European Union some kind of this forests are protected in the Natura 2000 network as the priority natural habitats. The presence of this specific 'floristic refugia' in many cases has been extended due to human activities, which dates back to the Neolithic period. However, in last decades we may observe a rapid decline of open forests (especially oak forests) as a result of the expansion of mesophilic trees and shrubs after the cessation of traditional forms of use. The Polish territory spreading between the Carpathians and the Baltic Sea is situated in the transition zone between the temperate oceanic (Atlantic) climate in the west and the moderate continental climate in the east. Therefore, it offers various habitat conditions for thermophilous plants in the glacial, peryglacial, highland and mountain forelands landscapes. The aim of this study is to perform a geobotanical analysis of forests with *Quercetalia pubescenti-petraeae* species, which have the highest frequency in oak forests (*Potentillo albae-Quercetum*, *Sorbo torminalis-Quercetum*, *Quercetum pubescenti-petraeae*, *Luzulo luzuloidis-Quercetum genistosum*) and are also found in thermophilous forms of oak-hornbeam (e.g. *Tilio-Carpinetum melittetosum*), beech forests (*Carici-Fagetum*, *Taxo-Fagetum*, *Cephalanthero-Fagetum*) and subboreal mixed pine-oak forests (*Serratulo-Pinetum*). Data from the Polish Vegetation Database have been analysed in geographical and ecological gradients. Predictive modelling of the geographical distributions and general habitat conditions were modelled by the use of maximum entropy algorithm (Maxent, version 3.3.3). In this machine-learning method environmental variables were presented in the following GIS layers: parent material of soils and bioclimatic data (19 bioclimatic variables from WorldClim database).

Species composition of macrophytes-environmental conditions relationship - study from two distinct biogeographical areas [OP2]Kochjarová J.¹, Hrivnák R.², Oľahel'ová H.², Paľove-Balang P.³¹Botanical Garden of Comenius University, Blatnica 315, SK-03815 Blatnica, Slovakia; judita.kochjarova@rec.uniba.sk²Institute of Botany, Slovak Academy of Sciences, Dúbravská cesta 9, SK-84523 Bratislava, Slovakia³Institute of Biological and Ecological Sciences, University of P. J. Šafárik, Mánesova 23, SK-040 01 Košice, Slovakia

Effect of selected 35 environmental variables on species composition of macrophytes was studied in 160 aquatic habitats. Two model regions, Borská nížina lowland (1) and Turčianska kotlina basin (2), from distinct biogeographical areas (Pannonicum and Carpathicum) in Slovakia were selected. Species and environmental data were collected within four basic groups of aquatic habitats (rivers, streams, canals and ponds).

Totally 72 macrophytes were found; 27 macrophytes were common for both regions, while 24 and 21 were detected only in region 1 and 2, respectively. More frequent species only for region 1 were *Spirodela polyrhiza*, *Potamogeton nodosus*, and only for region 2 *Batrachium aquatile*, *B. circinatum*. From the species, which grew in both regions, are *Lemna minor*, *Ceratophyllum demersum* and *Potamogeton pectinatus* more frequent in region 1, while *Fontinalis antipyretica*, *Rhynchostegium riparioides* and *Elodea canadensis* in region 2. Forward selection in Canonical correspondence analysis was used for detection of effect of environmental variables on species composition of macrophytes in studied habitats. Ten environmental characteristics statistically significant ($p < 0.05$) affected species composition in region 1 and explained 15.23% of total variability. The highest values were found for portion of fine substrate, water conductivity and hydrological connectivity. In contrary, only 5 variables influenced species composition in region 2 and explained 31.13% of variability. These variables are flow velocity, altitude, naturally origin of locality (Or), portion of coarse substrate (CoSu) and water redox potential. Only two variables are common for both regions, Or and CoSu. Our results showed that species composition of aquatic vegetation in various biogeographical areas is influenced by different environmental conditions.

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Saline soils Vegetation of the Northern Serbia [P1]

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The studied area is located in the southeast part of the Pannonian Basin. This is the territory of Northern Serbia defined as a province of Vojvodina. Overview of this vegetation comprises the saline habitats that are essentially intrazonal form of vegetation present in the climate-zonal vegetation zone with steppe woods characteristics, developed, in a significant percentage, on carbonate base (chernozem). Given that this area is a historically known for its agricultural importance, analyzed habitats were exposed to significant fragmentation.

This paper presents syntaxonomic affiliation and geographical distribution of these communities on the basis of a comprehensive review of data from the

literature and our own research in the field. Conducted analysis included data in the time range of almost a century. All relevés are accumulated in the database with the help of TURBOVEG software package. We carried out a comparison of plant communities in relation to their ecological characteristics, cluster analysis of dataset in the program PC-ORD 5 and floristic analysis of all species from relevés. All plant communities that are found on the saline soil in Vojvodina were grouped into classes: *Phragmitetea* R. Tx. et Preising 1942, *Molinio-Arrhenatheretea* R. Tx. 1937, *Thero-Salicornietea* Pignatti 1953 Emend. R. Tx. 1955, *Festuco-Puccinelieta* Soó 1968 and *Festuco-Brometea* Br.-Bl. and R. Tx. 1943. Communities within each of these classes alternate with each other in dependence to the salinity gradient and soil moisture. In Vojvodina, typical halophytic communities belong to the classes *Thero-Salicornietea* Pignatti 1953 Emend. R. Tx. 1955 and *Festuco-Puccinelieta* Soó 1968, but there are also vegetation types of shallow water with *Bolboschoenus maritimus* (L.) Palla and *Schoenoplectus tabernaemontana* (CC Gmel.) Palla and, dry pastures with xerophytic vegetation ass. *Festucetum pseudovinae* Danon et Blažencić 1969, recorded on saline soils.

Anthropogenic transformation of the grassland vegetation of Forest and Forest-steppe zones of Ukraine in temporal and spatial scales [OP2]

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State of grassland vegetation is determined by the socio-economic conditions, that lead to changes of this vegetation type in temporal and spatial scales.

The degree of anthropogenic transformation of communities was determined using the modified coefficient of destruction coenosis (K_d), (Bykov 1969, Kuzemko 2005, 2006), which was determined separately for each relevé. According the meanings of K_d the relevés were divided into five classes with the following calculation of the average K_d for time interval or administrative province.

The lowest average value of K_d is characterized by time period until 1950, due to reduction of livestock during II World War and postwar years, and, as a result, slight man-made pressure on grassland communities. During the 1950-1960's there was a significant development of agriculture, including cattle breeding, resulting in increased pressure on natural grasslands and consequently a sharp increase in the average K_d in the 1950s, and less sharp, but quite noticeable increase in 1960's. In the 1970-1980's K_d is slightly varied, and, since 1991, there was a decrease, which becomes sharper after 2001 caused by decline of agriculture due to the transition to market relations, urbanization and economic crises.

The analysis of communities transformation in spatial scales revealed that the Northern regions in general are characterized by lower transformation of grassland communities than the Southern ones that is connected with large areas of grassland vegetation in the north at a relatively lower density of rural population. In Southern regions grassland, especially meadow vegetation, occupy less area that increases pressure on communities in these densely populated regions. Furthermore, in a Forest-Steppe zone meadow communities are found in the southern limit of its continuous distribution, outside of their environmental optimum, which is located in the Forest zone. This makes them more vulnerable to external factors.

Dry grassland vegetation of Central Podolia (Ukraine) - first insights on syntaxonomy, ecology, and biodiversity [OP2]

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Ukraine is situated between Western and Central Europe on the one hand, and the former Soviet Union on the other, where the vegetation classification developed to a certain degree in isolation from each other, resulting in the appearance of a number of controversial issues, which are impossible to solve at the level of a country without close international cooperation.

Based on these considerations, the European Dry Grassland Group (EDGG; www.edgg.org) decided to conduct the second EDGG Research Expedition in Ukraine in 2010. When choosing a model area for the study, we were guided by the following criteria: i) it had to be a region with a high diversity of dry grasslands, caused by a variety of environmental conditions with ii) a predominance of natural grassland on the secondary ones, from which iii) hardly any phytosociological data were available before. The territory of the Central Podolia fully met these criteria.

We sampled the types of dry semi-natural grasslands occurring in the area with two approaches, always including all vascular plants, bryophytes and lichens. On the one hand we applied nested-plot series of 100 m² with subplots of 0.0001, 0.001, 0.01, 0.1, 1 and 10 m², on the other hand we made classical phytosociological relevés on 10 m² including the sampling/measurement of a wide range of structural, soil and other environmental variables.

Based on the 10-m² plots, we could distinguish nine communities that seem to warrant the rank of association and belong to two classes (*Festuco-Brometea* and *Koelerio-Corynephoretea*). We describe their floristic composition and their characteristics in terms of structure, biodiversity and environmental condition, and discuss their placement in the European phytosociological system. Furthermore, we will present the diversity patterns of all taxonomic groups at the different spatial scales studied.

Phylogenetic structure of plant communities indicates their age [OP2]

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Phylogenetic community structure, i.e. diversity of extant lineages constituting a community, is an important emergent property of communities. We suggest that community age can be inferred from the phylogenetic community structure. We combined species composition information of 88 major vegetation types of central Europe with phylogenetic topology of 1798 plant species to determine patterns of phylogenetic structure of their representative plant communities. We characterized phylogenetic structure of these communities using the average phylogenetic distinctiveness index. Forest, subalpine, rock-outcrop and mire plant communities tend to be phylogenetically overdispersed, while grasslands and disturbed types of herbaceous vegetation phylogenetically clustered. Therefore, the overdispersed communities represent old types of vegetation in central Europe, constituent lineages of which mainly diversified already in the Tertiary. In contrast, clustered communities probably developed more recently in open landscapes of late Tertiary and Pleistocene; therefore they consist mainly of species from a few lineages with preadaptations to open environments.

Floristic and functional composition of the dry Puna (south Peruvian Andes) as a response to environmental features and grazing disturbance [OP2]

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Alpine environments lining within tropics represent as much as 10% of the total surface area of the alpine ecosystems worldwide, still their ecology has been studied much less thoroughly than outside the tropics. The widest ecosystem of high tropical Andes, one of the leading biodiversity hotspots worldwide, is the dry Puna. In this alpine environment, the main stress factors are represented by the long period of water shortage, the high degree of potential evapotranspiration, the wind erosion of soil and its low nutrient content, and the extreme thermal variation. The aim of this study was to deepen our understanding of the dry Puna species composition and community diversity connected with the environmental/anthropogenic variables. To this end, a stratified sampling method was applied for the data collection: the cover percentage values of species were evaluated and soil samples were collected in 121 plots. For the statistical elaboration of the data a Multivariate Regression Tree, Indicator Species Analysis and RDA were executed. Our results demonstrate that the dry Puna landscape is anything but homogeneous from a floristic point of view. As a matter of fact, disturbance intensity, land form and soil features shape the specific composition of pastures, leading to a quite complex mosaic of plant communities. The main sources of this variability are disturbance

intensity, altitude, percentage of outcropping rocks, slope, aspect and, with a lower degree, soil features (organic matter, pH, and potassium). In particular, high grazing intensities cause the spread of species with avoidance strategies as thorny dwarf shrubs (*Tetraglochin cristatum*), annual grasses and prostrate plants. Harsh conditions promote the spread of cushion plants (*Pycnophyllum* spp.) instead. The dominant plant community in the dry Puna is the *Festuca orthophylla* tall grassland, whose species composition emerged as shaped by aspect and soil features.

Multitemporal analyses of coastal dune landscapes in Central Italy: what has happened in the last 60 years? [P1]

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The current degradation of the Mediterranean coastal landscape highlights the necessity of performing long term multitemporal analysis to guide land managers seeking to improve coastal conservation, planning and management. This work sets out to quantify landscape changes for the last 60 years in one sector of the Italian coast, and to analyze the spatial configuration of natural dune cover types in relation to the anthropogenic ones in order to investigate the processes underlying these changes. On the basis of detailed land-cover maps (dated 1954, 1986 and 2006), we assessed landscape changes by transition matrices. The spatial pattern of natural dune cover types (Beaches with Pioneer annual Vegetation, Herbaceous Dune Vegetation and Woody Dune Vegetation) for the three dates was described by patch-based (Patch Size and Shape Index) and edge-based metrics (patch shared boundaries with manmade cover types) and compared using the non-parametric Kruskal-Wallis median test. Multitemporal analyses provided a description of the coastal changes which have occurred in the last half century. Particularly notable are consistent intensification of agricultural and reforestation activities in the inner sectors of the dunes and a widespread urbanization. The natural dune categories originally distributed in a few large and elongated patches have undergone a substantial reduction of extent and an alteration in their spatial pattern, this now reduced to many small and regular patches. A significant rise of contacts between natural dune categories and urbanized areas and infrastructures was observed. Such landscape analysis could be useful in identifying the management strategies for coastal dune areas.

Plant and genetic diversity of *Elymus farctus* in Apulian coastal environments [P1]

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Elymus farctus (Viv.) Runemark ex Melderis ssp. *farctus* (= *Agropyron junceum* (L.) Beauv. *Thinopyrum junceum* (L.) A. Love) is an allopolyploid species distributed in Europe (particularly in the Mediterranean region), western Asia and northern Africa. It is resistant to abiotic stress (drought, cold, salinity), and is usually

involved in the formation of the dune belt (mobile dunes) to the extent that it has also been referred to as a “pioneer species”. Coastal dunes, characterized by high biological diversity, are areas that are particularly vulnerable to land use changes due to human activities, such as intensive agriculture, industrial and other economic activities, infrastructure development, etc. Many methods to preserve these habitats and their biological diversity have been considered.

The evaluation of genetic diversity in natural populations of species of European conservation interest, such as *Elymus farctus* ssp. *farctus*, has often been considered a valuable tool to study habitats and ecosystems under severe biotic and abiotic stresses, and in general to determine the level of biodiversity loss.

Studies on the structure and composition of *Elymus farctus* ssp. *farctus* natural populations and related plant communities, which are present in two protected areas located along the Adriatic coast of the Apulia region, were carried out in parallel with biochemical characterization of seed storage proteins extracted from the same populations, which were collected in the same areas during the years 2009 and 2011. The preliminary results permitted: (1) characterization of the structure and composition of *Elymus farctus* ssp. *farctus* natural populations and related plant communities growing within the boundaries of the protected areas; (2) preliminary ecological characterization of the surveyed plant communities through bioindication values; (3) understanding of the polymorphism of seed storage proteins, gliadins and glutenins, extracted from the 18 populations collected; (4) understanding of the frequencies of genotypes belonging to each vegetation class.

Ecological and chorological remarks of *Chamaerops humilis* s.l. in the Mediterranean Region [OP2]

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Chamaerops humilis L. (dwarf fan palm) is the northernmost naturally occurring palm in the world, in the Western Mediterranean area. This species plays an important ecological role in the forest woodlands and shrub degraded of the Mediterranean region.

The great morphological variability of dwarf fan palm and its large geographic distribution in the Mediterranean basin has easily created several forms inside the species, along the past. Some of them have been assumed as local ecotypes, others have been isolated for superior properties in appearance and growing and achieved cultivar or sub-species status. This has generated interference in the nomenclature where synonymy and homonymy often occurred (World Checklist, Royal Botanic Gardens, Kew). In any cases there are insufficient data on the description and the variation degree among the spontaneous fan palm populations until now.

The aim of this study was to analyse ecological and chorological traits of *Chamaerops humilis* L. in different natural ecosystems. For this purpose several natural population in Italy, Iberian Peninsula and North Africa were investigated. Particularly, the investigation of the moroccan populations was focussed on both *C. humilis* accepted varieties: var. *humilis* and var. *argentea*.

A total of 45 parameters, relating to environmental factors and morphological traits are here presented and mapped.

Succession of inland saline vegetation after a large-scale disturbance [P1]Melečková Z.^{1*}, Dítě D.¹, Galvánek D.¹, Eliáš P. jun.²¹Institute of Botany, Slovak Academy of Sciences, Dúbravská c. 9, 845 23 Bratislava, Slovak republic,

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During 50 years the area of inland halophytic vegetation of Slovakia decreased below 500 ha which is less than 6% of the data surveyed in the early 1960ties. The reason of the significant reduction is the intensification of agriculture in the lowland areas of the country. Permanent plots were established to examine the effect of tillage and abandonment on the diversity and structure of the saline habitat on the study site Pavel, located west from the town Komárno in the Podunajská nížina Lowland. Formerly it was an important locality of Pannonian salt steppes (class *Festuco-Puccinellietea*) with rare halophytic species. It was still used for grazing in the 1940-ties, although there were often efforts to transform the saline grasslands into arable land. In the last decade it was ploughed up by the local farmer company with attempts to grow wheat and barley, but after two years it has been left fallow again. We analysed the 7-year vegetation development after the tillage and abandonment. Open vegetation structure was typical for initial stages of succession, dominated by obligate halophyte *Tripolium pannonicum*, accompanied by *Atriplex littoralis*, *A. patula* and other pioneer weedy species. The species richness increased in the subsequent years due to colonization of some occasional species. The cover of *T. pannonicum* decreased, same trend had the other indicator species *Puccinellia distans*. Only one halophyte, *Plantago maritima* was able to increase, since the rhizomes are a key factor of its high competitiveness. Colonisation of facultative halophytes and expansive species (*Lotus tenuis*, *Tetragonolobus maritimus*, *Agrostis stolonifera*; *Phragmites communis*, *Calamagrostis epigejos*) from the 5th year of the study indicates desalinization of the soil. The results show that the rate of succession is very fast and the spontaneous regeneration after the ploughing is not a proper restoration method in the case of inland saline vegetation.

Tremendous changes of Central Europe's arable plant communities since the 1950s/60s - a resampling study [OP2]Meyer S.^{1*}, Bergmeier E.², Becker T.³, Wesche K.⁴, Krause B.¹, Leuschner C.¹¹University of Göttingen, Albrecht von Haller Institute for Plant Sciences, Department of Plant Ecology and Ecosystems Research, Untere Karspüle 2, 37073 Göttingen, Germany, *corresponding author: smeyer1@gwdg.de²University of Göttingen, Albrecht von Haller Institute for Plant Sciences, Department of Vegetation and Phytodiversity Analysis, Untere Karspüle 2, 37073 Göttingen, Germany,³University of Trier, Faculty of Geography and Geosciences, Department of Geobotany, Behringstraße 21, 54296 Trier, Germany⁴Senckenberg Museum of Natural History Görlitz, Am Museum 1, 02826 Görlitz, Germany

Various studies examined changes in arable plant vegetation on species or population level but a synoptic analysis of the impoverishment on the community level is lacking. Here we present the results of a survey across ten sub-regions throughout Central Germany with a range of different soil/climate conditions and therefore a wide range of arable plant communities. We compare changes in community composition and diversity of phytosociological syntaxa in the

1950s/early 1960s before the onset of agricultural industrialisation with the current situation in 392 arable fields. At every locality, recent samples were taken at increasing sizes of 25, 50 and 100 m² (nested); comparisons over time were, however, based on the size used in the given historical sample (mean plot size: 65m²).

We applied a Detrended Correspondence Analysis (DCA), as suggested by a relatively high β -diversity (gradient length on first DCA axis: 5.2 multivariate s.d. units). Arable plant species diversity at the plot-level (α -diversity) was assessed with respect to species richness (qualitative) and arable plant cover (quantitative, median cover abundance value).

Our study proves for the field interiors a dramatic reduction in the species pool of nearly one fourth (from 301 to 233 taxa), and an equally significant diversity decline at plot-level in most arable plant communities. Diagnostic species for phytosociological syntaxa have largely vanished, with losses being more pronounced among character species lower-ranked syntaxa such as associations. They are more threatened than diagnostic species for higher-ranked syntaxa like alliances, orders and classes.

For the majority of recent samples, strong impoverishment renders assignment to phytosociological associations impossible. The resulting community fragments may be classified on the levels of higher-rank syntaxa. To our knowledge, this is the first study which shows the decline of an entire vegetation class for a large area.

Secondary succession of the Bereg-mires (NE-Hungary) after flooding - basic results of an eighteen years monitoring [OP2]

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We are examining the change of vegetation systematically till 1995 on three peaty oxbows.

For our monitoring we use fixed transect created by interlocking, square shape, permanent sampling plots across entirely the basin of the oxbow named "Bence-tó", and numerous temporary sampling plots on the other two oxbows, named "Navad-patak" and "Zsid-tó".

Before the floods the bed of the mires was filled *Salici cinereae* – *Sphagnetum recurvum squarrosum* associations. After artificial- (Navad-patak and Zsid-tó, 1994) or natural (Bence-tó, 1998) floods the peat moss cushions were submerged in (more than 1.5 m) high and constant (longer than ten years) water level and failed to survive. On these former peat moss mires secondary floating mire formation processes can be observed: The dead broken fragments of plants floating in large quantities in the mire water were felting with the long and bushy hair shape willow's roots of stem origin and with the plant residues on the bottom of the peaty lake. Inside of this carpets dense mat of aquatics (*Stratiotes aloides* at the centre and *Hydrocharis morsus-ranae* at the shore) has formed. The shore and mud plants (eg. *Cicuta virosa*, *Carex pseudocyperus*, *Galium palustre*, *Lycopus europaeus*, *Poa palustris*, *Glyceria maxima*, *Bidens cernua*, *Polygonum lapathifolium*, *Rumex hydrolapathum*, *Oenanthe aquatica*, *Typha latifolia*, *Typha angustifolia*) have begun to colonize these floating surfaces immediately.

The secondary succession of these mires has followed this process: *Lemnetea* associations (*Stratiotetum aloidis*, *Hydrocharitetum morsus-ranae*) - *Cicuto-Caricetum*

pseudocyperi and *Glycerietum maximae* dominant floating carpet on it - *Typha latifolia* dominated floating mires - *Salix cinerea* dominated floating mires.
In optimum cases peat mosses (*Sphagnum squarrosum*, *S. teres*, *S. palustre*, *S. fimbriatum*) can appear and propagate very quickly as we have observed on the floating willow mire of Zsid-tó since 2003, nine years after the flooding.

The coastal saline vegetation of the Gulf of Korf, Koryak District (North of the Russian Far East) [P1]

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Vegetation cover of Bering Sea western coast is scantily investigated. Coastal wetlands attracting thousands of migratory waterfowl birds are of high conservation value. The coastal marshes of the Gulf of Korf occur on saline clay, silt or sandy substrata under the influence of flood-tide and harsh subarctic climate. Salt-marshes are regularly flooded during the high tide and often remain waterlogged. They are met as small-scale patches and strips in river mouths and lowlands protected from the direct storm impact. The community classification based on the principles of Russian geobotanical approach was elaborated. 10 associations differing by dominants and species composition were distinguished. Semi-aquatic communities of *Hippuridetum tetraphyllae* occurred in saline hollows and ponds inundated during the tide. The tall-sedge *Caricetum cryptocarpae* communities occupied hollows. Small-sedge *Caricetum subspathacea* and *Caricetum glareosae* communities were spread on wet marshes. The *Puccinellietum friganodis*, *Dupontietum psilosanthae* and *Arctopoetum eminentis* grasslands were common in river mouths and estuaries. Low-herb *Potentilletum egedii*, *Stellarietum humifusae* and *Juncetum arcticus* meadows were met on saline sandy soils. Constant species were: *Poa arctica*, *Potentilla egedii*, *Stellaria humifusa*, *Arctanthemum arcticum*, *Galium trifidum*. The species composition of coastal saline communities was compared to the salt-marsh vegetation of Greenland, Iceland, Kola Peninsula, Aleutian Islands and Alaska. The peculiarity of the Gulf of Korf salt-marshes was the absence of *Triglochin maritimum*, *Juncus maritimus*, *Cochlearia* and *Plantago* species and the high abundance of *Arctopoa eminens*. However, *Triglochin maritimum* and *Cochlearia officinalis* were found in Kamchatka North-Western coast. *Juncus arcticus* seems to be a geographical vicariat of *J. maritimus*. Our investigations allow revising the species composition of syntaxons defining the Arctic and Subarctic coastal vegetation.

Can forest plantation contribute to restore and conserve biodiversity? [OP2]

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In tropical rainforest, the dynamics of natural regeneration in forest plantations has been very little studied, and there are contradictory debates on the possibility for forest plantation to contribute to the restoration and conservation of biodiversity. This study concerns the possibility of a restoration of biodiversity through the natural regeneration mechanism in Magombe's forest plantation.

A total of 2239 stems with dbh $\geq 2,5$ cm were censused over 9600 m² in the undergrowth of 12 tree plantations. These are constituted of 107 species distributed in 42 families and 93 genera. The Shannon biodiversity index is 4.97. The species richness in the plots with great transect (79 species, 72 genera and 35 families) does not show significant difference from those in regrowth (85 species, 76 genera and 38 families) while the basal area in the plots with great transects (10.76 m²/ha) is significantly larger than in the plots of regrowth (8.65 m²/ha). The Most important species according to their value index (IVI) have an affinity with the under storey of the forest such as: *Tabernaemontana pachysiphon* Stapf, *Tabernaemontana crassa* Benth., *Mallotus oppositifolius* (Geiseler) Müll. Arg. and *Heinsia crinita* (Afzel.) G. Taylor. Fabaceae (11 species), Euphorbiaceae (10), Annonaceae (9) and Rubiaceae (9) are the most frequent families and among the genera are *Diospyros* (6 species), *Anisophyllea*, *Beilschmeddia*, *Berlinia*, *Cola*, *Drypetes*, *Garcinia*, *Maesobotrya*, *Strombosia* and *Tabernaemontana* with two species each.

The natural regeneration of forest plantations is rich and diversified. The importance of flora with forest affinity strengthens the possibility for natural regeneration to reconstitute in long-term the biodiversity of vegetation in the plantation. This restoration of biodiversity may be favoured by microclimate created in the under storey by planted trees, canopy gaps, the abundance of litter fall that brings humus to the soil, the type and the age of plantation, the planted species and the complexity of spatial and vertical structure of the plantation stand.

Restoration of raised bog habitats in Melnais Lake Mire in Latvia [OP2]

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From 2010 - 2013 the EC LIFE+ Project „Restoration of Raised bog habitats in the especially protected nature areas of Latvia” is carried out in the 4 sites – Melnais Lake Mire, Aklais Mire, Rozu Mire and Aizkraukle Mire and forests” in Latvia.

Melnais Lake Mire is a nature reserve with the total area of 317 ha. Negative threats to the site include drainage and peat extraction close to the border of the site. At the same time the site includes various habitats, like raised bog with pool complex and dystrophic lakes, as well as forest habitats.

In 2010 habitat and hydrological monitoring was started Melnais Lake Mire. The aim of the study is to evaluate the effectiveness of raising water level and consequently the increase of the coverage of raised bog species. In total, 58 monitoring plots were set up on ditches where dam building was carried out. They are located in the bog area influenced by drainage ditches, non-flooded cutover peat fields and intact raised bog. To study the hydrological change after rising of the groundwater level, 13 groundwater monitoring wells installed.

In January/February 2012 the raised bog habitat restoration by building dams on the drainage ditches was carried out in Melnais Lake Mire. Six month after building of dams positive changes were observed in the mire vegetation as the coverage of *Eriophorum vaginatum*, *Rhynchospora alba*, *Sphagnum angustifolium*, *S. cuspidatum* and *S. rubellum* has increased indicating the rise of mire wetness. The cover of *Calluna vulgaris* cover – decreased. Development of *Sphagnum* mats was

observed in ditches thus diminishing the water outflow from raised bog. Monitoring of vegetation changes must be continued as these studies reveal only initial vegetation response to changes in groundwater level regime in Melnais Lake Mire.

The Red list of plant communities of Silesian Voivodship (Southern Poland) [P2]

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Poster presents the results of a risk assessment of 517 plant communities occurring in Silesian Voivodship in the year 2011. Because of the incomplete phytosociological data, IUCN (1994) risk criteria for plant species, have been adopted. The Red list contains a total of 268 vascular plant communities, including: 1 extinct in the wild (EW), 5 extinct regionally (RE), 46 endangered (E), 122 vulnerable (V), 33 of undetermined threat (I) and 61 rare regionally (R). Risk ratio, calculated for 381 plant communities clearly referred to syntaxonomical classification, is 70.5%.

To the most vulnerable communities belong water communities (*Charetea*, *Lemnetea minoris*, *Potametea*) and from the waters dependent (*Isoëto duriei-juncetea bufonii*, *Isoëto-Littorelletea*, *Montio-Cardaminea*, *Oxycocco-Sphagnetes*, *Phragmitetea australis*, *Scheuchzerio-Caricetea fuscae* and others), which represent more than 48% of the number of syntaxa included in the Red list. These plant associations also dominate among the endangered communities (73%). Endangered communities belong primarily to the classes: *Potametea* (10 communities), *Scheuchzerio-Caricetea fuscae* (9), *Lemnetea minoris* (4) and *Stellarietea mediae* (4).

In respect of syngeneses dominate natural communities (222, 83.8%), including the perdochoric (95, 35.8%), auxochoric (86, 32.5%) and about unspecified changes in trends (41, 15.5%). On the list there are 20 (7.5%) seminatural communities and 23 (8.7%) synanthropic – including 13 (4.9%) segetal and 10 (3.8%) ruderal. 182 plant communities (68.7%) is placed in the Annex I of the Habitat Directive (45 habitats), 162 (61.1%) in the ordinance from the year 2001 about habitats subject to the protection (52 habitats), and as many as 60 (22.5%) communities are not protected by law.

The study presents also the changes in threat of vegetation in the Silesian Voivodship in 1997-2011, which was calculated by the method of Red List Index (Butchart et al., 2007). Methodological problems of elaborating of the regional red lists of plant associations, also in the light of the criteria for assessing the risk of ecosystems (i.a. Rodríguez et al., 2010), were likewise discussed.

Dry grasslands of NW Bulgarian mountains: first insights into diversity, ecology and syntaxonomy [OP2]

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The Balkan Peninsula, as south-east corner of the European continent, is well known for its rich flora and well preserved vegetation. Overall, biodiversity in the region is considered to be one of the highest in Europe. Among the vascular plants, nearly one quarter is endemic to the peninsula. In Bulgaria, which covers the northeastern part of the peninsula, semi-natural grasslands of high nature value persisted until now to an extent that exceeds most other European countries. However, in many places of Europe the area of these valuable habitats is rapidly declining.

The third research expedition of the European Dry Grassland Group (EDGG; www.edgg.org) in 2011 was conducted in two geologically and climatically contrasting regions of NW Bulgaria (Vrachanski Balkan and the valley between the Balkan Range and the Sredna Gora Mt.). We sampled the types of dry semi-natural grasslands occurring in the area with two approaches, always including all vascular plants, bryophytes and lichens. On the one hand we applied nested-plot series of 100 m² with subplots of 0.0001, 0.001, 0.01, 0.1, 1 and 10 m², on the other hand we made classical phytosociological relevés on 10 m² including the sampling / measurement of a wide range of structural, soil and other environmental variables along with the floristic composition (including vascular plants, bryophytes and lichens).

Based on the 10-m² plots, we could distinguish 10 communities that seem to warrant the rank of association and belong to three classes (*Festuco-Brometea*, *Koelerio-Corynephoretea* and *Calluno-Ulicetea*). We describe their floristic composition and their characteristics in terms of structure, biodiversity and environmental condition, and discuss their placement in the European phytosociological system. Furthermore, we will present the diversity patterns of all three taxonomic groups at the different spatial scales studied.

Hardwood floodplain forest, red list community, threatened by plant invasions (case study from the Pannonia) [P2]

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Invasions of neophyte plant species are considered as one of the major threats to the diversity of natural ecosystems including floodplain forests. Pressure from human activities has increased rapidly during last few decades, therefore we suppose that the penetration of neophytes into forest habitats is greater nowadays than it was in the past. The aims of our study were to find out if there is a significant increase in the number of neophyte species and their cover in the hardwood floodplain forests in the Pannonian region over time; and to explain the relationship between ecological factors and species richness of native vegetation, and the level of invasion of hardwood floodplain forests.

The study is based on the dataset of 359 relevés ordered within the suballiance Ulmenion from Slovakia and 218 from Hungary. The dataset was divided into decades, and the number and cover of neophytes in each period was compared by Kruskal-Wallis nonparametric ANOVA. To analyse the influence of ecological factors we used the number of native species in the plot, Shannon-Wiener diversity index and information about vegetation structure together with Ellenberg's indicator values for ecological factors. The influence of time and other factors on the number of neophyte species was tested using generalised linear models.

Along the time gradient, there is a significant difference in the number and cover

of neophytes between analysed periods in the study area. Eight ecological factors were involved in minimal GLM – with six of them being significant and two being close to the significant level. The most important ecological factor is the amount of nutrients. Other significant factors are light, soil reaction, cover of herb layer and moisture.

Inventory of garden plants; is their invasion a result of propagule pressure and residence time? [OP2]

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In ecology, there is a general lack of the information how the planted species from private gardens contribute to the pool of invasive species. For many introduced species factors such as biological traits, date of introduction (residence time) or pathway of introduction are known in well-studied regions, but the level of propagule pressure is usually unknown. For propagule pressure several proxies are used in invasion biology, but hard data are extremely rare. It is known, that high levels of propagule pressure or mass effect may overcome the series of barriers in the invasion process.

We ask what is the propagule pressure of alien herbaceous species planted in private gardens in the Czech Republic expressed by frequency and duration of planting, and what is the relative role of biological traits and propagule pressure in determining the invasion success of alien species cultivated in gardens? In our study we therefore collated data from floristic inventory in private gardens in order to get estimates of propagule pressure. We simultaneously collate from literature and garden experiments species traits. By combining the above information sources in one model, we are able to determine the relative importance of species traits, residence time, propagule pressure and phylogeny in naturalization of species planted as ornamental in private gardens. Furthermore we can explore the interactions between (i) biological traits of species, and (ii) stochastic and socio-economic factors represented by the frequency of planting and time since introduction. At the species level, the project will identify particular species that are likely to become invasive, although their invasion may have not yet been realized, and provide managers and state authorities with information background for taking appropriate decisions.

***Camphorosma* dominated communities in the Central Balkan [P1]**

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Diversity and spatial distribution of vegetation dominated by the presence of

two halophytic species, the *Camphorosma annua* and *Camphorosma monspeliaca* was analyzed in addition to syntaxonomical and ecological characterization. Both species are distributed in different communities of saline habitats, mainly within the vegetation of extremely salinized soils, such as solonchaks.

The remarkable data set of all available literature sources concerning the halophytic vegetation in the south-east Europe, as well as our own unpublished results was processed and analyzed. The final dataset contained around 400 relevés referred for Serbia, Macedonia, Bulgaria and Romania. We carried out the Cluster Analysis of the dataset in the program PC-ORD 5, using Euclidian distance measure and Ward's method algorithm for dendrogram construction. Diagnostic species of each of the clusters were determined by calculating the fidelity of each species to each cluster using the phi-coefficient as a fidelity measure.

Cluster analysis of the whole data set has resulted in clear distinction of relevés of ass. *Camphorosmetum annuae* developed in north Serbia and communities identified in southern Serbia, Macedonia, Bulgaria and Romania where *Camphorosma monspeliaca* dominates. Clear differences were obtained between south Serbian and Macedonian as well as south Bulgarian and north Bulgarian communities, whereas certain phytosociological similarity was found between the north Bulgarian and Romanian relevés, probably as a consequence of soil features and salinity level dependent on temperature and humidity.

Evaluation of threatened steppe plant communities of Southern Siberia [P2]

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Steppes of Southern Siberia are most heavily used and destroyed as a result of agricultural activity. Besides some natural steppes are well-preserved in Nature Reserves and removed areas. Cataloguing and evaluation of these steppes communities is actual scientific task.

Steppe landscapes are located on different landforms and bedrocks. Besides, the peculiar combination of ecological factors (special conditions of heating and moisture exchange, degree of formation of soils) influence to the high variety of steppes in the same landscape, from desert steppes on the flat places to meadow steppes on the slopes of different aspects.

Dataset of 230 relevés of steppes was analyzed. Classification of the vegetation was produced using the Braun-Blanquet method. The use of the TURBOVEG (Hennekens 1996) and JUICE 7.0 for database management and for quantitative treatment of a large number of relevés made it possible to develop a classification of steppe vegetation.

Ten criteria for assessment of plant communities significance (peculiarities of location, conservation status, biodiversity parameters, evaluation of the present status and required status of protection from Lavrenko, 1971; Green Book of Siberia, 1996; Red Data Book of plant communities of the former USSA, 1997 was used. The steppe communities were divided into 2 classes, 3 orders, 5 alliances, 9 associations and 2 subassociations.

Five categories of steppes and were applied for evaluation:

- reference vegetation communities;
- communities reflect historical land cover change processes;
- communities reducing the areal for anthropogenic factor;
- communities growing at the areal boundary or having limited areal

- communities which include relict, endemic and rare species.

Red List of Lithuanian plant communities: how does it look like and what is it for? [P2]

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Redlisting of rare and protected plant communities has long tradition in the countries of Eastern and Central Europe. In this context, Lithuania is not an exception. The national *Red List of Plant Communities* was published in 2000 and it included 53 types of protected communities. In 1997–2009, this list had a legal status: plant community types were protected based on the *Act for Protected Species of Animals, Plants, Fungi and Plant Communities*.

The national list lost its legal status and there was not any scientific interest in upgrading it when European *Habitats Directive* and its *Annex I* entered into the force.

But a chance to compare and evaluate both legal acts has emerged.

Red List has some advantages, as it has been compiled after evaluating all the diversity of national plant cover. This meant it could cover some inconspicuous communities such as *Centunculo-Anthocerotetum*, *Juncetum squarrosi* or *Spergulo-Veronicetum dillenii*. The communities were evaluated using *Si* sozologic index and grouped into 5 categories that enabled evaluation of their environmental status. The communities of the *Red List* are characterized by factual data, like phytosociologic relevés or distribution data. This enhances credibility of the attributed protection status and enables the monitoring of communities.

The *Annex I* of the *EU Habitats Directive* also has some advantages, as its units are broader and more recognisable. The *Annex* is a part of a legal act, which helps to ensure important actions for the protection of biologic diversity. The transnational context of the *Annex* is also important. The common interpretation of its habitat types helps the communication and implementation of the *Habitats Directive* goals. Both ways for evaluation of the plant cover are important, but it seems that the *Red List of Plant Communities* could have a bigger weight in the process of compilation of the habitat type list included in the *Annex I* of the *Habitats Directive*.

Diversity of humid dunes slacks (2190) in Latvia [P1]

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The research has been made in Slitere National Park and along the western part of the Riga Gulf, in the coastal zone of the Baltic Sea, in Latvia. The study area – wet dune slacks are part of the unique habitat and landscape complex of wet dune slacks and biologically old wooded dunes.

Dune slacks are linear depressions close to sea level in coastal dune systems, which lie between the ridges of coastal dune systems. Dune slacks occur within primary, secondary and relative stable dunes on post Baltic Ice Lake transition area in Latvia, including post Littorina Sea impact area.

Main core zone of dune slacks in Latvia is located in the north – western part of the country, on geologically relatively younger terrestrial part.

The area is noted with insignificant human impact and wide diversity of plant species. Nevertheless, some dune slacks within fishermen villages along the Sea has been used extensively for agriculture before ~80 years. These dune slacks are assessed as semi – natural.

To study structure and functions of the habitat, and plant communities in dune slacks of inter - dune complexes vegetation was assessed in 18 transects, and 48 vegetation sample plots in all were established. Structure and functions of the habitat was registered in special questionnaire.

Structure of humid dune slacks in Latvia is not homogenous. It varies from extremely dry in coastal areas to dry or wet towards inland, as well as, composition of vegetation varies. Dune slacks in Latvia mainly developed in process of primary succession and following development towards forest of bog with some stages of grasslands.

This succession on wet sand, however, is very different to that on the dry dunes. A range of wetland plants are important and early vegetation can be extremely species-rich with plants, for example: *Equisetum variegatum*, *Sagina nodosa*, *Juncus buffonius*, *Centaureum littorale*, *Ranunculus sceleratus*, as well as with number of bryophytes. While in dunes slacks with mire vegetation, one can determine three types of peatland – bog, fen and transition mire, where key species are *Carex* sp. and *Sphagnum* sp.

All dune slacks in Latvia are protected on the State and Europe Union level as very rare habitat. At present all dune slack habitats in Latvia cover 1301 ha or 0,02% of the country.

Halophyte plant communities of *Artemisia pauciflora* in the European Russia [P1]

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Artemisia pauciflora Web. – Caspian-Kazakhstan steppe and desert species, obligate halophyte. The most part of its area lies within a steppe zone. It is widespread in a desert zone also, but only in the northern subzone. Plant communities of *Artemisia pauciflora* are usually grow on solonetz, carbonate soils and tertiary clays. They play large role in formation of a complex vegetation cover of arid part of the European Russia, especially on Caspian Lowland. Plant communities of *Artemisia pauciflora* are characterized by a poor species composition (to 15) and rarefied cover (30–50%). There are both monodominante plant communities and with 1–3 codominants species. Grasses are among them. These are halophyte rhizome grass *Leymus ramosus* (Trin.) Tzvel., cespitosae grass *Agropyron desertorum* (Fisch. ex Link) Schult. (in a steppe zone only) and evrytopic ephemeroïd cespitosae grass *Poa bulbosa* L. Dwarf semishrubs are more often codominants – halophytes *Kochia prostrata* (L.) Schrad., *Camphorosma monspeliaca* L., *Anabasis aphylla* L., *A. salsa* (C.A.Mey.) Benth. ex Volkens, *Tanacetum achilleifolium* (Bieb.) Sch. Bip. (in a steppe zone only), and evrytopic wormwood *Artemisia lerchiana* Web. From perennial herbs it should be noted halophytes *Limonium gmelinii* (Willd.) O. Kuntze and *L. suffruticosum* (L.) O. Kuntze. In places halophyte annual species are abundant – *Bassia sedoides* (Pall.) Aschers., *Climacoptera* spp., *Eremopyrum triticeum* (Gaerth.) Nevski, *Petrosimonia* spp. etc. There are more than 30 associations of *Artemisia pauciflora* (in ecological-phytocoenotic classification).

Beech forests vegetation of Žumberak - Samoborsko gorje Nature Park (Croatia) [OP2]

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The Nature Park Žumberak – Samoborsko gorje is situated in the north-western part of Croatia where the characteristics of the Dinarides, the Alps and the Pannonian plain meet together. It spreads on an area of 333 km². The largest part of the forest area in the Nature Park is occupied by beech forests. A total of 144 vegetational relevés have been made following the standard Braun-Blanquet method. Numerical analyses of floristic composition were conducted and the relevés have been compared with the relevés of the beech forests from the surrounding area of Croatia and Slovenia. For description of ecological conditions Ellenberg's indicator values were used. Six plant associations and two subassociations of beech forests have been established in *Luzulo-Fagion* and *Aremonio-Fagion* alliances. Large part of the Nature park is affected by secondary succession which makes the relevés classification difficult. The highest altitudes of the park are occupied by ass. *Cardamine savensi-Fagetum*, whereas the lower altitudes are occupied by ass. *Lamio orvalae-Fagetum* and *Hacquetio-Fagetum*. Ass. *Hacquetio-Fagetum* spreads on southern slopes and ridges, whereas ass. *Lamio orvalae-Fagetum* comes in ditches and on northern slopes. On the warmest habitats with shallow soils on dolomite base comes ass. *Ostryo-Fagetum*. Small part of the Nature park is characterized by silicate substrate which is occupied by ass. *Luzulo-Fagetum* and *Blechno-Fagetum*.

Environmental factors controlling species composition and richness pattern in Slovak alder-dominated forests along latitudinal gradient [OP2]

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Effective phenotype adaptations of alder species to extreme soil conditions allow them to form canopy-closed forests on alluvial and marshland localities. The sampling was carried out in forest vegetation with dominance of *Alnus glutinosa* and/or *A. incana* along latitudinal (south-north) transect of Slovakia. The data set of 130 vegetation plots with a constant size of 400 m² was collected by the authors in 2009–2011. In each plot, we recorded the total plant species list (incl. vascular plants and ground-dwelling bryophytes) along with their percentage cover using the traditional Braun-Blanquet approach. The environmental (explanatory) variables assessed for each plot including edaphic (pH, conductivity, C/N, Ctot, Ntot, Ca, Mg, K, Na, Mn, Fe) and topographic parameters (altitude, latitude, indices of radiation and heat). Species composition-environmental relationships in alder carr forests (*Alnion glutinosae* Malcuit 1929) and mesophilous streamside alder vegetation (*Alnion incanae* Pawłowski in Pawłowski et al. 1928) were determined using linear ordination technique. The RDA with forward selection procedure (Monte Carlo permutation test; 999 unrestricted permutations) identified the significant ($P < 0.05$) effect of altitude, latitude, N, K, Ca, Fe, which accounted for

21.2% of total floristic variability. To identify how species richness (α -diversity) of individual plant functional groups is related to environmental factors, we used Generalized Linear Model (Poisson distribution; logarithmic link function). The total species richness was predicted by combination of altitude, C/N, heat, Ca, Mg, Mn, Fe (pseudo R^2 =0.635); richness of vascular plants by altitude, latitude, C/N, N, Ca, Fe (pseudo R^2 =0.572) and bryophyte richness by altitude, radiation, Ca, Mn, Fe (pseudo R^2 =0.354). Our study was supported by grants of Slovak grant agency VEGA (2/0059/11, 2/0027/13) and GAPF (1/24/2012).

Patterns in spatial distribution of plant species along latitudinal gradient in southern Bulgaria and northern Greece [OP2]

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The aim of our study is to test how diagnostic species of various vegetation types differ in North-South gradient in terms of their number and abundance. We hypothesize that sub-Mediterranean and Mediterranean species are more numerous in grassland communities in SW Bulgaria than in SE Bulgaria. Our second presumption is that higher number of these species reaches more northern distribution in SE Bulgaria as compared to the south-western part of the country. The present study includes lowland grasslands of southern Bulgaria and northern Greece up to 1000 m altitude. Dataset of about 1700 relevés is used for analysis. A list of typical diagnostic species, which occur in Bulgaria and Greece, for three vegetation classes (*Thero-Brachypodietea*, *Helianthemetea guttati* and *Festuco-Brometea*) is prepared. Distribution patterns of established diagnostic species are tested along latitudinal gradient as follows: 1) variation of the number of species representing each class per relevé; 2) variation of species abundance in N-S direction.

The results obtained from this study expand the knowledge about contact zone and borders of continental and Mediterranean vegetation types on the Balkans.

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Seed features and germination environmental requirements focused to conservation management of threatened halophytic vegetation with *Halocnemum strobilaceum* (Pall.) M. Bieb. [P1]

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Halophytic communities with *Halocnemum strobilaceum*, growing in littoral marshes and inland salt deserts, are distributed from South Europe through Asia and North Africa, mainly in arid or semiarid areas. Generally, European Mediterranean halophytic vegetation faces a serious risk of extinction and is protected by the Directive 92/43/EEC (1420 Mediterranean and thermo-Atlantic halophilous scrubs, *Sarcocornietea fruticosae*). Conservation strategies are required

for species living in these threatened habitats.

The relationship between vegetation and environmental factors for each particular population, and the different reproductive strategies that arise from it, are fundamental factors for planning management of natural environments. Under this approach, the seed features and the germination strategies, related to the environmental conditions from diverse populations of *Halocnemum strobilaceum*, were compared. Six populations from Italy, Spain and Egypt of three different associations, *Arthrocnemo glauci-Halocnemum strobilacei* Oberd. 1952, *Frankenio corymbosae-Halocnemum strobilacei* Rivas-Martínez, Alcaraz, Belmonte, Cantó & Sánchez-Mata 1984, and *Zygophyllo albi-Halocnemum strobilacei* Géhu, Arnold, Géhu-Franck et Apostolides 1992, were analyzed.

Seed dimensions and weight were determined, and seed surface were described. Germination percentage and speed (5 to 35°C), salt tolerance (0 to 500 mM) and recovery (25°C, 12/12h photoperiod) were evaluated. Thermal time and hydrotime were calculated, in order to assess the competitiveness of populations.

Substantial differences were found on morphological features and germination behaviour in the seeds from the studied populations, as adaptation to environmental conditions. High germination responses were obtained in a wide range of temperature and salt conditions in the most of the populations, a common Mediterranean opportunistic behaviour. Differences were only observed in the most northern of the studied populations.

Halophytic plant communities of the Lower Volga valley [P1]

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Lower Volga valley includes Volga-Akhtuba floodplain and Volga River delta. At present, the following higher syntaxa are established in the Lower Volga valley.

Ruppietalia maritimae J. Tx. ex Den Hartog et Segal 1964

Ruppialia J. Tx. ex Den Hartog et Segal 1964

Ruppion maritime Br.-Bl. ex Westhoff in Bennema et al. 1943

Bolboschoenetalia maritimi Vicherek et R. Tx. 1969 ex R. Tx. et Hülbusch 1971

Bolboschoenetalia maritimi Hejný in Holub et al. 1967

Typhion laxmannii Losev et Golub in Golub et al. 1991

Crypsidetalia aculeatae Vicherek 1973

Crypsidetalia aculeatae Vicherek 1973

Lepidion latifolii Golub et Mirkin in Golub 1995

Scorzonero-Juncetalia gerardii Golub et al. 2001

Althetaetalia officinalis Golub et Mirkin in Golub 1995

Althaeion officinalis Golub et Mirkin in Golub 1995

Alhagion pseudalhagi Golub et Chorbazde in Golub 1994

Glycyrrhizetalia glabrae Golub et Mirkin in Golub 1995

Glycyrrhizion glabrae Golub et Mirkin in Golub 1995

Thero-Salicornietalia R. Tx. in R. Tx. et Oberdorfer 1958

Thero-Salicornietalia Pignatti 1953

Salicornion prostratae Géhu 1992

Camphorosmo-Suaedion corniculatae Freitag et al. 2001

Kalidetea foliati Mirkin et al. ex Rukhlenko 2012 (*Kalidienaea* Golub et al. 2001)

Halimionetalia verruciferae Golub et al. 2001

Artemisio santonicae-Puccinellion fominii Golub et al. 2001

Nerio-Tamaricetea Br.-Bl. et O. Bolòs 1958

Tamaricetalia ramosissimae Borza et Boşcaiu 1965

Agropyri fragilis-Tamaricion ramosissimae Barmin 2001

Elytrigio repentis-Tamaricion ramosissimae Golub in Barmin 2001

In addition, the halophytic plant community are represented by individual associations in classes *Artemisietea lerchianae* Golub 1994 (*Salsoletum dendroidis* Golub 1994) and *Potametea pectinati* Klika in Klika et V. Novák 1941 (*Zannichellietum palustris* Lang 1967).

The problems of saline meadows *Juncetum gerardi* Nordh. 1923 at the Polish Baltic coast [P1]

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Polish part of the Baltic shore is not very welcoming for halophilous vegetation. Mostly sandy beaches, cliffs and low salinity of the Baltic Sea (7-8 PSU) are reason that the saline meadows (*Juncetum gerardi* Nordh. 1923) are extremely rare at the Polish shore. Halophytes there inhabit spots where marine waters driven by wind flood low, peaty areas. There are only a few such places at the Polish coast: Odra, Rega, Wisła estuaries and at the Puck Bay. Salty sea water is the main factor limiting non-halophyte competition. However, because of low chloride concentration (and after mixing with fresh water it is merely brackish), it does not play a sufficiently determining role. Furthermore, the salinity decreases eastward (Puck Bay <1-4 PSU), what prevents many halophyte taxa from inhabiting the Polish part of the coast. Numerous taxa reach their eastern occurrence limit here.

There are four *Juncetum gerardi* subassociations at the Polish coast (determined by habitat condition, distinguished by species composition). Their existence depend on human activity. The meadows persist in areas used as pastures, grazed by livestock. Unfortunately the role of the community in costal landscape is continuously diminishing. Decrease of the *Juncetum gerardi* acreage is caused by changes in land use (including cease of grazing and disturbance in water management). Habitats formerly occupied by saline meadows or possibly attractive for halophytes are often occupied by rush of *Phragmitetum australis* or *Molinio-Arrhenatheretea* meadows.

Does plant richness of *Molinia* meadows depend on sampling schemes? [OP2]

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Preferential sampling was the most common sampling scheme throughout the history of vegetation science. Generally, in preferential sampling only typical phytocenoses are being chosen. Most preferred were species-rich plant communities with constant presence of diagnostic species or large share of rare and protected plant species. One of the objective approach in vegetation studies is random sampling. The aim of the present study was to determine whether there are differences in phytosociological classification and species richness of *Molinia* meadows between samples collected preferentially and randomly. The vegetation from which samples were collected is highly diversified in terms of its floristic

composition. This is mainly due to various land use management: study area comprises meadows regularly mown as well as abandoned at different time in the past. Study area was divided into 3 sections, accordingly to their management type. In each section, series of preferential and random samplings were conducted. Preferential sampling was done with presence of at least one of the diagnostic species for *Molinia* meadows. Whereas, random sampling had to be preceded by selection of plots. This was done in GIS software and plots were tracked down using GPS navigation device. In comparative analysis following traits of plants were used: 1) mowing tolerance, 2) ecological strategy, 3) morphology traits. Preliminary analysis indicate significant differences in species richness and differentiation of vegetation between samples collected preferentially and randomly. Many floristic differences were also found between *Molinia* communities that develop under the influence of various management types in relation to sampling schemes. Preferential samples are characterized by greater species richness than samples collected randomly. Furthermore, they represent typical forms of *Molinia* meadows; rich in species, with low share of shrubs, trees and alien plant species.

How do plant functional features affect flowering patterns in submediterranean mountain grasslands? [OP2]

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Although trait-based approaches are widely used to understand ecosystem functioning and community responses to stress and disturbance, few studies have been done on trait patterns linked to flowering phenology. In this study we analysed the flowering pattern in submediterranean mountain meadows and addressed the following questions. 1) Is the flowering pattern affected by species coenological role and plant traits devoted to competition and stress tolerance? 2) Is the flowering-related functional pattern influenced by the variation of environmental conditions and resource availability during the growing season, and by the invasion of tall grasses due to management cessation?

Our results indicated that both in mown and in abandoned meadows dominant species tend to bloom in the central phases of the growing season, when no stress related to temperature and to water scarcity acts in the system, day-length and light intensity allow a high rate of photosynthesis, and a long time is available for plant growth and seed maturation. These species do not need functional strategies allowing canopy fast pre-emption or tolerance to stresses mainly acting at the edges of the growing season. Non-dominant species have functional strategies that allow them to flower before or after the flowering period of dominant ones or to share the same period through a different type of space occupation. The functional trait set underlying their flowering pattern limits competition with dominant species by an early and fast growth strategy (e.g. short stature, mobilization of stored reserves, spring green leaves) and enables tolerance to drought stress (e.g. scleromorphic leaves, light seeds) and to the low light availability at the ground level owing to the sward canopy closure (e.g. tall size, upright growth form). In abandoned meadows, where the cover of invasive tall grasses was greater than 80%, we recorded a delay of the flowering events of some species and a general decrease in the average flowering percentages in the first phenological phases. In the subsequent phases, the growth of invasive grasses, that altered site conditions and resources availability, filtered a set of traits devoted to stress tolerance (i.e. rhizomes, heavy seeds, persistent green and succulent leaves).

Dealing with normative elements in Red Lists of plant communities. The example Mecklenburg-Vorpommern (NE-Germany) [P2]

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Red Lists (RL) analyse the vulnerability mainly in order to identify conservation priorities. For RL of species this appears to be clear because the existence of a species is generally regarded as a value and its conservation logically as morally “good”. Plant communities, however, are hardly of moral relevance themselves but reflect other morally relevant conservation values, e.g. as habitats of threatened species or by providing other ecosystem services. Therefore, in RL of plant communities conservation values have to be separately defined.

In our project “Plant communities of Mecklenburg-Vorpommern and their vulnerability (PCMV)” we strictly separated scientific descriptions and normative elements by two main pillars: (a) the classification of “vulnerability” and (b) the assessment of “conservation value”. By combining both we defined conservation priorities. The second pillar (conservation value) includes the following normative elements: (1) selection, number and relative importance of criteria and indicators to specify these criteria for single plant communities, (2) scaling or setting of thresholds to measure criteria and indicators (categorisation), (3) aggregation rules for processing the results of all criteria in order to define conservation value the , vulnerability and conservation priorities. We emphasise the legitimisation aspect by maximising the intersubjective comprehensibility, transparency and adaptability of the method. The PCMV approach therefore uses clear concepts, few and precisely scaled categories and simple, justified aggregation rules, illustrated in matrices. We conclude that it will be crucial for the future standardisation of normative elements in RL of plant communities, to apply the first approaches in different ecological, institutional and socio-cultural environments. Future increasingly degrading and hybrid ecosystems, climate change effects and human demands for maintaining livelihood will influence moral values and thus conservation priorities of the global society. It is a big challenge to adapt RL to the complexity of human values in space and time while still reflecting accurately the conservation status of plant communities.

An integrated approach for the monitoring of coastal wetlands in Apulia (Italy) trough in situ and earth observation data [P1]

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A detailed and suitable monitoring of the status of coastal wetlands is one of the priorities for their effective management and requires an integrated approach. If field based methods provide detailed information essential in determining habitat conservation status, Earth Observation (EO) data may ensure a long term and multi-temporal monitoring to detect changes in habitat condition and extent.

The present work has been carried out in the framework of the three-year BIO_SOS (www.biosos.eu) project, funded within FP7-SPACE third call. The main objective of BIO_SOS is the design and development of a pre-operational ecological modelling system suitable for effective and timely multi-annual monitoring of NATURA 2000 sites and their surrounding areas, with a focus on Mediterranean ecosystems. The system adopts the FAO-Land Cover Classification System (FAO-LCCS) strategy and deductive learning (e.g. expert knowledge based) techniques for classification purposes. The outputs of the proposed system include: Land Cover (LC) and LC change (LCC) maps; habitat and habitat changes maps.

Two coastal wetlands located on the Adriatic side of the Apulia region and belonging to the Natura 2000 network - "Zone umide della Capitanata" and "Le Cesine" - are study sites of the BIO_SOS project. "Le Cesine" has been identified as training site for the development of the monitoring procedure. For natural and semi-natural habitat types, vegetation samplings were carried out in plots randomly distributed throughout the site, in order to validate LC and habitat maps produced by processing satellite images. Composition and structure of both annual and perennial plant communities have been detected in order to make comparison with the pre-existing LC and habitat maps (2007-2008) and to point out possible changes. Main phenological phases, required for habitat discrimination in multi-temporal images analysis, have been recorded. All habitat types have been labeled according to LCCS and to the most widely used Habitat classification systems in EU. The same procedure will be applied to the analysis of the site "Zone umide della Capitanata"; preliminary field campaigns have been carried out in order to verify presence and distribution of natural and artificial habitat types.

Flora and vegetation in a Hungarian plain micro-region, Jászság (valuable fragments of vegetation in disturbed habitats) [OP2]

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The examined area, Jászság is a plain micro-region in Hungary; its districts are 701 square kilometer. (Elevation of Jászság is between 84.5 and 101 meters.) The ground covering was formed on the stream deposit of the river Zagyva and the

river Tarna. This consists of clayey silt and upon was heaped loess. The main type of soil is chernozem. Land of micro-region mostly used by agriculture and forestry. In Hungary the river control and spate discharge were begun in the 18th century. Before this work the river system was meshed the all region. After this transformation many backwaters were stood back. In our days these backwaters and wetlands are valuable habitats.

Without these habitats are important in natural conservation the remains of the open dry grassland, dry and semi-dry closed grassland too. The remaining semi-natural habitats are located in mosaic.

The systematic research was stated in 2009. Primarily we research the flora of the area and besides this our aim is to prepare a vegetation map of the area.

The most important plant species that were found are e.g. *Acorus calamus*, *Agrostemma githago*, *Amygdalus nana*, *Clematis integrifolia*, *Cephalanthera alba*, *Cephalanthera longifolia*, *Dianthus serotinus*, *Dryopteris carthusiana*, *Epipactis atrorubens*, *Epipactis microphylla*, *Gypsophila arenaria*, *Limonium gmelinii*, *Ornithogalum brevistylum*, *Phlomis tuberosa*, *Pholiurus pannonicus*, *Scilla vndobonensis* and *Stipa borysthenica*.

Habitat types occurring in the Jászág based on „ÁNÉR 2011” habitat classification system, which was synchronized with the Natura 2000. Main habitat types are: Euhydrophyte vegetation (Natura 2000 code 3260); Marshes; Rich fens, wet grasslands and tall-herb vegetation (7230); Halophytic habitats (1530); Open dry grassland (2340); Dry and semi-dry closed grassland (6190); Scrub (91E0); Dry deciduous forests (91H0); Other tree-dominated habitats (9260); Water bodies; Other treeless habitats; Forest and plantations dominated by non-native tree species.

Coastal vegetation of the National park “Valdaisky” lakes [P1]

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The National park “Valdaisky” is situated in the middle of the Russian plain on the border of the subzones of the southern taiga and coniferous-broadleaved forests. The vegetation cover of the National park is consisted with ecosystems of spruce and pine forests on the dead-ice topography, small-leaved forests, mixed coniferous-broadleaved forests, raised bogs with *Sphagnum* and transitional or low sedge bogs, lake and fluvial plant communities. There are also agricultural landscapes.

The lake complexes are the most interesting among them. There are 76 lakes of various origins in the Park. The square of 56 of them is more than 20 hectares. The biggest lakes are: the lake Seliger (only small northern part of it is on the territory of the Park), the lake Velie (4500 ha), the lake Valdai (1970 ha), the lake Uzin (nearly 1000 ha), the lake Borovno (nearly 1000 ha). The total square of the water surface is 14704,5 ha. The lakes are differed by the composition and structure of the coastal vegetation. There are the lakes with coniferous forests (Cl. *Vaccinio-Piceetea*) on their shore. Some lakes are surrounded by willow and alder thickets (Cl. *Quercus-Fagetes*), or meadows (Cl. *Molinio-Arrhetatheretea*). Some lakes are met in the middle of raised or transitional bogs (Cl. *Oxycocco-Sphagnetes*), or lowland fens (Cl. *Scheuchzerio-Caricetea*). The natural coastal and lake vegetation is pressed by anthropogenic, mostly recreational impact. Among the coastal communities the pine forests are the most vulnerable ones. The willow and alder thickets are very difficult to penetrate through and form protected zone of the coastal line. The best

of all situation with the coastal ecosystems inside the bogs difficult to access. Long term investigations revealed high diversity of species and habitats mentioned in the Bern Convention's Resolutions 4 and 6. That's why we could propose to include the National park "Valdaisky" as a potential territory of the Pan-European Emerald network.

Habitat Mapping Experiences in Spil Mountain National Park (Turkey) [OP2]

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Spil Mountain National Park is located in the west of the Anatolian peninsula between the cities of Izmir and Manisa. The park has an area of about 6859, 5 hectare, from sea level up to 1571 meters above sea level where there is the Gediz Plain, an elevated plateau. Dominant vegetation types are dense forests of black and red pine, evergreen maquies and dry phyrgana. Maquies take places between 400-1200 m and common species are *Quercus coccifera*, *Phillyrea latifolia*, *Quercus infectoria* subsp. *boissieri*, *Spartium junceum* etc. Between 400-850 m are common *Pinus brutia* forests while between 1040 and 1460 are dominated by *Pinus nigra*. There are few studies on the flora and vegetation (bibliography) and for this reason was drawn a phytosociological mapping project. This project will run for three years. During the first two years is expected to collect floristic samples and vegetation data. The vegetation data will follow the Braun-Blanquet method and will promptly georeferenced. The use of Turboveg will store the data collected and through Juice will be classified the vegetation components and at the same time will be created vegetation models through the Maximum entropy model (Maxent). During the third year will be completed mapping 1/10000 of natural vegetation and habitats map according Natura 2000 of the Spil Mountain National Park.

Hierarchical formalized classification of Slovak mesophilous grasslands of the *Arrhenatherion elatioris* [OP2]

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The results of a syntaxonomical revision of mesophilous grasslands of the *Arrhenatherion elatioris* alliance in Slovakia are presented. More than 2500 relevés ordered to *Arrhenatherion elatioris* by original author were analyzed by TWINSpan method. Based on the results, 7 associations were distinguished and each association was characterized by its diagnostic, constant and dominant species and its physiognomical, synchorological and synecological attributes based on climatic-topographical and soil-geological factors. To provide a reasonable tool for relevé identification at both, associations and alliance levels, a hierarchical expert system was formulated on the stratified data set of relevés belonging to all syntaxa

stored in Slovak Phytosociological Database (GIVD ID: EU-SK-001; <http://ibot.sav.sk/cdf>). It is based on formal definitions created by the COCTAIL method using sociological species groups and dominance criteria. In total, 38 sociological species groups were used to formulate formal definitions of the target syntaxa. The created definitions were applied on unstratified data set of more than 48 500 relevés belonging to all syntaxa, from which 2 703 relevés matched the definition of the *Arrhenatherion elatioris* alliance (this number corresponds well with the number of relevés ordered to *Arrhenatherion elatioris* by original authors) and 750 relevés (28%) matched simultaneously the association definition. The assignment of a relevé to an association was allowed on condition that this relevé fulfilled the alliance definition criteria. We conclude that the COCTAIL definitions can be formulated also for higher syntaxonomical units and we show an example of such definition for *Arrhenatherion elatioris*, an alliance having intermediate position along the main environmental gradients. Hierarchical formalized classification has several advantages compared to the one-level formalized classification and it could serve as an effective tool for identification of syntaxa in nature conservation. Financial support: VEGA 2/0099/13.

Coastal evolution and habitat management in SCI “Dune di Marinella” (S Italy) [P1]

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The studied area represents one of the largest coastal dune/paleodune systems in Calabria. Sandy formations reach out 800 m from the coastline and host one of the most complete dune vegetation series in the region. Structure and floristic composition of plant communities and habitat types are described. The observed communities mainly belong to *Ammophyletea*, *Helichryso-Crucianelletea maritimae*, *Cakiletea maritimae*, *Tuberarietea guttatae* and *Quercetea ilicis*. The importance of the site is also due to the presence of *Retama raetam* ssp. *gussonei* that forms peculiar communities proposed as a new association. The vegetation of the paleodunal complex has been modified by human activities and often the shrubby communities are alternated with rich in species xeric grasslands belonging to *Stellarietea mediae* and *Lygeo-Stipetea*, favorite by frequent fires.

A syntaxonomical scheme and a vegetation map (in scale 1:5.000) of the area are presented. Evolution of the coastline and the landscape are both analyzed in order to explain the *R. raetam* ssp. *gussonei* population dynamics and as a support of the conservation measures elaboration. The main spatial metrics of the landscape are calculated, analyzed and optimized for the aim of the long time biodiversity monitoring program elaboration.

On the base of the current study, standard data form and map of SCI have been updated, main threats quantified and a proposal for management plan elaborated.

Environmental segmentation and vegetation mapping of *Pinus nigra* ssp. *calabrica* in Sila Mt. (S Italy) [OP2]Uzunov D.^{1*}, Gangale C.², Menguzzato G.³, Martirano G.⁴¹Dipartimento Scienze Agrarie, Alimentari ed Ambientali, Università Politecnica delle Marche, Via Brecce Bianche IT-60131, Ancona, *corresponding author: uzunovd@gmail.com²Museo di Storia Naturale della Calabria ed Orto Botanico, Università della Calabria, Arcavacata di Rende IT-87036³Dipartimento di Agraria, Università Mediterranea di Reggio Calabria. Località Feo di Vito. IT-89124 Reggio Calabria⁴Epsilon Italia srl. Via Pasquali, 79, IT-87040 Mendicino (CS)

The Sila Massif, situated in Northern Calabria and reaching 1927 m a.s.l. (Monte Botte Donato), represents a territory of remarkable phytogeographic interest because of its geology, geographical position and bioclimatic features. This area, together with other S Calabrian mountains and NE Sicily, belongs to the Calabrian Arc, an Ercinic unit dominated by siliceous substrata, mostly granites, mica-schists and kinzigitic gneiss. About 1000–1600 m a.s.l. forest vegetation is characterized by beech forests of *Doronico-Fagion* often replaced by *Pinus nigra* ssp. *calabrica* woods, especially on dry soils. The aim of presented work is the definition of the potential distribution of *P. nigra* ssp. *calabrica* in Sila Mt., setting up a model for territorial segmentation based on geomorphology and geology, hydrology, climatic and bioclimatic data. For the aim of the GIS analysis are defined the appropriate scale and data standards for the different layers in relation with spatial characteristics of the studied phenomenon. A particular attention is dedicated to the discussion of different approaches and techniques to verify and validate the GIS model using forestry and forest ecology data. A sample design for collecting phytosociological data to use for definition of vegetation dynamics (geosynphytosociology) is proposed.

Effects of Plant (Trait) Diversity on the Stability of Grassland Ecosystem Functioning [OP2]Van Rooijen N.M.¹, De Keersmaecker W.², Hennekens S.M.³, Ozinga W.A.⁴, Schaminée J.H.J.⁵, Honnay O.⁶¹Department of Plant Conservation and Population Biology, University of Leuven, Kasteelpark Arenberg 31 - bus 2435 3001 Heverlee, Belgium, nils.vanrooijen@bio.kuleuven.be / Community Assembly and Ecoinformatics, Radboud University, Institute of Water and Wetland Research, Experimental Plant Ecology P.O. Box 9100 – 31 6500 GL Nijmegen, The Netherlands, nils.vanrooijen@science.ru.nl²Department of Biosystems, University of Leuven, Willem de Croylaan 34, Heverlee, Belgium, wanda.dekeersmaecker@biw.kuleuven.be³Centre for Ecosystem Studies, Alterra Wageningen University and Research, P.O. Box 47 6700 AA Wageningen, The Netherlands, Stephan.hennekens@wur.nl⁴Community Assembly and Ecoinformatics Radboud University, Institute of Water and Wetland Research, Experimental Plant Ecology P.O. Box 9100 – 31 6500 GL Nijmegen, The Netherlands, Wim.Ozinga@wur.nl⁵Community Assembly and Ecoinformatics Radboud University, Institute of Water and Wetland Research, Experimental Plant Ecology P.O. Box 9100 – 31 6500 GL Nijmegen, The Netherlands, joop.schaminée@wur.nl⁶Department of Plant Conservation and Population Biology, University of Leuven, Kasteelpark Arenberg 31 - bus 2435 3001 Heverlee, Belgium, olivier.honnay@bio.kuleuven.be

The hypothesis that a greater species diversity leads to a greater stability of ecosystem functioning has been a point of debate for decades. The increasing effects of climate change and the current biodiversity crisis makes this one of the most relevant research topics in vegetation sciences. Much research is done in small scale *in situ* and *ex situ* experiments and is often focussed on species diversity. In this research project it is aimed to upscale this research using observations from large databases and remote sensing techniques and expanding it with trait diversity and functional group diversity. This research will focus on grassland vegetation in the Netherlands, with species rich semi-natural dune grassland systems in particular. Using species abundance data from over 560.000 vegetation recordings (including over 6000 permanent quadrants) from the Dutch National Vegetation Database and combining it with species specific trait data from the European LEDA traitbase, diversity dynamics in these grassland systems are followed. First results, using 10.000 relevés, show a positive correlation between diversity and the stability of grassland vegetation and confirm the diversity-stability hypothesis in non-experimental semi-natural grassland systems. On the short term, using Remote Sensing techniques, biomass developments can be observed over these large areas. By using meteorological data to identify external large scale environmental stressors, like extreme climate events, the response of grassland systems can be observed over time to approximate an ecosystem's resilience against climate change.

High-rank syntaxa of the dry-grassland vegetation in the Central Balkan Peninsula - some preliminary results [OP2]

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Dry grasslands are widely distributed in the central part of the Balkan Peninsula, i.e. Bulgaria, Northern Greece, F.Y.R. of Macedonia, Kosovo, and Serbia (without Vojvodina). They belong to the classes *Festuco-Brometea*, *Helianthemetea guttati*, *Koelerio-Corynephoretea* incl. *Sedo-Scleranthetea* and *Festucetea vaginatae*. In this study, we aimed to find high-rank syntaxa of these vegetation types and characterize them

floristically and ecologically. The data set analyzed is comprised of approximately 5000 relevés gathered from all available published and unpublished sources as well as original data from the study area. We present a comprehensive overview of collected data in terms of geographical and altitudinal distribution of original syntaxa, plot size diversity, soils and cryptograms data when available. All relevés were also placed in UTM Grid (10 X 10 km.). We present some preliminary results about high-rank syntaxa of the dry grasslands. Modified TWINSpan was used as a classification method and it was applied to the vascular plant data only. Non-vascular plants were identified only in a subset of relevés. Diagnostic species of various syntaxonomic levels were determined according to phi-values. Diagnostic bryophyte and lichen species were determined *post hoc* within relevés in which they had been treated. Within subsets of relevés with available environmental data, we determined the major ecological gradients across the Balkan dry grasslands, using ordination techniques and ANOVAs.

Restoration of coppice-with-standards woodland: the impact on plant species composition as the indicator of conservation value [OP2]

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We studied the effect of restoration of coppice-with-standards woodland on understory plant communities in a ten-year experiment. With two levels of thinning intensity, we focused on species diversity and compositional turnover as overall features. Specific focus was on the abundance of endangered species and species of open oakwoods, as the indicators of the restoration success. We also analyzed the risk of ruderalization. A strong vegetation change was followed heavy thinning, while moderate thinning had almost no effect. A weak but statistically significant increase in endangered species was recorded, compared to a more pronounced increase in ruderal species.

Diversity and classification of the vegetation in salt pans in the Chaco Boreal, Paraguay [P1]

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The South American Gran Chaco with its particular geological and climatic conditions is especially susceptible to salinisation of soils and water. In the transition zone between the regularly inundated Humid Chaco and the dry Central Chaco widespread natural salinisation occurs in lagoons, depressions and along courses of period rivers. The aim of this study was to classify the halophytic vegetation in these areas and to find patterns of species composition in relation to different ecological and soil properties.

The study was based on 175 original phytosociological relevés obtained in 2010–2012 in the Paraguayan Chaco in an area between 58.4°–59.4°W and 21°–23°S. The

analyses were performed using the TURBOVEG, JUICE and CANOCO software. Preliminary results of the classification are presented, including floristic and ecological characterisation of nine distinguished communities. Most common were the *Heterostachys ritteriana* community (on soils with the highest salinity) and the *Sarcocornia ambigua* community. Species richness as well as structural and taxonomic gradients are also discussed.

Soil seed banks of alpine dry grassland habitats: implications for red list species [P2]

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Due to the decline of traditional agriculture, species rich dry grasslands, which harbour many red list species, are among the most threatened habitats in Europe. The dry grasslands of Switzerland declined dramatically by 90% over the past 60 years due to intensification of agriculture, abandonment, conversion of grassland into settlement area and afforestation. Soil seed banks are a source for re-establishment of species which are lost from the above-ground vegetation. Hence, maintenance and restoration of species rich dry grasslands will also depend on their soil seed bank. We studied the seed bank diversity and its relation to aboveground vegetation and seed longevity of 23 dry grassland sites of lower elevations of the Swiss Alps (alliances Mesobromion, Xerobromion, Cirsio-Brachypodion, Stipo-Poion). The seed bank was investigated using the seedling emergence method. For each of the recorded 231 species the seed accumulation index (SAI) was calculated. Only 45% of the species established a seed bank: 35% built a short-term persistent seed bank (e.g. *Dianthus carthusianorum* s.l. and *Phleum phleoides*), only 10% were able to establish a long-term persistent seed bank (e.g. *Cardus defloratus* s. str. and *Koeleria macrantha*). Alliances differed significantly in the mean SAI of their species, the Mesobromion showed the lowest tendency of species to accumulate seeds in the soil and thus to establish a long-term persistent seed bank. Owing to the lacking persistence of many dry grassland species in the seed bank there is a high risk of extinction if the species is also absent from aboveground vegetation. In comparison with other studies from mesic and alluvial grasslands, we conclude that the density and diversity of soil seed banks decline with decreasing soil water availability. Therefore, dry grassland communities are most disadvantageous to re-establish from the soil seed-bank. Our findings strongly support the high importance of conserving still existing dry grassland sites.

The EU habitat type 9110 (*Euro-Siberian steppic woods with *Quercus* spp.) in Austria - delimitation, distribution, and conservation status [OP2]

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The EU habitat directive is an important tool for nature conservation. Unfortunately, the habitat types listed in Annex I are not always clearly defined, and their interpretation is not consistent among EU member states. In 2011 and 2012, a complete census of the habitat type 9110 (*Euro-Siberian steppic

woods with *Quercus* spp.) within Austria was conducted. This type is especially problematic as its delimitation towards other types of thermophilous oak forests (91H0 - *Pannonian woods with *Quercus pubescens*, 91M0 - Pannonian-Balkan turkey oak- sessile oak forests) as well as towards Pannonic *Carpinion* forests (91G0 - *Pannonic woods with *Quercus petraea* and *Carpinus betulus*) is rather ambiguous. The lack of a supra-national phytosociological revision of the Pannonic oak forests makes the interpretation of these habitat types even more difficult.

Most critical is the delimitation between the habitat types 91I0 and 91H0. Following the wording of the Interpretation Manual, we used the substrate (loess or sand versus calcareous hard rock) as the primary discrimination factor. On this basis, we calculated diagnostic species for both types. However, the floristic differentiation is rather weak. Phytosociologically the associations *Geranio sanguinei-Quercetum pubescentis*, *Inulo ensifoliae-Quercetum pubescentis* and *Lithospermo-Quercetum pubescentis* clearly belong to habitat type 91H0, while the associations *Corno-Quercetum* and *Euphorbio-Quercetum* seem to be divided between both types. Perhaps the habitat type 91I0 corresponds only to one or two subassociations of a broadly defined *Euphorbio-Quercetum*.

All stands of the habitat type 91I0 in Austria were mapped at a scale of 1:10.000, and within each 3' x 5' grid cell 1–3 monitoring sites were established using a random selection procedure. At each monitoring site, the conservation status of the stand was assessed.

Functional diversity of forest ecotones on Mt. Vermio (NC Greece) [OP2]

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Ecotones are areas of sharp changes between biological communities and comprise a basic unit for landscape ecology studies, while their dynamics (e.g. changes of location and species composition), make them effective indicators of environmental or global climate changes.

This study aimed at the investigation of functional diversity patterns, along transitions of two different pairs of homogenous forest ecosystems (beech forests – broadleaved forests and beech forests – black pine forests).

Multi-scale vegetation sampling took place at Mt. Vermio (north-central Greece). The Moving Split-window Analysis was applied for the determination of ecotone's location and width. Functional diversity was evaluated by using the four indices FRic, FEve, FDiv and FDis, while compositional one was measured applying Simpson's index.

Results showed that the width of ecotone was found slightly longer between the beech and black pine forests than that between beech and broadleaved forests. However, this trend was not found for all the transects, a fact that may be attributed to factors, such as vegetation patchiness and slope aspect. Functional and compositional diversity within ecotonal zones, were found to be intermediate (more often in the transects from beech to broadleaved forests) or higher (more often in the transects from beech to black pine forests) compared with the diversity of the two homogenous forest ecosystems.

Conclusively, high diversity in ecotones does not comprise a global property for them, but this depends on the ecological conditions and properties of the

surrounding landscape. Moreover, ecotones seem to function mainly like additive blending areas of species that prefer to settle at the edges of neighboring communities and it is less likely to comprise a new assemblage with distinct environmental conditions that hosts specialist species not occurring at the neighboring, homogenous communities.

Red Data Book alpine communities of the Altai and Sayan [P2]

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The Altai-Sayanian mountain region is characterized by the highest diversity of alpine vegetation and unique alpine flora among mountain systems of Northern Asia.

The purpose of the study is to prepare a Red Data List of Plant communities from Alpine zone.

The criteria for Alpine vegetation evaluation were developed on the basis of proposals represented in "Green Book of the Siberia" (1996) and "Key botanical areas of Altai-Sayan Ecoregion" (2009). Vegetation classification was carried out using the Braun-Blanquet approach.

A new list of criteria for endangered plant communities was applied in our study:

- presence of rare plant species included in the Red Book of Russia and other International Red books as well as the endemic and relict species.
- importance of plant communities for the conservation and stabilization of natural processes in landscapes.
- pattern of natural vegetation.
- source of plant species valuable for introduction and industry.

Seventeen rare and endangered Alpine plant communities at the association level were distinguished for the Altai-Sayan montane region. Eight association belong to the class *Mulgedio-Aconitetea*, three association - class *Carici rupestris-Kobresietea bellardii*, four - class *Loiseleurio-Vaccinietea*, one - class *Rhodieletea quadrifidae* and one association - class *Salicetea-Herbaceae*.

Identification of a red list of plant communities in Italy: an approach based on the Habitats Directive [P2]

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Based on the data obtained through the completion of the Italian report on the monitoring of the conservation status of habitats of Community interest (in compliance with Article 17 of Directive 92/43/EEC), the Authors propose a methodology for identifying the rarest habitats on the Italian territory. Starting from the distribution maps of habitats, carried out with data available at national level and the standard required by the guidelines of the European Community (Evans & Arvela, 2011), the Authors also propose to identify the most rare plant

communities that characterize the habitats identified as the most rare. It is not possible to exhaustively identify all plant communities on the Italian territory, but such an approach, based on a European law recognized as the main initiative for the protection of biodiversity in the territory of the Member States, allows us to focus on the phytocoenoses that must be protected with greater urgency among those already considered important for conservation by the European Community.

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