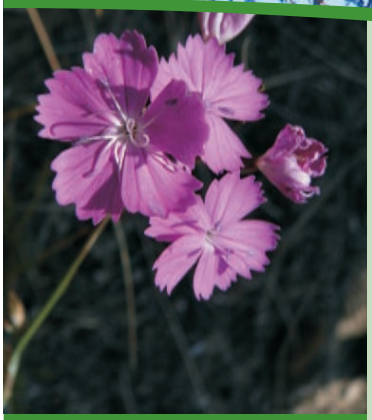

PUSZTAI TÖLGYESEK

Steppe Oak Woods and Pannonic Sand Steppes Conference

6-8 October 2011

Kecskemét, Hungary

Steppe Oak Woods and Pannonic Sand Steppes Conference

Abstract book

The conference and the publication was funded by the European Commission and the Ministry of Rural Development of Hungary in the frame of the “Conservation of the Pannon endemic *Dianthus Diutinus*” (LIFE06 NAT/H/000104) and the “Conservation of Euro-siberian steppic woods and Pannonic sand steppes in 'Nagykőrösi pusztai tölgyesek' pSCI” (LIFE06 NAT/H/000098) LIFE projects.

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VIDÉKFEJLESZTÉSI
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Abstract book

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Foreword

Steppe oak woodlands are unique habitats in Hungary. They are one of the last outposts of a vegetation zone stretching about 8000 km long across Eurasia and reaches its Western border in the Carpathian-Basin. They are home of a number of species and communities which can not be found west of this region. Oak woodlands played considerable role in our history, since pasturing was a traditional lifestyle on dry lowlands for centuries. However, not so much left from this heritage. Most of the biologically diverse steppe habitats were converted to arable land or tree plantations. Surviving stands of oak woods are still threatened by conversion, invasive alien species, high game pressure, and different anthropogenic influences.

During the last five years - in the frame of *Steppe Oak Woods of Nagykőrös LIFE-Nature Project* - habitat restauration started in one of the largest and most natural steppe oak stand that can be found in Hungary, near the city of Nagykőrös. Elimination of invasive plants, replanting native tree species and controlling game pressure are important steps in the conservation efforts of this important Natura 2000 site. Raising awareness in a newly established education center in the woods are also of great importance, especially for future local generations. In *Conservation of the Pannon endemic Dianthus diutinus* LIFE Project main objective was to stabilize the populations of an extremely rear steppic plant species.

With *Steppe Oak Woods and Pannonic Sand Steppes Conference*, held in the famous city of Kecskemét, our objectives are to invite different experts from all over Hungary and abroad to discuss the main problems of conservation and management of this unique habitat type. Botanists, zoologists, foresters, national park staffs and ministry officers along with NGO's were invite to share their ideas related to proper forest management, hunting, treatment of alien species and other issues. Experiences from abroad can provide particularly valuable information to the successful restauration. We hope, there will be enough room for constructive dicussions, and we can have a pleasant overview of the steppe oak woodland itself along the field trip.

In the name of all contributing partners, we wish you a pleasant staying in Kecskemét and Nagykőrös Oak Woods.

Laszlo Galhidy
forest programme officer
WWF Hungary

Preface

The results of the Millennium Ecosystem Assessment, which is the most comprehensive global examination of the state of ecosystems and the services they provide, proved that the decline of biodiversity is critical. The European Commission launched several initiatives to conserve biodiversity, including legal and financial instruments.

Every member state of the European Union has an important mission to implement the Birds Directive (2009/147/EC) and Habitats Directive (92/43/EEC). Natura 2000 sites have also been designated in Hungary to promote the conservation of habitats and species of community interest, including priority ones such as Euro-Siberian steppic woods, Pannonic sand steppes and *Dianthus diutinus*.

Parallel to the announcement of the Habitats Directive (92/43/EEC) in 1992, the Financial Instrument for the Environment (LIFE) was established. As part of the programme, the LIFE-Nature strand was devoted to contribute to the implementation of the Birds and Habitats Directives, and to support the development and implementation of the Natura 2000 network.

Hungary started to take part in the LIFE programme in 2001 as an accession country and since then LIFE has played a very significant role in the financial support of nature conservation. Up till 2006, 16 LIFE-Nature projects were supported by the European Commission, and Hungary received almost 12.8 million Euros for habitat restoration and species conservation projects.

In 2007 the LIFE+ programme started with some changes in comparison to the LIFE programme. So far in Hungary, one LIFE+ Biodiversity and nine LIFE+ Nature projects have been supported by the European Union with almost 14.3 million Euros.

The LIFE-Nature and LIFE+ Nature and Biodiversity projects are very successful; huge areas of natural habitat have been restored and the populations of many target species have increased.

The two LIFE-Nature projects that give the opportunity for this conference the "*Conservation of Euro-siberian steppic woods and Pannonic sand steppes in 'Nagykőrösi pusztai tölgyesek' pSCI*", and the "*Conservation of the Pannon endemic Dianthus diutinus*" started in 2006 and will be completed at the end of 2011.

The Ministry of Rural Development (formerly Ministry of Environment and Water) strongly supports these projects, also as a co-financer, as the projects contribute to the conservation of very rare and threatened natural values that have outstanding significance on a national and European Union level.

The Ministry of Rural Development welcomes the organisation of the Steppe Oak Woods and Pannonic Sand Steppes Conference, because this initiative gives the opportunity to discuss in a broader public high priority issues such as habitat restoration, conservation forestry and invasive species. Due to the diverse and high-level presentations, posters and discussions, the conference enables closer national and international cooperation between protected area managers and researchers to preserve these unique natural values. We hope that the conference can also contribute to emerging ideas for LIFE+ projects, in which the conservation of steppic woods, Pannonic sand steppes and other habitats and species of community interest can be further supported by the European Union.

Éva Sashalmi - András Attila Takács Ph.D
Ministry of Rural Development, Hungary

PRESENTATIONS

Biogeographical connections of Pannonian Steppic woods

Professor Zoltán VARGA

University of Debrecen, Faculty of Science and Technology

The western Palaearctic forest steppe belt is subdivided by the Carpathians into a Pannonian (sub-Mediterranean) and a Continental sub-zone, strongly differentiated in biogeographical connections, vegetation structure and composition, and also in phylogeographic dynamics. In the Carpathian Basin the forest-steppe, typical in the central lowland and hilly parts of the basin, is represented by a number of regional variations, showing distinct geological, edaphic and meso-climatic characters.

The organisation of community-complexes of the Pannonian forest-steppe connected by habitat ecotones resulted in the overlap of several different faunal types, e.g. Mediterranean, Balkanic, Siberian, Ponto-Caspian, Ponto-Pannonian, Turano-Eremic and Xeromontane elements. Especially the hilly areas of transitional climatic conditions, surrounding the Pannonian lowland are populated by numerous, biogeographically important species and communities, e.g. the lanuginose and Turkey oak forests, and also the steppic oak forests of sandy ridges. The xerothermic slopes and foothills of the Hungarian Middle Range served both as refuges for thermo-xerophilous elements during several cold and cool-humid climatic phases of the Quaternary and as centres of their postglacial dispersal. On the other hand, the Pannonian forest steppe and xerothermic oak forests show close connections with the core areas of the Balkan Peninsula.

The distribution of several Holo- and Pontic-Mediterranean species in the Carpathian Basin strongly suggests that the loess and sandy ridges along the Danube and between Danube and Tisza have served as important corridors of northward expansion from the Balkan Peninsula. Molecular phylogeographic surveys have shown that many thermophilous elements populated the Carpathian basin not only by long-distance colonisation from remote glacial refuges, but also from

meso- or microclimatically favourable sites, lying at the fluctuating borderlines of the Mediterranean refugial and periglacial belts.

The varied and fine biostratigraphical structure of the Hungarian young Pleistocene, often characterised by a coexistence of forest and non-forest faunal elements also provides evidence to support this view and demonstrates the transitional biogeographical character of this region during the whole time-span of the Quaternary period.

Steppic wood vegetation between the Carpathians and the Dniester

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The authors have been researching the remnants of the steppe vegetation and flora of the Great Plain and its peripheries for more than a decade, focusing on the area south of the North Hungarian Mountains, on Csanádi ridge, Upper Bácska, and Bánság. Their work has been carried out within a central and Eastern European framework.

Hungarian steppic wood vegetation has become almost extinct. Frequent research into the other areas of the steppic wood belt is necessary for the correct evaluation and protection of the remnants. There are significant natural stands between the Carpathians and the Dniester under more or less similar conditions to the Hungarian ones. We are following the footsteps of Gábor Fekete and Pál Jakucs with comparative studies of these stands.

Besides covering the Hungarian literature, three trips were made between 2006 and 2008, during which 25 dry grasslands, six opening, and ten closed steppic woods were thoroughly examined with the help of the traditional phytosociological methods (altogether 67 photos) and a complex data sheet developed by us about the set and pattern of the species, and use of the landscape and dynamic processes.

In the observed area similar to the one within the Carpathian basin the two main species of steppic woods are continental (or Northern, closed), and sub-Mediterranean (or Southern, open).

The vegetation is similar in many respects. The most important differences lie in the history of land-use. The grasslands in the area are

still used, primarily grazed with a fairly small number of animals, and there are often controlled burns. The forests are not consciously converted, they are often cut, but tree species selection and shrub layer cutting are not common. Renewal is successful everywhere. Forest grazing is not used; we have only seen it once. The alternation between abandoning and then starting to manage an area again can last for hundreds of year.

The "open" steppic woods are the representatives of two association-groups, the *Aceri tatarico-Quercetum roboris* (Zólyomi, 1957) and the *Quercetum pedunculiflorae* (Borza, 1937). The set of species is mostly the same as in Hungary; it is only the presence of the *Quercus pedunculiflora* in some areas of the open woods which is unique. The real grassland species comprise most of the undergrowth, and can be found evenly under the stands, not only in the clearings. Some stands are the same as the Hungarian loess steppic woods, and some are local allopatries.

The "closed" steppic woods are mosaics of closed forests and distinct clearings. The set of species includes at about one-third of dry elements as well. The species composition is basically the same as in Hungary. These are the Eastern allopatries of the former woods of the Gödöllő hills or more mesic forests.

The syntaxonomy of steppic oak forests of Southern Nechernozemie of Russia as a reflection of phytogeographical patterns

Yu. A. SEMENISHCHENKOV, A. D. BULOKHOV

The xeromesophilic steppic oak forests of Southern Nechernozemie in Russia correspond typologically, floristically and ecologically to the European thermophilous broad-leaved forests of *Quercetalia pubescenti-petraeae* (Klika, 1933). Here the regional ass. *Lathyro nigri-Quercetum roboris* (Bulokhov et Solomeshch, 2003) is established. It represents light sparse oak forests, formed mainly by *Quercus robur f. tardiflora*. These forests are common in habitats with grey and soddy-podzolic loamy soils within the landscapes of loess plateaus, poljes, polesies, predpolesies, on the slopes of ravines and river valleys.

The most similar association is the European ass. *Potentillo albae-Quercetum* (Libbert, 1933). In the recent time several authors have substantiated its trans-provincial distribution from the Central European province to the Urals. In our view, this approach is very much against the logic and concepts of phytochorological zoning. Not well-defined interpretation of the characteristic species, in our opinion, makes the volume of the association not adequately large and loses the "face" of association. This eventually leads to an unjustified expansion of areas of syntaxa.

On the geographical gradient from Central Europe to Southern Nechernozemie, with the increase in continentality of the climate, the flora of the kseromezofilic forests is depleted by Western European species characteristic of Central European thermophilous forests. The absence of *Quercus petraea*, *Q. pubescens*, *Carpinus betulus*, *Acer pseudoplatanus*, *Tilia platyphyllos*, *Ligustrum vulgare*, *Viburnum lantana* etc. is the most important for the forest typology. Practically sub-Mediterranean species do not occur here. In the more eastern regions, the floristic composition of oak forests again becomes richer through the invasion of southern Siberian species.

On the whole steppic oak forests of the Southern Nechernozemie of Russia cannot accurately be called "thermophilous". These forests are

distributed here in the same habitats with the broadleaved forests of other typological groups. Their coenoflora composed mainly by mesomorphic species with xeromorphic.

For these reasons, it is more correct to call these forests not "thermophilous" but "kseromesophylic.

The floristic originality of the kseromesophylic forests of Southern Nechernozemie is demonstrated with use of the NMDS-ordination. It reflects the contribution of climate continentality in the differentiation of Eastern and Central European steppic oak forests.

Forest vegetation of the Ukrainian steppe zone: past and present

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The Ukrainian steppe is part of the large Eurasian steppe zone and is defined as a territory the vegetation of which is not typically featured by trees. First of all this is caused by more of a continental climate in these areas. Historically, the forest-steppe/steppe boundary has fluctuated due to climatic changes until it stabilized in post-glacial times (CHIBILYOV, 1990). However, the Ukrainian steppe zone is intersected by the valleys of several big rivers, such as the Dnieper and South Bug, which host natural forested floodplains and gallery forest vegetation. During the active steppe exploration by humans since the 18th century, tilling has always been accompanied by intensive gallery forest destruction. The process was stimulated by a considerable demand for ship timber and timber supply for everyday needs.

Therefore, the present day steppe biome, including the characteristic steppe biotopes and green corridors along rivers, has already passed the waterfall on the Regeneration River, along with all the indigenous biodiversity that has ever lived in it. The habitat is severely fragmented. For example, in the Luhansk region it is separated into 2,000 parts. Its ecological structure is destroyed and unable to recover over abandoned fields, and the areas are being invaded by adventive flora and fauna instead. Many animal and plant species native to the steppe are now on the brink of extinction and are listed in the Red Book of Ukraine (CZERVONA KNYGA.., 2009; KONDRATENKO, ZAGORODNIUK, 2006). What disappoints most is that instead of recovering natural forests that have been characteristic of floodplains in the past, forest shelter belts and parks have been built with introduced foreign trees and shrubs in Ukraine. As a result, natural forest stands of the steppe zone have been replaced by low production planted patches of forests with extremely low biodiversity.

In addition, the State Agency of Forestry finds it necessary to expand woodlands in Ukraine specifically over the Ukrainian steppe zone, which is often accompanied by the creation of small planted forests of low prospective value on the last remnants of steppe biotopes. These measures lead to the degradation and extinction of the numerous rare plants and animals which totally depend on typical steppe biotopes.

With this in mind, public nature conservation volunteers are taking action to prevent allocation of the remaining steppe vegetation areas for afforestation and are campaigning to promote natural forest recovery in appropriate river valley biotopes. We oppose wasting governmental finances for planting small patches of introduced flora in areas occupied by classic steppe biotopes.

Author:

The author is a specialist studying plant reactions to extreme environmental factors. He graduated from Biology Department of Taras Shevchenko National University of Kyiv in 2009 and has a PhD degree in Plant Cell Biology. Since 2003, the author has participated in a number of practical nature conservation endeavours, like establishing new nature reserve areas and developing and introducing programmes for biodiversity conservation. The author and his NGO Kyiv Ecological and Cultural Centre are jointly active participants of the Ukrainian public campaign for Ukrainian steppe conservation http://pryroda.in.ua/step/

Pannonian sand steppic woods in space and time

Zsolt MOLNÁR, Marianna BIRÓ

Pannonian steppic woods develop on humus-rich sandy soils and are dominated by *Quercus robur*. They are represented both by rather small groups of trees or more extensive stands. In the landscape they typically form a mosaic with sand steppes. *Festuca rupicola* and *Poa angustifolia*, together with often regionally rare forest steppe species are common in the herb layer.

It is assumed that the extent of sand steppic woods was greater in the first half of the Holocene and much smaller afterwards. Based on indirect evidence, these woodlands were perhaps composed of *Tilia* and *Ulmus* in addition to *Quercus*. In the Middle Ages, much more extensive but by far discontinuous woodlands existed in certain areas. It may be inferred from the *Descriptio* of the First Military Survey (1783) that most sand forests were dominated by *Quercus robur*. Forest stands were heavily used for firewood (with a 15-year clearing cycle) and also for wood pasture.

The stands have shrunk to a fraction of their original size over the past 200 years. They were transformed to arable land to a lesser extent and tree plantations (first *Robinia* then *Pinus*) to a larger extent. The formerly short clearing cycle was gradually increased to 25, then 40 years and grazing in the forest was abandoned. Owing to water regulation, the groundwater table has dropped (2-3 metres by the 1980s) and the oaks have started to die. The forests have been degraded first by the invasion of *Robinia pseudoacacia*, more recently by *Prunus serotina*, and in places by wild game populations (Wild Boar, Fallow Deer). Establishment of oak plantations by currently adopted forestry methods is hardly successful.

Sand steppe forest is one of the most endangered vegetation types in Hungary. The total area of open sand steppic woods is ca. 290 hectares; closed sand steppic woods cover a further several hundred hectares. Half of the stands are degraded and their regeneration potential is the lowest of all. Despite their legal protection, stands are cleared even today by forestry companies.

Further reading on history and vegetation:

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MOLNÁR Zs., BIRÓ M., SZOLLÁT Gy. (2010): A nagykőrösi homoki erdőssztyepp-tölgyesek tájtörténete. In: MOLNÁR Cs., MOLNÁR Zs., VARGA A. (ed.): „Hol az a táj szab az életnek teret, Mit az Isten csak Jókedvében teremt." Válogatás az első tizenhárom MÉTA-túrafüzetből. 2003-2009., MTA ÖBKI, Vácrátót, pp. 325-330.

BIRÓ M., MOLNÁR Zs. (2006): Az Alföld erdei a folyószabályozások és az alföldfásítás előtti évszázadban. In: Kázmér MIKLÓS (ed.): Környezettörténet 2006. A környezet változásai történeti és természettudományi források tükrében. Hantken Kiadó, Budapest, pp. 169-206.

Further reading on distribution:

BÖLÖNI J., MOLNÁR ZS., BIRÓ M., HORVÁTH F. (2008): Distribution of the Hungarian (semi-) natural habitats II. Woodlands and shrublands. Acta Botanica Hungarica 50: 107-148.

Authors:
Zsolt Molnár and Marianna Biró are botanists interested in landscape history, vegetation dynamics, recent and retrospective vegetation mapping, ethnoecology and nature conservation evaluation and management. They have been working at the Institute of Ecology and Botany of the Hungarian Academy of Sciences at Vácrátót since 1990. They prepared the first recent vegetation description and historical reconstruction of Nagykőrös wood.

Work and result from a project aiming to save the oak steppic woods in Turkey and comparisons with Sweden

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The beetle fauna living on the wood of old oaks (*Quercus* spp.) is known to be very rich. This fauna is threatened all over Europe and neighbouring countries. The reason is a lack of suitable trees because of poor management or habitat conversion.

Turkey is known to have high species richness from different studied groups - plants, birds and butterflies. In this project similar methods have or will be used in Israel, Turkey, Italy, France, the UK, the Czech Republic and Sweden to study the beetle fauna living on the wood of old oaks. The aim of the study is to compare the diversity and similarity of this fauna in these countries, but also to inform the Turkish authorities of the high value of their oak forest and to convince them to start conservation work in the country.

Preliminary results from the on-going analysis from the oak beetle project are presented. Eight stands with old hollow oaks, spread over

four areas, were studied in Turkey during 2005-2009. The saproxylic beetles were caught with traps on ten trees per stand in one season. In this preliminary presentation twelve beetle families were included and only data from France, the UK and Sweden are presented. A comparison shows that both the total species richness per stand and the medium number of species per tree was in most cases higher in Turkey than in the other countries. Only 10% of the species caught with window traps in Turkey and the countries from Western Europe were in common. Many of the beetle species found in Turkey were found for the first time in that country and so far 25 species have been identified as new to science. Of the species found in Turkey, there are ten species that are very rare and threatened in Europe and are on the European Red List. The most species-rich trees in the study were pollarded oaks (trees with regularly cut branches) near Gülnar, Mersin region in Turkey. An expansion of the project in Turkey and comparisons with the preservation work in Sweden will also be presented.

Steppic wood habitats in Austria: definition, phytosociology, and conservation status

Wolfgang WILLNER PD Dr

Vienna Institute for Nature Conservation and Analyses

Steppic wood habitats in Austria are classified within two EU priority habitat types: 91H0 ("Pannonian woods with *Quercus pubescens*") and 91I0 ("Euro-Siberian steppic woods with *Quercus spp.*"). The delimitation between these two habitat types has been a source of confusion for many years, and the distribution of "real" steppic woods (91I0) in Austria remained doubtful until recently. In a new classification of the Austrian forest communities (WILLNER & GRABHERR, 2007), we tried to clarify this issue but recent field work showed that further adjustment is needed. In my talk I will discuss the main features and differences of these two habitat types from a phytosociological point of view, their current distribution in Austria, and I will show some examples of both habitat types. Steppic woods are restricted to soft sediments (mostly loess, rarely also sandy soils) while 91H0 woods occur on hard bedrock (limestone or dolomite). Both types have close ecological, spatial and successional relationships with open grassland habitats. However, while mosaics of dry grasslands and 91H0 woods are still abundant in the Pannonic region of Austria, most steppic woods have become closed forests which are isolated from the remaining patches of loess and sandy grassland. Since the majority of rare and endangered steppic plant species are rather confined to open habitats (forest edges, grasslands) than to the forest, most of these species have disappeared from the steppic woods. The closed oak forests are mostly species poor and dominated by rather common species. Invasion of *Robinia pseudoacacia*, high stock of game, and dominance of *Rubus* and other ruderal species after clearing are obvious conservation problems in steppic oak forests. Historical maps show that steppic woods are mostly old forests, but human impact (hunting, coppicing, grazing) has always been very strong. 91H0 woods, on the other hand, are rather young forests which have developed on former pasture land. At the eastern edge of the Alps, old plantations of Black Pine (*Pinus nigra*) are partly developing into

Quercus pubescens forests now. While most of 91H0 woods are located in protected areas, only a minor part of steppic woods (91I0) are protected. Two Natura 2000 sites are dedicated to steppic woods: Steinbergwald (Lower Austria, *ca*. 200 ha) and Zurndorfer Eichenwald (Burgenland, *ca*. 70 ha).

Author:

Wolfgang Willner is a vegetation scientist with special focus on temperate forests and grasslands. He did his PhD at the University of Vienna where he worked as post-doc from 2001 to 2004. Since 2004 he has been director of the private research institute VINCA (Vienna Institute for Nature Conservation and Analyses). In 2007, he published a new survey of the Austrian Forest and Shrub Communities. His current research interests include the diversity and historical biogeography of Central European forests and dry grasslands.

The historical development, state and conservation of steppic woods in Slovakia

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In Slovakia, it is under discussion whether steppe or steppic wood habitats originated as climax associations or developed after the removal of native forests (e.g. MICHALKO et al., 1987). The majority of botanists, ecologists and historians explain the development of wood steppe mosaics as a process generated or maintained by human activities over centuries (e.g. LOZEK, 2011). In special cases, the climax origin of remaining steppe fragments can be accepted (e.g. saline habitats, cf. FEHÉR, 2007). This presentation is based on a critical analysis of the Slovak literature.

In Slovakia, a special word, "lesostep" (les = wood, step = steppe), is used to identify the mosaic of woods and steppes regardless of substratum (lesostep is also used in the names of protected areas, e.g. Zoborska lesostep on limestone, Cenkovska lesostep on sand dunes). The first Slovak catalogue of habitats listed two wood steppe biotopes (RUZICKOVA et al., 1996). The sub-Mediterranean thermophilous mixed oak woods 2114100 create mosaics in degraded and karst regions. The sub-xero-thermophilous oak and xerophilous pine woods 2114300 occur in contact zones of pine and oak forests and are dominated by both Euro-Asian continental steppic wood species and continental species of East European mixed forests (with relict species known from this habitat only). The later catalogues considered the NATURA 2000 classification (STANOVA, VALACHOVIC ed. 2002, VICENIKOVA, POLAK, 2003) and included e.g. Pannonian woods with *Quercus pubescens* 91H0*, Euro-Siberian steppic woods with *Quercus spp.* 91I0*, Pannonic inland sand dune thicket 91N0* (*Junipero-Populetum albae*) but also Carpathian steppe pine woods (missing in the NATURA 2000 system but present in CORINE, Emerald etc.). Steppic wood elements can also be found in other habitats and plant communities of Slovakia (e.g. Pannonian-Balkanic turkey oak-sessile oak forests 91M0*). All these habitats are mapped in GIS layers (SEFFER, LASAK ed. 2004) but no special literature is

available about the wood steppes (the xerophilous habitats of Slovakia are given in DAVID et al., 2007 and sand dunes forests are characterized in KALIVODOVA et al., 2002).

Slovakia also has the Information System of Taxa and Habitats, Central Phytocoenosis Database and Information System of Slovak Habitats. The Forest Management Information System is administrated by Lesoprojekt in Zvolen. It uses a unified system for the whole country (excluding military forests of 73,000 ha) and also contains the Database of Forest Management Plans. A manual to maintain and promote favourable status of habitats is available; it also includes the evaluation and management of the above mentioned steppic wood habitats (POLAK, SAXA eds. 2005). There is a lack of a comprehensive strategy for management of the wood steppes in Slovakia.

Author:
Dr. Alexander Fehér is an associate professor at the Slovak University of Agriculture in Nitra and director of the Baltic University Programme in Slovakia. He earned his doctorate in landscape engineering, is a member of national and international professional societies, as well as the European group NEOBIOTA and the editorial boards of Acta Regionalia et Environmentalica (Slovakia) and Management of Environmental Quality (Germany). His major scientific interests are landscape history and management, biodiversity and biological invasions.

Sand steppes and oak woodlands in Vojvodina (Serbia)

Klára SZABADOS

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The overwhelming part of the Vojvodina province (74.5%) is arable land and only 6.8% is covered by grasslands. The two vast sandy areas, the North Backa Sand Region (Subotičko-Horgoška peščara) and the South Banat Sand Region (Deliblatska peščara), are dominated by forest monocultures of Black Locust and Black Pine.

Subotička peščara is suitable for agriculture due to the high groundwater levels. The natural vegetation of chernozem-like sandy soils was converted into orchards and vineyards. Fragments of sand steppe and open sand grassland habitats are preserved in forest clearings and on the sand dunes of alkali meadows. Although the xerophilous oak forests were destroyed centuries ago, some structural elements of the original herbaceous vegetation still exist in the planted forests. The two protected areas include more than 5,000 ha of forests and pastures, hosting marginal populations of *Iris arenaria, Gypsophyla arenaria, Dianthus serotinus, Colchicum arenarium* and *Bulbocodium versicolor*, all of them growing at the southernmost edge of their areas. The wide variety of habitats provides suitable conditions for the rich bird fauna, protected within the boundaries of the Important Bird Area called Subotica Sands and Lakes. The spread of invasive plants (*Celtis occidentalis, Ailanthus altissima, Asclepias syriaca*) demands continuous management of the protected areas.

The 25 km wide and 60 km long Deliblat sand ridge area is known for its characteristic high dunes. The ground water level is very low, but the precipitation accumulated in the dunes enables forest development on the northern slopes, creating dynamic forest-steppe mosaics. The typical forest community is the thermophilous association Rhamno-Quercetum virgilianae with the differential species *Fritillaria degeniana* and *Paeonia officinalis subps.banatica*. The open sand grassland (Festucetum vaginatae deliblaticum) with *Stipa joanis* includes rarities such as *Rindera umbellata, Echinops banaticus* and

Paeonia tenuifolia. The fauna is rich in endemic species. Spread out on some 30,000 hectares, the Deliblatska Pescara Special Nature Reserve provides an almost undisturbed habitat for the only wolf population in Vojvodina and for the rare birds of prey (*Falco cherrug, Pernis apivorus, Aquila pomarina)*. One of the most important mammal species is the Southern Birch Mouse (*Sicista subtilis),* registered only at this locality in Serbia. The Ground Squirell (*Spermophilus citellus*) and the Mole Rat (*Spalax leucodon*) are represented in large populations, both of them endangered by habitat fragmentation in other parts of the province. As the natural habitats are scattered among forest monocultures, the effectiveness of their conservation depends on appropriate forest management. Abandoned monocultures of Black Locust have become sources of plant invasions, enhanced by frequent forest fires. Afforestation of the clearings by pine leads to the further loss of steppe habitats. One of the ongoing conservation activities is to ensure the continuity of the traditional grazing of the pastures.

Outside of the protected areas 16 valuable sand steppe habitats are registered in the database of the Institute, covering an area of 1,887 hectares. The pastures in South Banat are large (91- 860ha), but unfavourably shaped. Fragments of sand habitats in the North Backa are very small; nevertheless a few of them could be included into the planned protected area.

Steppe woods in the northern part of the Great Plain

Balázs LESKU

Hortobágy National Park Directorate (HNPI)

The steppic woods of the Great Plain are unique and severely endangered habitats of the Pannonian biogeographic region. There are types to be found on sandy and on saline areas in the northern part of the Great Plain (within the area of the HNPI). They both have Pedunculate Oak (*Quercus robur*) as the most characteristic tree species, their clearings and boundary strips are in close but dynamically changing connection with the woody vegetation, and human impacts have been important in forming the present vegetation.

The steppic woods are primarily found in the Nyírség. The sand bedrock and soil, and the resulting microclimatic and water conditions, have affected their formation. Originally, the stands were probably of mosaic arrangement, with a transition to mesic type oak woods inseparable from them both in space and in succession. Their stands have almost completely disappeared now, their small remnants only within bigger forests (e.g. Fényi-, Gúti-, Sóstói-forests, Nagyerdő of Debrecen). Their maintenance and nature conservation management entail a lot of problems. Decreasing groundwater levels negatively affect the present stands, and their renewal is not taken care of, often because of the overgrown wildlife population; and invasive species (both woody and herbaceous plant species) also have a strong effect. The small stands of mosaic arrangement are continuously degrading, whereas the naturally occurring successional changes (drying, opening oak woods "turning into" steppic oak woods) are impossible due to forest management and invasive species.

The theory of the genetic relationship between saline steppic oak woods and floodplain and loess oak woods is generally held, also supported by the herbaceous vegetation of saline oak woods. Anthropogenic factors and their effects are however judged differently. The stands are small, even within the forests. The well-known stands are in the area of Hortobágy (e.g. Tilos forest in Újszentmargita, Ohat

forests), that of the Jászság and Bihar (Csere and Miklós forests). The overgrown wildlife population is an obstacle to natural forest renewal, whereas the role of moderate grazing in the protection of steppic wood is still to be examined. Incorrect forest management measures have caused serious damage in some areas. In some places the invasive species pose a threat. The HNPI has started structural conversions in the assigned areas, changing the alien stands to native species, but this is not necessarily enough for long-time survival.

The loess oak woods on loess soil have almost completely disappeared; their remnants remain only in sub-mountain location. The specified areas preserved only little remains of them in the oak woods on the hills in Bereg (e.g. Kaszonyi-hill).

Wood pastures, and wooded scrublands and grasslands of e.g. the Bereg-Szatmár-plain are artificially created, and hardly fit into the category of natural associations. However, their nature conservation role in land formation and in providing a habitat for several species connected to the steppic woods is very important.

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Obtained his degree in biology from Kossuth Lajos University of Debrecen (1997). Has been working for Hortobágy National Park Directorate from 2000 as an ecological-botanical expert.

Steppic oak woods within a city: problems, opportunities and an NGO response.

Csaba SZIGETVÁRI, E-misszió Természet-és Környezetvédelmi Egyesület

Sóstó forest is a less than 400 ha steppic oak forest remnant near Nyíregyháza (120,000 inhabitants) completely isolated from similar habitats. Its situation is special for several reasons: on one hand this forest is the northernmost steppic oak forest in the Pannonian region, and on the other the nearby city has a serious anthropogenic effect on it.

Most of the forest is part of the Natura 2000 network. At the time of the survey (beginning of the 2000s) Sóstó forest could be described as:

Forest structure, habitat and biological point of view:

- Only about half the area is covered in natural stands, most of which are of closed, mesic type, while "steppic oak wood characteristics" can only be found in certain patches.
- Both the "mountainous" and the "steppic" elements can be found in its wildlife.
- Structurally it is varied, but the stands are of the same age.
- Reduction in groundwater levels is not as profound as elsewhere in the Great Plain.
- Game pressure is moderate.
- Alien species are mostly Red Oak (*Quercus rubra*), with some Black Locust (*Robinia pseudo-acacia*).
- Bulk invasive species include Black Cherry (*Prunus serotina*), Black Locust (*Robinia pseudo-acacia*), Small-flowered Touch-me-not (*Impatiens parviflora*), locally Tree of Heaven (*Ailanthus glandulosa*) and increasingly Giant Goldenrod (*Solidago spp.*).

"Human" point of view:

- Continuous decrease in area size, fragmentation, isolation in the last 150 years.
- Conventional, clear-cutting forest management.
- Urban hiking hot-spot: significant, and increasing, but uneven human impact.

- Inadequate appreciation, management, interest from the locals compared to its utilization.
- Lack of vision, strategy, coordination, and even complete disinterest or conflicting interest of decision-makers and parties with authority.
- Lack of publicity, clarity concerning issues about the forest.

Many (strategically planned) initiatives were made from the NGOs for Sóstó forest, which play an important role in changing the situation for the better:

- Official initiative and professional basis for declaration of protection.
- Important and unique nature conservation research.
- Continuous contact and mediation between nature conservation and forestry bodies.
- NGO participation in planning forestry management.
- Representation of and lobbying for local interest.
- Management of own awareness raising and volunteer collecting, thematic, and interactive homepage building on modern tools.
- Frequent volunteer programmes, combined with the awareness arising and volunteer-based "forest guard programme".

Several beneficial processes have started recently in the life of Sóstó forest:

- Significant shift towards a more ecological forestry management.
- Better dialogue between nature conservation and forestry authorities.
- Increase in the importance and appreciation of civilian expertise.
- Significant volunteering programme among the locals with visible results.
- Better publicity and media attention.

The importance of protecting verges, the most frequent location of ancient loess steppe remnants

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Loess steppe grasslands and shrublands, which are the most important components of loess steppes, are mostly restricted to only a small area. The characteristic locations of these are verges (by roads, rail, boundaries), small ridges emerging from saline areas so-called kurgans, old cemeteries and mottes.

The obvious role of preserving plant species is supported by data. Our research was conducted on the Csanádi-ridge, situated in the eastern part of the Great Plain. This small area is covered with 33 central European vegetation survey quadrats. During the last ten years on the loess ridge, an average of 5.5 protected plant species have been recorded per quadrat (roughly 6.5×5.5 km), of which 1.0 (18.6%) could only be found in connected natural areas (grasslands, forests etc.), 0.4 (6.6%) in arable lands (silt plants) in connected areas and verges, and 4.2 protected species (74.9%!) could only be found in verges. If protection over the area is taken into account, we get the following surprising result: *71.0% of the protected vascular species found in* the quadrats are from *non-protected verges*. On Csanádi-ridge, 90-100% of the protected and regionally protected plant species including *Adonis vernalis*, *Ajuga laxmannii*, *Allium rotundum*, *Althaea cannabina*, *Anchusa barrelieri*, *Brachypodium pinnatum*, *Chamaecytisus virescens*, *Clematis integrifolia*, *Euphorbia glareosa*, *Hieracium umbellatum*, *Inula germanica*, *Lithospermum officinale*, *Oxytropis pilosa*, *Prunus tenella*, *Rapistrum perenne*, *Silene bupleuroides*, *Vinca herbacea* and *Vincetoxicum hirundinaria* etc. are found in verges considering the number of locations or of the plants.

Experience shows that these grassland strips are of importance for the sake of preserving the steppe in other areas of the Great Plain, e.g. in other areas of MarosKörös interfluve, Nagykunság, Upper Bácska, on

Hevesi plain, and across the border in Bánság, Bácska, in Partium, in the south-western areas of Felvidék etc. This nature conservation issue is of great importance in the Pannonic Biogeographical Region. Based on the origin, two main types of verges can be distinguished from each other, differing in nature conservation values. The *primary verges* preserve a thin slice of the original vegetation, whereas the *secondary verges* have been created as a result of ploughing.

Apart from their botanical value, verges have important zoological, wildlife management, landscape history and management values as well. However, only part of these significant natural values are under (any kind of) protection. In general, discontinuing management (mowing) after change of the regime has led to rapid conversion into shrubland, severely damaging (and often completely destroying) the loess steppe associations.

The situation requires action now from nature conservationists. On the one hand, regional protection of primary loess verges should be ensured there are dozens of especially important verges to put under national protection and, on the other hand, management (mowing, removal of shrubs) of the grassland strips should also be done by the authorities.

Lowland sand oak forests are extremely important and vulnerable elements of Pannonian sand forest steppe biodiversity

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As a result of the interaction between transitional forest-steppe climate, relief and substrate, the original vegetation of the Kiskunság sand area in the middle of the Carpathian basin is a fine scale mosaic of different semi-arid mesic and wet habitats. On areas not directly influenced by water, the elements of Pannonian sand forest steppe vegetation dominate this complex. The elevation, geographic location and variation of soils determine the proportion of the elements: Closed oak and poplar forests, open steppic oak forests, juniper-poplar shrub, closed and open sand grasslands. Land use strongly changed the vegetation in the region, reduced in area and fragmented the natural habitats.

The vulnerability and regeneration of forest steppe components are quite different.

Grasslands have higher species richness and regeneration potential than forests, which are the most threatened habitats of the complex. The main goal of our research was to understand the main factors determining the actual biodiversity of oak forests in Kiskunság. Based on habitat maps of the DT-map project we visited all the important stands and collected floristic, coenological data.

Our results show that the remaining oak forests are exclusive refugees for several forest species in the regions. The main factors determining the presence of these species are forest continuity and location along a northwest-southeast climatic gradient. The recolonisation potential of these species is extremely low, secondary forest stands or native plantations are colonized by a few, mainly zoochor or some anemochor generalists. The area of the elements of dry oak forest (*Quercetea*

pubesceni-petraeae) fits well with the climatic gradient; mesic (*Querco-Fagetea*) species survived in the refugees of the gallery forest of the earlier river valley.

Based our results we suggest the protection of the surviving semi-natural oak stands without compromise. The final extinction of these habitats would result in significant biodiversity degradation on a regional scale. Complex biodiversity studies of several taxonomic groups are needed to estimate the potential losses.

Diversity and plant invasion in primary and secondary sand grasslands in Kiskunság

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The mosaic landscape of Kiskunság is heavily influenced by human land-use. The most important processes related to nature conservation are fragmentation of semi-natural habitats, abandonment of agricultural habitats, and plant invasions. In order to plan an ecologically sustainable land-use pattern and reduce the harmful effects of these processes, it is important to know the present state of different habitats.

Here we present the results of a regional survey of plant diversity and invasion in different dry sand habitats. We examined fifteen different habitats (each sampled by 400 m^2 plots) within sixteen 25 km^2 sites dominated by different land-use types that represent the main land-use forms in Kiskunság (natural grasslands and forests, agricultural lands, and forest plantations). Altogether we sampled 605 plots. Old-fields were categorized into three age groups based on aerial photographs: fields abandoned 1-7, 8-20, and 21-57 years ago. The habitats were compared in terms of richness and cover of predefined species groups (all species, neophytes, characteristic species of natural habitats).

We found that the species richness of older old-fields were the same as primary grasslands. Forest species establishment was limited in old-fields; therefore, forest regeneration seems to be unlikely in old-fields on a decadal time scale.

Conyza canadensis, Asclepias syriaca and *Ambrosia artemisiifolia* are the most important neophyte and invasive species in the region. Young abandoned old-fields and non-native forest plantations are

most heavily invaded by neophyte plant species. The dominance of alien species only slightly declined with old-field age and was much higher than in natural grasslands. The finding that open grassland communities recovered on old-field sites, but they also had stable alien components, suggests that these communities could be regarded as a new combination of species, or novel communities, with a considerably high conservation value. However, the primary aim of nature conservation should be the preservation of the still existing natural communities.

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She get her MSc (1999) and PhD (2008) at Eötvös Loránd University, Budapest. As PhD student she got a grant at Dept. of Plant Ecology, University of Groeningen, The Netherlands; where she worked together with Rudy van Diggelen. The title of her thesis is: Study of secondary succession on sandy old-fields in the Kiskunság. *She works as researcher at the Institute of Ecology and Botany, HAS since 2002. Her research topics are:* ***s****econdary succession of old-fields, plant traits in grassland and invasion of ragweed.*

Habitat reconstructions in the LIFE Nature project for the conservation of the Pannonian endemic *Dianthus diutinus*

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[1] Kiskunság National Park Directorate

The main objective of this LIFE-Nature project, started in 2006, is to stabilize the wild populations of Long-lasting Pink (*Dianthus diutinus*) on its most important sites. Recently most of the species' habitats have been classified as forests; however, according to the ecological need of the plant, it is rather related to perennial grasslands. The natural habitats of the species are mosaics of open perennial grasslands and clusters of native trees, where *Dianthus diutinus* mostly occurs in the open grasslands. However, these habitats have been fragmented in the past 50 years mainly due to forestry activity, and the survival of presently known populations is largely dependent on the intensity of actual land-use.

Conservational measures have been implemented on the three most important sites of the Long-lasting Pink (Bodoglár, Bócsa, Csévharaszt) for the enlargement and unification of its present habitats, in order to create habitat networks which are influenced by significantly reduced forestry activity. The availability of interconnected potential habitats with reduced disturbance definitely increases the survival chances of the species in the long run. Habitat reconstructions took place in tree plantations of non-indigenous species with high canopy cover. 27 hectares of European Black Pine plantations have been thinned at Bodoglár, and a further 17 hectares are to be cut in order to create glades. There have been 19 hectares, and 20 hectares of Black Locust forests cut in Bócsa and Csévharaszt respectively to convert these sites into habitats with clusters of native tree species. As a result, the potential area beneficial for *Dianthus diutinus* at the three sites may reach 455 hectares.

The extension of grasslands have increased at Bodoglár after Black Pine thinning, while native poplar shoots appeared at Bócsa where soil conditions are better. In the meantime, the total number of Long-lasting Pink individuals has significantly increased, from 20,000 in 2007 to 80,000 now. However, there is still activity to be done in the future. Shoots of *Robinia pseudoacacia* have to be treated with mechanical and chemical methods, together with the significantly reduced stands of *Asclepias syriaca* in the project sites.

Ex situ propagation and reestablishment of the Pannonian endemic *Dianthus diutinus*. Contribution of the Botanic Garden of the University of Szeged to the implementation of the LIFE06 NAT/H/000104 project.

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Background
D. diutinus is a strictly protected species of the open grasslands in the area between the rivers Tisza and Duna in Hungary. This plant species was the subject of floristic and coenological studies for a long period; the number of plants was monitored occasionally. The generative characteristics and processes were studied in the Botanic Garden of the University of Szeged, where an *ex situ* population was established in 1998. Since then we have studied changes in pollen- and ovule numbers, pollen fertility, seed production, seed germination rate and other traits. It was a great pleasure for us to join the project organized by the Directorate of the Kiskunság National Park on the conservation of the Pannonian endemic *D. diutinus*.

Aims
On the basis of our former experience we undertook the *ex situ* propagation and re-establishment of 15,000 individuals in order to stabilize three natural populations after partial deforestation and the removal of invasive species. The aim was to build up continuity between the natural patches with the help of the newly planted individuals.

Results
Before the start of the *ex situ* propagation we detected genetic heterogeneity of the populations and checked the seed amount in the soil seed bank. Although we could not assign a definite DNA pattern to the populations, there were differences in the genetic heterogeneity. This was taken into consideration during seed collection. Seeds were collected separately from natural populations and the plants grown

from them were replanted in the same area.
The seeds were germinated in light chambers. The germination rate was high, above 80%. The survival of the seedlings was about 70%. One month after germination the seedlings were transplanted individually in growing pots and after two weeks' acclimation in greenhouse were kept in open fields until planting.

The eight month-old individuals were planted in patches. We made an effort to make the pattern of plant patches similar to that of natural ones. Between autumn 2007 and spring 2011 we repeated the planting yearly. This way we could establish a plant stand with different age structure during the project period and could compare the survival of plants in the spring and autumn plantings. In Bócsa 39 patches and 6,558 individuals were planted, in Bodoglár 48 patches and 8,442 individuals, in Csévharaszt 25 patches and 3,904 individuals. The survival rates of the individuals were different: 10-80%, depending on the season and the site.

Discussion
The propagation and planting of *D. diutinus* was successful. More than half of the planted individuals survived for more than one year and also gave rise to more and more offspring. The survival rate depends first of all on the amount of precipitation. The rate of survival is higher in autumn, when the weather is usually wet; however, in a rainy spring the survival success is almost the same.

Professional career of the speaker
Erzsébet Mihalik Ph.D. finished her university studies in 1972 at the University of Szeged as a secondary school teacher of biology and chemistry. After graduation she started work at the Department of Botany and Botanic Garden of the University, and she is working there now, being the director of the Botanic Garden of the University of Szeged. She takes part in education, among others teaching biology students. Her research is the biological background of ex situ plant conservation. She was and is the leader of numerous projects.

A nagykőrösi pusztai tölgyesek történetének térinformatikai elemzése

BÉRCESNÉ MOCSKONYI Zsófia

A Magyar Alföldön található homoki tölgyesek a Kárpát-medence erdősztyepp növényzetének ritka és rendkívül veszélyeztetett társulásai. Jelen munka célja: 1. a nagykőrösi homoki erdősztyepp-tölgyesek tájhasználatának térinformatikai feldolgozása, 2. megvizsgálni, hogy mennyiben magyarázható az erdőssztyepp mai állapota annak múltbeli használatával.

Az erdők történetének feltárása során összegyűjtöttem a rendelkezésre álló térképeket, légifotókat és írásos anyagokat. A rendelkezésre álló erdészeti üzemtervek 1887-től napjainkig széles időszakot fognak át, ezek digitalizálása és megfelelő leíró adatokkal való feltöltése után térinformatikai változás-elemzést tettek lehetővé. Alapadatok az üzemtervi dokumentáció részletes állományleírásaiból, valamint terepi felmérésekből származnak. A változás-elemzéshez három időpont erdészeti üzemtervét használtam fel: 1938, 1966-76 és 1996-2006.

Az elemzések eredményei alapján látható, hogy a jelenlegi leginkább természet közelinek mondható állományok a múltban is tölgy dominálta erdők voltak. Az akác csak ott válik egyeduralkodóvá, ahová tudatosan ezt a fajt telepítik. A fenyő térhódítása a területen napjainkra megdöbbentő méreteket öltött. A hazai nyarak mindhárom időpontban kis elegyarányban vannak jelen. Szintén alacsony elegyaránnyal szerepelnek a nemesnyár fajok is, melyeknek nagyobb arányú ültetése a XX. század első felére jellemző, később a fenyőfajok terjedésével jelentőségük háttérbe szorul.

Az üzemtervek mindegyike megfogalmazza, hogy a területen elsősorban a tölgyesek telepítése ajánlatos, a gyakorlatban a XX. századra a tölgyesek folyamatos és rendkívül nagymértékű visszaszorulása jellemző. Ennek oka, hogy a tölgyesek felújítása a betelepített új fafajokhoz viszonyítva nehezebb volt, több odafigyelést igényelt. Így a század elején a háborúk miatti nagy tűzifaigény, majd az

1950-es és 1960-as évek tervgazdasági elvárásai, napjainkra pedig az egyes gazdálkodók profitorientált érdeke határozta meg az erdők felújításához használt fajokat.

Vizsgálataim alapján megállapítható, hogy a tölgyesek területének folyamatos csökkenése nem elsősorban a vízviszonyok megváltozására, hanem sokkal inkább a gazdálkodási gyakorlat és szemlélet átalakulására vezethető vissza. Mindezek következménye, hogy a korábbi évszázadok nagyfokú erdőirtásai mellett mindig regenerálódni tudó tölgyesek mára szinte már csak nyomokban találhatóak meg.

LIFE-Nature project in Nagykőrös sandy steppic oak stands 2006-2011

György VERŐ

Duna-Ipoly National Park Directorate

The neighbourhood of *Nagykőrös* hosts the remnants of the formerly widespread steppic oak stands in the largest present extent in Hungary. Since the 19th century thousands of hectares of steppic oak woods in the area have been harvested and afforested with non-native species, mainly with *Robinia pseudoacacia, Pinus spp*. and clonic *Populus spp*. The highly fragmented remnants of this had nearly no legal protection up to the designation of the Natura 2000 network in 2004, which made application for LIFE funds possible.

In the proposal, five threatening factors were pointed out:

- spread of invasive plant species
- problems of natural forest regeneration caused by decrease in ground water level or/and excess in game stock
- forest management activities
- fragmentation
- ignorance of society, lack of information

In order to temper the effect of the above factors, the following actions have taken place:

- taking over the restricted right of disposal of the habitats Euro-Siberian steppic woods and Pannonic sand steppes on 175 ha of private land
- continuous negotiations with the forestry authority on conservation measures
- elimination of invasive tree species on more than 400 ha
- artificial forest regeneration with native species on ca. 65 ha
- exclusion of big game species on ca. 260 ha
- establishment of an educational centre and nature trail focusing on environmental education, which became very popular among local residents
- widespread communication on the habitat and accomplished actions

The most important experiences of the project are as follows:

- best practice for the elimination of arboreal invasive species is stem injection
- artificial forest regeneration should not precede the complete elimination of the former non-native forest
- forestry legislation designed for maximising timber production has difficulties in handling nature conservation management activities
- further management issues emerged, such as the potential problem of the expanding indigenous shrub species on the species rich forest edges

Mégis inkább tölgyes erdő?
Természetvédelmi kezelések a Nagykőrösi erdőben

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A Magyar Alföld egyik legnagyobb összefüggő erdőssztyepp tölgyes maradványa Nagykőrös mellett található (pSCI terület). Természetvédelmi kezelése - a Duna-Ipoly Nemzeti Park Igazgatóság irányításával - 2006-tól vett lendületet, egy nyertes LIFE-pályázat keretei között.

Fő kérdésünk az volt, hogy a nagy területeket érintő faállomány-átalakítások mennyire sikeresek, és pontosan milyen hatással vannak a növényzet állapotára.

A változásokat nyomon követő monitorozás mintavételi egységei két fő csoportba sorolhatók:
1) a természeteshez közeli állapotú biodiverzitás-monitoring helyszínek (10 kvadrát), illetve a
2) „kezelés" monitoring helyszínek (20 kvadrát). Előbbihez a legjobb állapotú, reprezentatív állományokat választottuk ki, utóbbiakhoz olyan állományok kerültek, amelyekben erőteljes faállomány-átalakítást terveztek. A felvételezéseket a klasszikus cönológia módszerével végeztük.
A 2007-es alapállapot-felvételezéseket követően, 2008-ban és 2009-ben kezdődtek el a természetvédelmi kezelések, így jelenleg 2-3 éves változásokról számolunk be.

A kezeléstípusok közül most az akácosok (6 db) és fenyvesek (3 db mintavételi egység) átalakítását emeljük ki. A lombkoronaszinti borítás kezdetben (2007) 80% volt, majd a sikeres átalakítások nyomán (2008-tól) az inváziós fajok gyakorlatilag eltűntek. Cserjeszintjüket is szinte teljes mértékben megtisztították az invádoroktól (az akácosokban korábban átlagosan 75%, a fenyvesekben 67%), ám 2011-ben újra 25%-os átlagos borítással vannak jelen.
Általános tapasztalatunk, hogy az utókezelések elmaradása esetén a B-szintben évente mintegy 15%-kal nő az invádorok borítása.

A gyepszintben az agresszíven terjedő inváziós fajok összborítása az utókezelés alá nem került területeken 2011-re a kiindulási állapotnál is nagyobb lett (néhol 25%).

A Nagykőrösi erdő természetközeli állományaiban is mindenütt tapasztalható inváziós fertőzöttség. Az erdőssztyepp- és erdő-karakterű foltokban végzett inváziós irtás eredményes volt. Kevésbé kedvező állapotúak az erdei tisztások sztyepprétjei: 2007 óta mind cserje-, mind gyepszintjükben növekszik az inváziós fajok borítása.

Összefoglalásul megállapítjuk, hogy a Nagykőrösi erdőben végzett természetvédelmi kezelések számottevő állapotjavulást hoztak mind a természetközeli, mind a telepített állományokban. Az invádorokkal erősen fertőzött állományokban azonban, az utókezelések ellenére is, csak időleges állapotjavulást sikerült elérni. Itt tehát rendszeresen, újra és újra el kell végezni az inváziós növényfajok irtását, a programot mindenképpen folytatni kell. A nagykőrösi példa azt is mutatja, hogy a felnyíló erdők és tisztásaik gyepszintjére kiemelten kell figyelni.
Mivel az alföldi, homoki erdősztyepp állományok hazánk legfontosabb természeti örökségei közé tartoznak, kezelésüket a nagykőrösihez hasonlóan átfogó, hosszú távú programok keretében kell megoldani.

Pine plantations on sand have high conservation potential

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Alien pine plantations (*Pinus nigra* and *P. sylvestris*) cover a considerable portion of potential sand steppe and woodland habitats in the Danube-Tisza Interfluve in central Hungary. These plantations were usually established between the 1920s and 1970s, mostly on natural/semi-natural grasslands and grassland-woodland mosaic, but sometimes also on abandoned agricultural land. While habitat conversion to pine plantation rarely occurs these days, existing pine plantations, once cut down, are usually afforested by pine again, since these habitats are considered unsuitable for other tree species (soil humus content is below 1%). However, recent concerns related to fire risk and nature conservation opened up the possibility of conversion of some of these plantations to more natural habitat types. We hypothesize that these pine plantations, compared to abandoned agricultural land or *Robinia pseudoacacia* plantations, have high regeneration and restoration potential because (1) the natural geomorphology is usually conserved, (2) initial conditions are favourable (low density of weeds), (3) soil nutrient content is low, similar to natural habitats, (4) natural vegetation patches as propagule sources are usually present in the landscape.

We studied the regeneration of sand grassland vegetation following a fire in 2007 that killed pine plantations in Kéleshalom Nature Protection Area in the southern part of the Danube-Tisza Interfluve. In an area of ca. 30 ha, we followed the natural succession in 99 permanent plots, 16 m^2 each, stratified according to elevational zones and forest management units. In addition, we experimentally

manipulated pine litter cover and the seed availability of dominant sand grassland species (*Stipa borysthenica* and *Festuca vaginata*) to assess the effect of these factors on recovery.

We found that many sand grassland species were present immediately after the fire, and their number increased considerably during the first four years of succession. Of the dominant sand grassland species, *Stipa borysthenica* increased its frequency quickly (from 15% to 62%), whereas *Festuca vaginata* increased more slowly (from 8% to 31%). *Asclepias syriaca* was already frequent after the fire, but spread only slowly afterwards (from 68% to 77%), while *Calamagrostis epigeios* was relatively rare but spread quickly through clonal growth (from 14% to 48%). In the sowing experiment, both *Stipa* and *Festuca* established in high numbers, and *Festuca* cover exceeded grass cover in control grassland habitats two years after seed addition. Litter removal, and the presence of *Asclepias syriaca* did not considerably affect grass establishment.

We conclude that pine plantations, when they burn down, have high potential to recover into valuable secondary grasslands, but the outcome of the fight between grassland species and weeds including natives and aliens is unpredictable at this stage. Restoration efforts should be built on and facilitate natural regeneration processes; sowing *Festuca vaginata* seeds, for instance, may accelerate the recovery process.

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György Kröel Dulay is a plant community ecologist at the Institute of Ecology and Botany, Hungarian Academy of Science. He got a PhD in Biology at the Eötvös Loránd University, Budapest, in 2002. His major research fields are the ecological effects of climate change and land-use change, plant invasions (such as Ambrosia - Common Ragweed), succession following natural and anthropogenic disturbances, field experiments.

Variation in groundwater levels in old growth oak forests on the Great Hungarian Plain in the last 75 years

Ágnes KISSNÉ UZONYI

Szent István University, Institute of Botany and Ecophysiology

The effects of climate change on forests at the xeric limit were investigated by analysing variations in groundwater levels. To follow up the temporal changes it is necessary to investigate soil, ground water and precipitation as a system, since soil characteristics largely determine rainwater percolation rates and the amount of water held in the soil, and therefore the fluctuation in groundwater levels too. These temporal changes will be comparable with botanical changes to follow the occurrent connection between diversity and variation in groundwater levels.

Sample areas on the Great Hungarian Plain were selected in loess, sandy and saline oak forests, older than 90 years: Berek-Forest near Kerecsend, Ohat-forest near Egyek-Ohatpuszta, Tilos-forest near Újszentmargita, Csere-forest between Hencida and Gáborján, Fényi-forest near Bátorliget and Nagyerdő forest near Debrecen-Pallag Forest Data Resources contains the inventory data of Hungary's forests on “describe papers”. This description shows the identity of property and forestry of the forest area, potential production, forest stand description and conservation of the forest area, together with forest management recommendations. Precipitation and groundwater level records have been gathered form precipitation stations and groundwater fountains closest to the investigated forest stand. The oldest groundwater level data are from 1935. These groundwater data are considered raw data, since they show groundwater levels from the rim of the groundwater fountain and not from the soil surface (mBF); therefore the real groundwater depth was recalculated by subtracting the vertical distance between the fountain rim and soil surface. The frequency of ground water records varied from three times a week to 24 times a day. Monthly sums of precipitation data were used in this analysis.
Potential production and relevant ecological data have been gathered from lab study results, documents and photos taken at sample soil

points of the Forest Conservation Network, from the describe papers of the Forest Data Resources and from previous soil analysis.

The groundwater level data are plotted in the whole timescale and in 10-year intervals on a chart, and the trend line shows the characteristic of groundwater level fluctuation. Hereinafter - owing to non-uniform distribution of data - the average monthly and annual groundwater level data were examined in detail:
- compared with the monthly and annual precipitation amounts for each year,
- the difference between minimum and maximum groundwater levels for each year.

The investigated years were classified according to the average groundwater level depth (deep, medium, high) and annual groundwater fluctuation (very large, large, medium, small).
Groundwater levels only deepened near three forests. Groundwater levels increased in all the other investigated cases.
The results do not support the widespread opinion about a general decrease in groundwater levels in forests on the Great Hungarian Plain.

Author:
I graduated from University of West Hungary, Faculty of Forestry as a forest engineer in 2005. I was an apprentice at Északerdő Zrt for one year, later I was responsible for open-air school programmes. In 2007 I worked at ÉKÖVÍZIG as a forestry administrator. In 2009 I worked at Napkor, where I was responsible for the planning and control of forests and open-air school programmes. I have been a PhD student at Szent István University, Institute of Botany and Ecophysiology since 2010. The topic of my PhD work is the effect of soil-water change on old-growth oak forests in an arid forest zone.

Experiences of root excavations on dry sandy sites

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The survival and regeneration technique of our sand forest-steppe oak stands primarily depends on the available water quantity and its temporal distribution.
The water regime of a site is determined by precipitation, soil water balance soil and groundwater found at an accessible depth.

The Hungarian sand forest-steppe oak stands appear on unfavourable sites. In these areas both the precipitation distribution and the water regime are unfavourable and the groundwater is at an inaccessible depth for the stands. In spite of the fact that a lot of old high quality stems can be found in the investigated forest associations, in our experience the associations' regeneration sometimes encounter unsolvable difficulties. Despite the fact that the rate of growth of the present stand relates to sufficient water quantity, the growth of planted seedlings and sowings is slow in the different forest regenerations. The state of health of the regrowth is bad, the stand becomes thinner and invasive weeds occupy the area after a few years.

We carried out a few root excavations in the area of Ásotthalom to find out the reason for the different growth patterns between the regrowth and the original stand. The investigated root systems of three tree species (Pedunculate Oak, White Poplar and Common Ash) shows that the present old stand did not evolve by means of dry sandy site, but its growth is due to the capability of the covered meadow soil. The partial excavation of the root systems of these three tree species refers to the fact that the water retention effect of the covered meadow soil had been able to correct the unfavourable effects of the dry site conditions for decades.

However, nowadays the image is dual. On the one hand, the older stand lives on the covered meadow soil to a depth of three metres, while on

the other hand the regrowth should cope with the known unfavourable precipitation distribution of the forest-steppe climate on dry and dry sandy sites.

Our investigation shows that under these circumstances we have to choose a regeneration technique that will enable the penetration of the seedling root into the covered soil layers.

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nutrient supplement of energy wood plantations
afforestation problems of salted soils

Expansion of Red Deer and afforestation in Hungary

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Similar to other European countries, population increase and massive area expansion of several big game species has occurred in Hungary over the last 50 years. In Hungary the majority of game management income us provided by Red Deer but this species also is responsible for substantial agricultural and forest damage. As Red Deer adapts well to environmental changes, its area is changing continuously. The expansion of Red Deer raises new management and economic issues awaiting sound solutions.

The rapid expansion of Red Deer in the Hungarian Plain has caused several conservation and management problems. Some authors believe that intensification of agricultural land is responsible. Others emphasize the importance of inappropriate game management or increasing forest cover. For example, based on previous studies, a rapid increase of Red Deer numbers occurred when the proportion of forest cover reached 13-15 % in two Hungarian counties.

In order to understand these processes we investigated the role of forest habitats in detail. A long-term radio telemetry study carried out in three different habitats proved that the majority of Red Deer individuals used the forests exclusively and only the temporal use of agricultural areas was detected. Based on diet analysis forests provide more and better quality food for deer than agricultural land. Finally, a GIS based analysis showed stronger correlation between population size and forest cover or the dispersion of forest blocks than coverage of forest-agriculture complex habitats. The results highlight that forests

are more important compared to agricultural land.
It is forecasted that until 2035 forest cover in Hungary will increase by ca. 25%. New forest areas are expected to become very similar habitats to those of our study sites. Based on our findings we expect that such landscape level changes in forest cover will be followed by pronounced Red Deer population expansion. Because of the extent and potential effects of this expansion, the efficiency of any kind of methods used for population reduction may be questionable. Red Deer can occur far from the forest blocks temporally in vegetation period causing damage in these areas. Consequently, it is necessary to account for the effects of the Red Deer in forestation plans.

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László Szemethy is a wildlife biologist, working as an associate professor at the Institute for Wildlife Conservation of Szent István University since 1986. He has coordinated the work of a research group studying the forest-large herbivores interactions in different habitats since 1992. The research group is a pioneer in the application of state-of-the-art methods, such as radio telemetry, GPS, GIS and micro-histological food analysis. He defended his PhD about the habitat use of Red Deer. He has published over 30 scientific papers and many other publications with his colleagues in the subject.

Feeding habits of Red Deer and game damage in the forests of the Hungarian Great Plain

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Climate change can result in significant modifications in the species composition of temperate forests, including steppic woods. In Hungary, we can expect the areal expansion of species that favour warm environments and tolerate longer dry periods. The spread of the introduced Black Locust (*Robinia pseudoacacia*) into the distribution area of native species (especially Sessile and Pedunculate Oak, *Quercus petraea* and *Q. robur*) is probable. During the ongoing afforestation programme in lowland areas, the establishment of Black Locust monocultures seems to be the most profitable choice for private forest owners in many cases. Red Deer (*Cervus elaphus*), as the most important large herbivore in Hungarian forests, is expected to adapt itself well to these vegetation changes.

In the last decade we collected data about the diet composition of Red Deer and the browsing effect of ungulates in Hungarian forests. One of the main study areas was Hajósszentgyörgy, on the Hungarian Great Plain. Based on our investigations, Red Deer feed mainly on woody plant species from the understory. Black Locust was found as a highly preferred food component. However, the proportion of supplementary food or agricultural crops in the diet of Red Deer was very low. We found that the most preferred species, based on browsing information, were not the dominant target tree species (e.g. oak species), but economically less or not relevant species, e.g. blackberry (*Rubus* spp.) or Elderberry (*Sambucus nigra*). One exception was the feeding preference for Black Locust.

Our findings strongly support the theory that supplementary feeding does not cause local deer “overabundance”. Forest game damage

reflects unbalanced forest-ungulate relationships. A decrease in deer populations (e.g. shooting campaigns) cannot be a tool to reduce this problem alone. Understanding food selection of deer and improving forest habitats by close-to-nature forest management can be a better solution. Areal expansion of Black Locust is an advantageous modification for Red Deer as it shows high diet preference to this plant species. This can cause problems in new plantations, but can decelerate Black Locust penetration into more natural forests. The relatively stable general preferences for different plant species can influence later damage in the changing forest areas. Forest damage is always a hotspot of conflicts. That is why it is an important question for the future is whether the economically important main tree species of the new forests will be more "attractive" to game browsing than oak species and/or the accompanying forest species later. Browsing by ungulates is not just simply damage, but can have positive effects! Selective browsing by deer can also stabilize or destabilize forest ecosystems and can influence biodiversity in both directions. It is necessary to consider the selective feeding pressure and feeding preferences of ungulates in planning future multifunctional forests.

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Krisztián Katona is a wildlife biologist, working as an associate professor at the Institute for Wildlife Conservation of Szent István University since 2000. He is interested in the feeding habits of small and large herbivores (hare, deer) and the interactions between ungulates and vegetation in differently managed forest ecosystems.

Gödöllői-dombság erdőgazdasági táj alkalmazott erdőfelújítási eljárásai - erdőssztyepp klíma

CSÓR Attila, Pilisi Parkerdő Zrt. Valkói Erdészet

Az erdőgazdasági tájban alkalmazott erdőfelújítási eljárásokat alapvetően meghatározó termőhelyi tényezők általában gyenge állományok létrehozását teszik lehetővé. A löszön és a homokon kialakult talajok, az erdőssztyepp klíma és a gyakori aszályok megnehezítik az erdők felújítását és az erdőszerkezet átalakítását. A homokborítású területeken fokozott cserebogár pajor károsítással kell számolni. Az elmúlt 20 évben kezdődött meg e területeken a természetes felújítás kisebb, de növekvő mértékű alkalmazása. A tapasztalatok még nem általánosak, azonban több területen kedvezőek.

A Pilisi Parkerdő Zrt. Valkói Erdészeténél jelenleg mintegy 70 hektáros területen alakítunk át, különböző technológiai megoldások mentén, kultúrerdőket őshonos állományokká.

Eredmények:

A) Teljes talajelőkészítéses technológia pajorkárosítással érintett termőhelyen, árnyalószint alkalmazásával.

B) Szálaló vágásos kísérlet, cseres-kocsanytalan tölgyes állományban, pajorkárosítással érintett termőhelyen, erdőssztyepp klímában.

Rövid ismertető:

A) A teljes talajelőkészítéses szekezetátalakítás (erdőfelújítás) nem újdonság a szélsőséges termőhelyen gazdálkodó szakemberek számára. A nálunk alkalmazott megoldás, véleményem szerint, ki van egészítve néhány egyedi elemmel, amely a tapasztalatok szerint az erdősítés sikerét, a szélsőséges körülmények ellenére (homokon gyakori aszálykár, cserebogár pajor károsítás) jelentősen megnöveli.

B) Természetes folyamatokra alapozott kedvezőtlen termőhelyi viszonyok között lévő erdőfelújítás eredményeinek bemutatása

Előadó:
Csór Attila okleveles erdőmérnök, Pilisi Parkerdő Zrt. Valkói Erdészet erdőművelési műszaki vezető
2000. okl erdőmérnök NyME
2000.-2005. Egererdő Zrt. erdőgondnok.
Feladat: Erdőfelújítási és fakitermelési munka irányítása. Természetes felújítási módok alkalmazása (fokozatos felújítóvágásos és szálaló vágásos felújítás)
2005.- Pilisi Parkerdő Zrt. Valkói Erdészet.
Feladat: Erdőfelújítási munka irányítása. Tapasztalatgyűjtés a természetes felújítási módszerek alkalmazhatóságáról a tájegységben, ezek kipróbálása. Pajorfertőzéssel érintett területek felújítási módszereinek kidolgozása és alkalmazása.

Kocsányos tölgyes állományok megújítása, illetve telepítése a Duna-Tisza közi Homokhátságon erdészeti tapasztalatok alapján

MADÁCSI Sándor

- Történeti áttekintés, a jelenlegi ökológiai helyzet kialakulásának okai

A török kori háborúk pusztító hatása, a legeltetés következményei, az erdők kiirtása miatt, a XVIII. századra a térségben az ember számára szükséges életfeltételek jelentősen leromlottak.

A XIX. század elejére a homok mozgása (homokverés) olyan mértékűvé vált, hogy elengedhetetlen feladat lett a homok megkötése, gyakorlatilag ökológiai katasztrófa sújtott területté vált a térség. Gyors azonnali megoldásra volt szükség, a homok megkötésének a szőlő és gyümölcs ültetvények mellett az erdősítés volt a leghatékonyabb eszköze.
A homok megkötésére legeredményesebben a nem őshonos akác, a XX. századtól a feketefenyő és erdeifenyő jöhetett szóba, emiatt nagy a térfoglalásuk.

Az előzőekben említett fafajok jellemzően a korábbi homoki gyepterületekre kerültek, az egykori tölgyesek helyén nagyon sok esetben mezőgazdasági művelés kezdődött, vagy a gyorsan növő, sokoldalúan hasznosítható akác ültetése vált gyakorivá. A hidrológiai viszonyok jelentősen megváltoztak a XX. században. A felszíni vizek elvezetése, a talajvízsüllyedés következtében gyökeresen más, rosszabb ökológiai viszonyok alakultak ki a Duna-Tisza közi Homokhátságon.

- Lehetséges erdészeti megoldások sikeres kocsányos tölgyesek megújítására, az erdősítések létrehozására, a megváltozott ökológiai körülmények között

A Duna-Tisza közi Homokhátságon speciális erdészeti technológiát kell alkalmazni még természetvédelmi területen is. A homoktalajt itt 50-60 cm - es mélységben meg kell lazítani, mely által a letömörödött homok, meglazul, a növények gyökere számára könnyebben

átjárhatóvá válik. A lazított és a nem lazított talajréteg találkozásánál természetes vízraktározó réteg alakul ki 50-60 cm-es mélységben, ami a nyári száraz időszakban biztosítja a vizet a növényzet részére.

A talajlazítás egyik elengedhetetlen előfeltétele a sikeres erdősítésnek.
A homoki tölgyesekre jellemző fafajokkal és cserjékkel végzett erdősítés után először az erdősítésnek záródnia kell, ami előfeltétele a későbbi fejlődésének.
Az erdősítés 8-10 éves kora után, mesterségesen elő kell segíteni a természetes lágyszárú növényzet betelepedését.

- Gyakorlati tapasztalatok, példák és referenciák, sikerek és sikertelenségek (1-100 év közötti tölgyesek bemutatása)

Előadó:
Végzettség
1990 okleveles erdőmérnök
1993 mezőgazdasági környezetvédelmi szakmérnök
2000 erdészeti növényvédelmi szakmérnök

Beosztások
1990-2001 erdőművelési műszaki vezető, KEFAG Zrt. Harkakötönyi Erdésze
Több mint 1500 ha erdőfelújítás szakmai irányítása, több mint 500 ha erdőtelepítés szakmai megtervezése, pályázata és kivitelezés irányítása
2001- erdészeti igazgató, KEFAG Zrt. Észak-Kiskunsági Erdészet
15000 ha-os erdészet szakmai irányítása jelentős védett területekkel (Kunpeszér, Kunadacs, Nyíri erdő, stb.)

The great capricorn and oaks as promotors for biodiversity

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The great capricorn *Cerambyx cerdo* is a charismatic and endangered beetle listed in the European Union's Habitats Directive. The species is associated with oaks and is supposed to have a keystone function for the saproxylic insect community living on the given trees. We used two approaches in north-western Germany to support conservation measures.

A **habitat suitability model** using presence/absence data shows that the most important parameters (insolation, presence of oak sap, bark depth and the distance from the next colonized tree) are able to predict the presence of the species very well. A spatial validation procedure revealed very similar predictive power, indicating the general validity of our model, at least for northern Germany. Tree-level parameters were shown to have a strong effect on the occurrence probability. To improve them habitat management in the form of semi-open pasture landscapes is recommended from which many other taxa will also draw considerable benefit, including endangered insects (e.g. ground beetles).

Flight interception traps on oaks colonized and uncolonized by *C. cerdo* revealed a significantly more species-rich assemblage on the trees colonized by the great capricorn. Colonized trees also harbored more red-listed beetle species. Our results suggest that an endangered beetle species can alter its own habitat to create favorable habitat conditions for other threatened beetle species. Efforts to preserve semi-open habitats (e.g. steppe woods) with the supposed habitat engineer *C. cerdo* therefore have a positive effect on the diversity associated with oaks.

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POSTERS

Monitoring of the Pannonian endemic *Dianthus diutinus* in the administrative region of the Kiskunság National Park Directorate

Eszter ARADI, Attila GÁL, dr. Éva KOVÁCS, Gyöngyi BATTANCS, András BANKOVICS

Experts of the Kiskunság National Park Directorate have monitored five allotted Long-lasting Pink (*Dianthus diutinus*) populations every three years in the framework of the National Biodiversity Monitoring System since 1998 using high precision GPS tools, together with the point mapping of three sample plots (10m x 10m) of different habitats (1. European Black Pine forest; 2. sand dune side covered with open perennial sand grassland; 3. sand dune side partly in the shade of White Poplars) in the vicinity of Bodoglár. In the framework of LIFE-Nature project for the conservation of *Dianthus diutinus* we could monitor all known populations of this endemic plant in the Danube-Tisza Interfluve on a yearly basis. Besides the effects of habitat change, removal of European Black Pines and Black Locusts, chemical treatments of Milkweed stands at Bócsa and Bodoglár project sites, on grassland regeneration has also been monitored having identified 4-4 sample plots in 50m x 50m large quadrates including 50 micro-quadrates from year to year.

Monitoring data of the last few years show a steady growth in the number of Long-lasting Pinks. The first vegetation period of the project was in 2007 and the number of Long-lasting Pink individuals then was 14,140. In 2008 we counted 19,021, in 2009 36,461 and in 2010 48,208 plants. Field monitoring of *Dianthus diutinus* populations in 2011 have not yet been finished, however we expect 72-78,000 individuals in the populations found in the Kiskunság National Park. The increase is partly due to the positive weather in 2010, an increased level of respect for the species in forest areas and the discovery of a new population. Eradication of Milkweed stands and thinning of European Black Pine forests are considered as successful habitat measures, since grasslands have been regenerated at most places or at least the ratio of natural grass species have increased on the created open surfaces, while invasive plants and weeds appeared after conservation measures were withdrawn. Regeneration after the removal of *Robinia pseudoacacia* stands in between open perennial grasslands and *Junipero-Populetum* is a slower process: *Anthriscus cereifolium* was followed by *Chenopodium album*, then later changed to *Erigeron canadensis*; hence it will take several years before semi-natural grassland inhabits the area again.

What the forests are telling us in Haláp (Southern-Nyírség)

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In the Great Hungarian Plain, where agricultural utilization is wide-ranging, semi-natural forest fragments are unique, and because of their small extension are vulnerable. They provide habitat for many rare species; therefore they are worth having to a greater extent. The oak and gallery forests of Haláp (Southern-Nyírség; N 47.55, E 21.82) and their botanical values are in extreme danger: the once continuous woody vegetation is now fragmented (0.8-6.3 ha); adventive species spread quickly in the forest fragments that have been converted by forestry cultivations. The mature oak stands are close to felling.

Our goals are to uncover and make an coenological survey of the flora those forest fragments (100K, 114 D, 97 I, 98 F, 117 B, 97 M, 117 D, 97 E, 97 G, 97 C, 114 F, 104 F, 104 B, 105 C), where botanical values are expected according to previous knowledge. We are trying to find out whether the forest fragments under uniform forestry cultivation have coenological differences, such as earlier when there were differences among these fragments for edaphic reasons. On the basis of the species lists we did cluster analysis (SYN-TAX 2000 programme). The GPS co-ordinates of the rare species were also set.

In the dendrogram showing the results of the cluster analysis, the *Convallario-Quercetum roboris* and the *Melampyro debrecenienseQuercetum roboris* stands separate with high dissimilarity from the *Festuco rupicolae-Quercetum roboris* association. The forest fragments containing many adventive and weed species with high-level similarity on the basis of their species stock; therefore they are close to each other in the dendrogram independent of degradation of association.

The surveyed forest fragments had been homogenized by forestry cultivations after draining; they were changed to a smaller extent because of succession changes due to water deficiency, with a contribution from the spread of non-indigenous tree species from adjacent areas. From the coenological table of the forest fragment it can be seen that the homogeneously treated areas contain mainly two or three associations: *Convallario-Quercetum roboris*, *Melampyro debreceniense-Quercetum roboris*, *Festuco rupicolae-Quercetum roboris* (of which the latter is the rarest). Some associations were afforested by forestry cultivation or through natural succession (e.g. *Magnocaricion*); their changed, poorer forms can be found as well in the forest fragments.

The fragments surveyed by us can at most be thought semi-natural due to their protected plant species and the remaining core areas. The key environmental problems are drainage, clearing, plantations with foreign species, invasive species and over-stocked game. These problems can be partly treated.

Historical woodland cover of the Kiskunság sand region, Hungary

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The past extent of natural woodland-cover of the central lowland basin of the Pannonian Biogeographical Region is still not clear. Currently we can hardly find the remains of the natural forest-steppe woodlands in this region (less than 3,500 ha). Our aim was to detect how the woodland cover changed in the past. What kind of historical and social event generated processes which altered the vegetation in the past? Was there any sand movement in historical times? In which period did the natural oak woodlands disappear from the sand dune areas? When did Juniper-Poplar steppe-woodland become the dominant and climax vegetation on dry sand dunes?

Our main data sources were the I. Military Survey and its country description, the diary of botanist Paul Kitaibel, 19th century written sources of botany, silviculture, and geography, present field data, oral history and further topographical sources. An 18th-century habitat map was reconstructed for 780,000 ha (Kiskunság sand ridge) too.

We found differences in the present and past vegetation, and the historical land-use between the northern and southern parts of the region as well (listed on the poster). In the 18th century the landscape was almost treeless and abandoned, only some remains of former woodlands were left. Extensive grazing sustained the open sand grasslands in the region. The effect of grazing reinforced by strong wind resulted in catastrophic sand storms and mobilization of the sand. Juniper, which is nowadays the most widespread shrub in the Kiskunság region, was very scarce two hundred years ago, but the area was rich in other shrub species. As a result of land use change

generated by the European sheep boom, cattle grazing was replaced by sheep pasture in the first part of the 19th century.

This generated intensive shrub encroachment starting in the sand region in the middle of the 19th century with White Poplar and Juniper (in the northern part) and White Poplar and Hawthorn (in the southern part).

Carbon sequestration, ecophysiological and growth characteristics of *Syntrichia ruralis* moss species in Pannonian sand grassland

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A great part of the grass-covered areas in Hungary is constituted by semi-arid sandy grassland communities. Bryophytes are the primary form of carbon storage in many ecosystems. Because they are a prominent feature of many forest and grassland types they can make an important contribution to their carbon balance. For example, in Pannonian sand grasslands the so called “black spots” are almost mono-dominantly occupied by mosses.

The main goals of this study were to describe the water and CO_2 fluxes of the desiccation tolerant ectohydric moss *Syntrichia ruralis*, to determine its main carbon sink period and to establish the yearly carbon budget. The time-course investigation of daily change in water content shows that the water content of moss cushions is incessantly changing between end values determined by the given circumstances, which generates a periodically alternating diurnal solute movement inside the shoots throughout the year. Both the direction and the extent of water vapour flux are primarily determined by the sign and extent of net radiation.

Seasonal change in diurnal CO_2 exchange of *S. ruralis* support suggests that winter and early spring are more favourable than the summer period. The results of daily carbon fixation verify that the photosynthetic activity and production of *S. ruralis* considerably depend on microclimatic conditions. The possibility of remoistening and a longer wet state is higher in late autumn, winter and early spring; especially so in winter, when regeneration is very rapid following an occasional desiccation. The seasonal changes in daily carbon-balance also indicate that the above 4-5 months were the most favourable for *S. ruralis*. In winter the C-balance is significantly influenced by snow cover. Examining the light transmission through the snow layer and the effect of its thickness on CO_2 assimilation, we found that *S. Ruralis*

was able to photosynthesize in under 15 cm of thick snow cover on clear days. In summer, the moss carpet of the community remained mainly dormant and the daily C-balance started to increase again in October. The daily C-balances of *S. ruralis* were positive during the year, except on those days, which the mosses spent dry, in a metabolic inactive state.

The highest rate of CO_2 assimilation was observed in late autumn and winter. The estimated yearly carbon gain and the observed growth in length through three years confirm that *S. ruralis* could achieve positive yearly carbon balance in the period between 2000 and 2003. The extent of carbon gain is dependent mainly on the length of the favourable period since the carbon loss of *S. ruralis* is negligible during the dry periods. The cushions prove to be an outstanding carbon sink just as the vascular species of the grassland. Components of the semi-arid sandy grassland vegetation contribute together in close co-operation and supplementing each other to the assimilatory capacity of the community.

Plant extracts as herbicides

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The use of herbicides nowadays composes a large share of the cropping system. In Hungary, 60% of the total use of pesticides is herbicide. Chemicals may be harmful to environment and more and more weeds are becoming herbicide resistant.

Worldwide there is a large interest in natural products and compounds which do not pollute the environment and can be produced economically. In addition there are several places (protected areas, urban areas, etc.) where herbicide-use is forbidden or unwanted.
Secondary metabolites have been isolated from numerous plants which we can also call allelopathic compounds.

Large amounts of allelopathic substances dissolve well in water and they are potential inhibitors. Compounds which principally cause allelopathic effects are phenoloids (polyphenol, phenolic acid), terpenoids (monoterpene, diterpene, sesquiterpenoid lactone, triterpenoid, saponin), polyine, alkaloid, cyanogenic glc, glucosinolate (SZABÓ, 1997).

There are many examples of natural products used as fungicides, insecticides or other pesticides; but there is much less study in reference to herbicides (PACHLATKO, 1998). The aim of this paper is to summarize the results of research regarding allelopathic plant extracts.

Examination of the development of *Lychnis coronaria L. (DESR.)* in different media

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The *Lychnis* genus is part of the carnation family *(Caryophyllaceae)*, which has two native and protected species in our country, Rose Campion *(Lychnis coronaria L. (DESR.))* and Ragged Robin *(Lychnis flos-cuculi L.)*. The Hungarian occurrence of the *Lychnis coronaria* can be found mostly in xerothermic oak forests, in karst bush forests, and sporadically in rocky scrubland.

The aim of our experiment was to determine the optimal conditions for Rose Champion's generative propagation. During the examinations we followed the development of experimental plants in four different media. The media used were: Novobalt peat; river sand; a 1:1 mixture of Novobalt peat and gritty granite; a 1:1 mixture of Novobalt peat and river sand. We put the plants from cell trays into 12 cm diameter pots, and started measurements. We did root classification at the start of the experiment, directly before pot implantation, as well as the close of the studies. During root classification we defined three different groups: the first group have completely interwoven rootball, the second group have semi-interwoven rootball, and the third group have disintegrating rootball.

On the first measurement date, the plants grown in the 1:1 mixture of Novobalt peat and gritty granite and the plants grown in the 1:1 mixture Novobalt peat and river sand were uniformly classified to the first group. On the second measurement date the results changed; the plants grown in Novobalt peat and the plants grown in the 1:1 mixture

of Novobalt peat and gritty granite were in the first group, while the plants in the 1:1 mixture Novobalt peat and river sand were now in the third group.

On the first measurement date we measured the leaf area index (LAI) of the individuals; we experienced the highest average value in the case of the plants which grew in the 1:1 mixture of Novobalt peat and river sand (4,112 mm^2), but the plants grown in river sand were the most uniform.

On every measurement date we measured the leaf number of the stems, and the bush diameter. The individuals grown in different media showed significant differences. While the plants which grew in river sand had on average 13 leaves and their bush diameters averaged 8.56 cm, the plants which grew in Novobalt peat had on average 21 leaves and 18.68 cm average bush diameter.

Based on our results we concluded that the optimal media for the plant is Novobalt peat; it measured the highest values and was the most uniform substance.

Author:

Nóra Koppány is a graduate gardening engineer; she graduated in June 2010 from Corvinus University of Budapest in Horticultural Science. She wrote her thesis about the cultivation feature and the application of herba log the Telekia speciosa (SCHREB.) BAUMG., from which several national and international publications were published.

Since September 2010 she has worked at the Department of Floriculture and Dendrology within the Corvinus University Horticultural Sciences Graduate School as a state-funded PhD. student. The theme of her doctoral dissertation is the ex situ gen conservation of Lychnis coronaria L. (DESR.). Furthermore she has investigated the Telekia speciosa (SCHREB.) BAUMG., and is researching in vitro and in vivo propagation of Clematis integrifolia L:, which is also a native and protected plant in her country.

Biodiversity in the Homokhátság Region

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The low intensity grazing livestock farming systems in the Homokhátság Region harbour rich and unique biodiversity. We investigated the relationship of biodiversity indicators (species and habitats) with farming. Species diversity indicators were: flowering plants (weeds), *Araneae* (spiders) and *Apidae* (wild bees). Habitat diversity indicators included habitat type patch species richness, diversity, vegetation composition, linear elements and grassland quality. Eighteen farms were selected, and *ca*. 150 sites for botanical and zoological sampling were determined across the most characteristic linear and patch habitats. Vegetation was surveyed in June 2010. Spiders were sampled by D-vac (suction sampling) three times during the summer. Bees were netted while walking along transects three times during the summer. Costs associated with the survey of farming and biodiversity indicators are recorded and will be analysed. Based on a standardised questionnaire, detailed interviews on farm management indicators were conducted in August and September 2010 to explore agricultural, economic and agro-environmental characteristics.

Private and public socio-economic benefits and non-monetary value of biodiversity promoted by low-input farming will be assessed through qualitative methods including semi-structured interviewing and focus groups among farmers.

The research leading to these results has partly received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under the BioBio: "Indicators for biodiversity in organic and low-input farming systems" Project, grant agreement n227161.

Integrated hyperspectral and LIDAR technology to evaluate the condition of the 'Debrecen-hajdúböszörményi tölgyesek' (Debrecen-hajdúböszörményi oak forests) Natura 2000 site

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NATURA 2000 sites are outstanding from the land use and ecological point of view. They cover more than 20% of our country. With established and applied monitoring strategies of Debrecen oaks we can acquire accurate data and determine the natural values, conditions, natural processes and the changes of protected areas. Therefore we have surveyed the 'Debrecen-hajdúböszörményi tölgyesek' NATURA 2000 site, which is situated in the Pannonian biogeographic region. The area of this Natura 2000 site is 5,634.62 hectares, which is a part of the 'Debreceni Nagyerdő Protection Area' and the 'Monostori erdő Protection Area'. For the complex spatial and temporal evaluation it is necessary to use such instruments with which we could in real time determine the natural condition of forests or the geometric structure of standalone trees. In this context we have investigated two remote sensing instruments (AISA DUAL hyperspectral camera and Leica ScanStation C10 laser scanner), which are rare in conservation applications. The AISA DUAL hyperspectral camera is capable of taking images of the reflection-changes on a given wavelength. The changing of the reflectance of each point of the surveyed object (changing of incoming light from the sun) could be drawn depending on the wavelength. With the camera we can investigate the whole vegetation, or recognize the health, water and nutrient supply of just one individual tree. Airborne hyperspectral surveying was done in this year over about 3 km^2. The hyperspectral camera contains two sensors: AISA EAGLE and AISA HAWK. The two hyperspectral sensors are assembled in a house; therefore it is known as ASIA DUAL system. The EAGLE camera takes images in visible and near infrared range, while HAWK operates in the middle infrared range. The full range is 400-

2,450 nm (EAGLE: 400-970 nm and HAWK: 970-2,450 nm), which can be set 1.25-10 nm wavelength band and maximum 498 spectral channels. The ground resolution is 0.4-3 m (with plane). The spatial resolution of the hyperspectral image of the NATURA 2000 site is 1.5 m, the spectral resolution is about 4.1 nm, and the image contains 359 bands. With the use of the camera we could investigate some vegetation characteristics.

A Small part of the 'Debreceni Nagyerdő Protection Area' was surveyed by terrestrial laser scanner too. The laser beam scans the investigated area, and gives the possibility for fast and accurate data acquisition and 3D modelling from the surrounding area. The Leica ScanStation C10 laser scanner was provided by the University of West-Hungary, Faculty of Geoinformatics. The measurement of laser scanner is based on time-of-flight (TOF) method. In a given medium, light waves travel with a finite and constant velocity. Thus, the measurement of time delays (also known as time-of-flight) created by light travelling in a medium from a source to a reflective target surface and back to the source offers a very convenient way to evaluate the range. The fast measurement provided a high scan rate (50,000 point/sec). The resolution of the image is 5 mm on 10 m, meaning we can make calculations even on leaf level with high accuracy and we could recognize the geometry of the trees. If we know the canopy extension, we can calculate the leaf-area-index (LAI). The LAI is an important index because of CO_2 flux, transpiration and interception. We could also measure the undergrowth, so we can model the effects of fires too.
The aim of FP7-CHANGEHABITATS2 is to develop operable, time and cost effective procedures, and (software) solutions for monitoring habitats using innovative airborne data acquisition techniques. Our research was carried out in the framework of FP7 IAPP Marie Curie CHANGEHABITATS2 project supported by European Union.

Özönnövények visszaszorítása a Csévharaszti Homokvidék Natura 2000 területen

SIPOS Katalin, Duna-Ipoly Nemzeti Park Igazgatóság

A Csévharaszt térségében fennmaradt Duna-Tisza közi nyáras-borókás élőhely maradványok két ütemben kerültek védelem alá. A Csévharaszti Borókás Természetvédelmi terület 1939 óta áll országos védelem alatt és megközelítően 90 hektár kiterjedésű, nagyrészt összefüggő homokpusztagyep - nyáras-borókás élőhelymozaik megőrzését biztosította (a védett terület teljes kiterjedése 128,8 hektár, de részét képezik telepített akácosok is). 2004-ben Natura 2000 természetmegőrzési területként a védett területen kívül kijelölésre kerültek a környezetében megmaradt további nyáras-borókás élőhelyfoltok is, melyek mára igen erősen fragmentált állapotban, telepített akácosokkal és fekete fenyvesekkel szabdalva maradtak fenn.

Ami a térség összes természetközeli élőhelyfoltját egyaránt jellemzi, az az aktív természetvédelmi kezelés hiánya, melynek következtében az özönnövények elterjedtsége mára komoly mértéket öltött. A Csévharaszti Homokvidéken legnagyobb problémát okozó fajok az akác (*Robinia pseudo-acacia*), a kései meggy (*Prunus serotina*), a selyemkóró (*Asclepias syriaca*) és a bálványfa (*Ailanthus altissima*). A természetes vegetáció maradványfoltjait sok ezer hektáros, idegenhonos faültetvény veszi körbe.

A jelenlegi helyzetben aktív természetvédelmi kezeléssel három fő feladatot kell megoldani. Ezek sürgősségi sorrendben az alábbiak:
- a természetes élőhelyfoltokról az özönnövények teljes eltávolítása komoly mechanikai zavarás nélkül;
- a természetes élőhelyfoltok közötti kapcsolat helyreállítása, az izolálódott foltok összenyitása az idegenhonos erdők átalakításával (erősen nyílt, ligetszerű nyarasok);
- az összenyitott természetes élőhelyfoltok körül őshonos nyárültetvények kialakítása, melyek a környező idegenhonos erdőktől elszigetelik a belső kapcsolataiban helyreállított magterületet.

2007 és 2011 között LIFE Nature projektfinanszírozással (LIFE06 NAT/H/000104) nagyrészt megvalósult az értékes élőhelyfoltok özönnövény mentesítése és megkezdődött az élőhelyfoltok közötti

kapcsolat helyreállítása. A projekt keretében összesen 116 hektáron zajlott kezelési munka. A taposási kár és a talajfelszín károsodás minimalizálása érdekében a fent felsorolt özönnövények mindegyike esetében vegyszeres technológiát választottunk:

- akác és kései meggy esetében az első beavatkozási évben (2008) tőelválasztás történt és a vágásfelületek kenése Garlon szerrel, az utókezelés során (2009-2011) nyári időszakban a sarjak kétszeri eltávolítása (sarjleverés), majd augusztus-október között hatáspermetezés (akác esetében Lontrel 300 szerrel, kései meggy esetében Medallon Premium szerrel);
- bálványfa esetében az első beavatkozási évben (2008) tőelválasztás történt és a vágásfelületek kenése Garlon szerrel, az utókezelés során (2009-2011) a sarjak pontpermetezése évente 3 alkalommal Banvel szerrel
- selyemkóró esetében minden évben 3 alkalommal (kettő a virágzás előtt) pontpermetezés történt Medallon Premium szerrel.

A beavatkozás tapasztalatai az alábbiakban foglalhatók össze:

- a kis elszóródású vegyszerhasználat az özönnövények visszaszorítására jól alkalmazható, a beavatkozási területen a természetes élőhelyeken mikrofoltokban lehetett csak megfigyelni vegyszer miatti károsodást (sárgulás, kiszáradás);
- a tőelválasztás és tuskókenés technológiájával az akác esetében kevés, vagy közepes mennyiségű gyökérsarj jelent meg, míg a bálványfa esetében kefesűrűen erőteljes sarjképződés mutatkozott, ezért bálványfa esetében kizárólag injektálással szabad megkezdeni a visszaszorítást, tőelválasztás élő egyedeken nem alkalmazható;
- a selyemkóró túlélési képessége igen nagy, a vegyszeres kezelés miatt leszáradt levelű hajtás némi csapadék után képes deformált, de terméképzést produkáló csúcshajtást hozni, ezért indokolt a nagy ismétlésszámú pontpermetezés alkalmazása;
- a kezelések sikeressége 4 év alatt megközelítően 90%-os (további egy év utókezelés még szükséges lesz), a kezelt egyedek sarjképzése miatt invazív fajok visszaszorítását csak úgy szabad megkezdeni, ha a teljes kezelési folyamat végrehajtása biztosítható.

A projekt megkezdésekor a teljes beavatkozási terület a Nagykunsági Erdészeti és Faipari Zrt. kezelésében állt, a beavatkozások megvalósításában aktív együttműködő szerepet vállaltak. A projekt során folytatott szakmai egyeztetések eredményeként a NEFAG Zrt. a projekt célterületén kívül is megkezdte a feketefenyvesek átalakítását őshonos nyarasokká, ezzel a puffererdők létrehozása megindult.

Radiocarbon-dated paleobotanical changes on a lake and peat sediment sequence from Kolon Lake in the Great Hungarian Plain during the last 25,000 years

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As shown by our chronological results, the lake basin must have emerged about 25,000 cal BP in an abandoned ice-age channel of the river Danube. Significant amounts of calcareous wind-blown sands were deposited into this abandoned paleochannel. This condition must have developed between 22,000 and 20,000 cal BP years. The lake itself was fringed by open parkland vegetation composed of pine stands and open grassy spots with *Artemisia*. This period was again followed by intense sand deposition. There is a marked change at 17,900 cal BP in the geology characterized by the accumulation of lacustrine deposits leading to the development of silty, minerogenic lacustrine layers. The basin was fringed by mixed sedge-reed aquatic vegetation during this period. At a larger distance from the shore mixed open parkland emerged harbouring stands of birch and pine. This oligotrophic lacustrine system was gradually transformed into a carbonate-rich, mesotrophic lake at around 11,600 BP. This system was characterized by intense accumulation of lacustrine marls embedding *Chara* fragments as long as 9100 cal BP. This phase was characterized by the advent of thermophylous and mesophylous

woodland elements into the area (oak, elm, ash, lime and hazel) giving rise to a highly mixed deciduous woodland with stands of pine around the lake. The basin itself was fringed by reeds, sedges and bulrush.
The accumulation of lacustrine marls lasted from the terminal part of the Ice Age till the first part of the Holocene. There is a marked change in the sedimentology at 9100 cal BP characterized by the complete cessation of marl deposition and the initiation of peat accumulation. As shown by the plant macrofossils, this period was marked by the advent of reed, sedge, bulrush and other tussocky elements covering almost the entire lacustrine basin. The period of the Holocene climatic optimum here witnessed the evolution of a peatland in the area. The initiation of peat formation was accompanied by a sharp increase in the proportion of pollen grains of deciduous trees and bushes, marking the closure of woodlands and the complete disappearance of coniferous elements at around 11.000 cal BP. The areas located at a larger distance from the lakeshore were hosting a steppe-forest - steppe type vegetation.

Signs of early human influence in the area could be inferred at 7500 cal BP, marked by a sharp rise in the concentration of cereal and weed pollen grains, as well as the intense shoaling of the lake basin as a result of accelerated soil erosion in the adjacent areas. As shown by the records of flue-ash, intensive deforestation took place in the vicinity of the lake at the turn of the Copper and Bronze Ages, resulting in the creation of open grasslands with Artemisia from about 3600-2600 BC. These conditions were preserved as long as the 19th century, when as a result of the river regulations and drainage measures a major part of the area dried up.

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Advanced monitoring technology development in NATURA 2000 forest sites of the Pannonian biogeographic region

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Oak-hornbeam forests and thermophilous oak woods took over in the drier area in the Pannonian biogeographic region. Nowadays, the forested areas are at around 20 % of the whole area of the country. These forests are quite important in the framework of the NATURA 2000 network too. NATURA 2000 sites cover over 20% of Hungary.
In "*Debrecen-hajdúböszörményi tölgyesek"* (site code: HUHN20033) NATURA 2000 site field measurements were carried out by the University of Debrecen. *Debrecen-hajdúböszörményi tölgyesek* area is 5,634.62 ha. The main habitat classes are broadleaved deciduous woodland and artificial forest monoculture (e.g. Plantations of poplar or other trees).

The main impacts in Debrecen-hajdúböszörményi tölgyesek are replanting, forestry clearance and hunting which are high influential. The impact of these activities on oak tree habitats is detectable by laser-scanning and hyperspectral flights technology.
On this site, laser-scanning and hyperspectral flights were carried out during the summer of 2011 to detect human disturbances and impacts in oak woods. This new technology was used for the first time and is an advanced monitoring technology development.

In 2006, an AISA DUAL airborne hyperspectral camera system was installed and operated in cooperation the University of Debrecen, AGTC, Institute of Water and Environmental Management with the

Mechanization Institute of Agricultural Ministry in Gödöllő. The hyperspectral sensor consists of one optic, one spectrograph and one digital cam. The two hyperspectral sensors are assembled in a house; therefore it is known ASIA DUAL system. The Eagle camera takes images in visible and near infrared range (VNIR), while Hawk operates in the middle infrared range (SWIR). By means of establishing of two cameras a DUAL system were installed. The full range is 400-2,450 nm, which can be set 1.25-10 nm wavelength band and maximum 498 spectral channels. Two sensors can also be operated separately, so it makes possible to utilize the wider wavelength of higher resolution (1,024 pixels) VNIR sensor.

Leica ScanStation C10 laser scanner includes scanner, tilt sensor, controller, data storage, auto-adjusting video camera and laser plummet. During measurement process a short laser pulse is emitted towards the object and is reflected on its surface; a part of the reflected radiation comes back to the scanner where it is detected by a sensor. As the light-speed is well known and time elapsed between emission and reception of the pulse can be inferred from a different magnitude measurement.

This technology will be used in the CHANGEHABITAS_2 project. Information about the field portable laser scanning technology and other technological details will be published in the poster section.
Our research was done in the framework of FP7 IAPP Marie Curie CHANGEHABITATS_2 project supported by European Union, which is gratefully acknowledged. The project started in January 2011.

Seasonal changes in weed vegetation on arable Pannonian sand lands in Hungary.

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Coenological records were made in Hungary's main sand agricultural habitat types. The coverage of each species in monthly changes and their expansion and aggressive expansion can be tracked from the edge to the inner area of rural areas.

Monthly tests were done in autumn and spring. During recording percent estimation methods were applied. Sample areas were identified randomly and theses were modified 1x1 m quadrats according to NÉMETH (2002). From each plot, six boxes were tested. Both edges and infield areas were assessed in 3-3 replicates. Recordings were made in 2010 and 2011, but former data were also used in order to review the rating of the last 50 years.

Results clearly separated the weed species of sand from the loess areas. Besides common species, incremental plants also appeared. Monthly recordings drew the phenological phases of species. Weed vegetation changes can be tracked and the results help to improve defence efficiency against weeds.

This research has partly received funding from the project "GOP-1.3.1-08/1-2008-0057" "Developing a mobile environmental measurement system".

Conservation status of Pedunculate Oak forest stands in Peszér forest

Dr Csaba VADÁSZ, Bence BOLLA, Zoltán FILOTÁS

Forest stands in Peszér forest cover approximately 1,200 hectares and are characterized by extreme variability in both species composition and vegetation structure, which reflects the variable hydrologic and edaphic conditions. Peszér forest is part of the Natura 2000 network, hosting a wide range of habitats of community interest, such as Pannonian sand steppes, *Molinia* meadows on calcareous, peaty- soils, Pannonian inland sand dune thickets and Euro-Siberian steppic woods with Pedunculate Oak. The preservation of these habitats is the responsibility of the Forestry Companies and the Nature conservation authorities.

Euro-Siberian steppic woods with Pedunculate Oak are amongst the most threatened habitat types. There was a continuous decline in both the economic value and the conservation status of Peszér forest since the introduction of systematic forestry till 1996, when clear cuts of Pedunculate Oak woods were finally been stopped. Based on archive documentation, during the second half of 20th century most of the former oak woods were transformed into Black Locust tree plantations and afterwards into Pine woods or - after trying to renew the Black Locust tree stands by root shoots these forest stands became unsuitable for producing wood material. Local experience supports the fact that Pedunculate Oak forests cannot be renewed by the commonly used intensive methods (i.e. by clear-cut deep ploughing planting Pedunculate Oak saplings). Only silviculture based on natural forest dynamics can guarantee the preservation of these Natura 2000 habitats, and can stop the decline in the quantity of the living wood material.

Our findings support the fact that the formation of a Pedunculate Oak forest stand requires a kind of pre-forest, which can be a bushy habitat or a forest stand of pioneer soft woods, e.g. Poplar trees or Birch. It can be clearly seen that in the remaining Oak forest stands, solitary trees can provide enough acorns for natural renewal processes, even in those

stands which are 4-500 metres away from these Oak stands. The most important goal for the near future is to work out, test and apply a new, site-specific silvicultural technology that provides society with the usual economic and social services (i.e. producing firewood and the possibility of employment for the local people) not only in a short- or medium term period, but it also should guarantee the preservation of the forest as a complex natural resource for a long-term period as well.

Lime formations of biogenic origin in the soils of forests in the Danube-Tisza Interfluve

Csaba VADÁSZ, András MÁTÉ, Richárd DÓKA

Soils of forest stands located at the Danube-Tisza Interfluve are characterized by relatively little humus and high concentrations of calcium. Average annual precipitation is less than the amount of the potential evapotranspiration, so an expressed bottom-up movement of the soil liquid can be observed in these soils during the vegetation period. One of the consequences of this fact is that the soil liquid can bring excess calcium to upper two soil layers (A and B).

Grains of different size and other formations with characteristic shape with extremely high concentration of calcium can be frequently found at the lower limit of the A layer. We attribute this phenomenon largely to biotic processes. We believe that these grains are built from the excess calcium which is not absorbed by the roots. In this way a calcium-rich layer can be formed around the roots, which can remain in the soil for a longer period after the death of the plant. Another potential consequence of this process is that living roots can lose their absorbance capacity because of this layer, which is not 100% permeable for the soil liquid. We believe that latter phenomenon is one of the potential explanations why the stands of intensively growing tree species (such as the Black Locust Tree) cannot be renewed from root shoots.

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