GYEPGAZDÁLKODÁS ÉS TERMÉSZETVÉDELEM
GRASSLAND MANAGEMENT AND NATURE CONSERVATION

Konferencia összefoglaló
Conference proceedings

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PROGRAM

2013. február 25. hétfő

9.00 Regisztráció

9.30 Megnyitó: Dr. Persányi Miklós a Fővárosi Növény és Állatkert igazgatója

Plenáris előadás
9.40-10.00: Bartha Sándor, Zimmermann Zita, Házi Judit, Juhász Melinda, Komoly Cecília, Szabó Gábor, Horváth András, Molnár Zsolt: Are Hungarian sand grasslands threatened by climate and landuse changes?

Szekcióelnök: Penksza Károly

10.05-10.20: Erdős László, Bátori Zoltán, Körmöczi László: Gyep-erdő kapcsolatok térben és időben: természetvédelmi vonatkozások – Grassland-forest relations in space and time: implications for conservation

10.20-10.35: Valkó Orsolya, Török Péter, Kelemen András, Deák Balázs, Miglécz Tamás, Albert Ágnes, Tóth Katalin, Tóthmérész Béla: Spontaneous regeneration of extensively managed lucerne fields – A promising example of grassland recovery

10.35-10.50: Deák Balázs, Valkó Orsolya, Török Péter, Kelemen András, Miglécz Tamás, Tóth Katalin, Tóthmérész Béla: Using low diversity regional seed mixtures in large-scale grassland recovery and weed suppression – A promising example from Hortobágy National Park

10.50-11.05 Hozzászólások

11.05-11.20 *Szünet*

Szekcióelnök: Bartha Sándor

11.20-11.35: Komoly Cecília: Results of a small scale grassland restoration experiment in the Great-Plain

11.35-11.50: Ing. Vlasta Ondrejka Harbuľáková., doc. Ing. Martina Zeleňáková: Technical measures increasing the river bank protection and stabilization

11.50-12.05: Martina Kudličková, Jitka Fialová, Hana Kubíčková, Miloslav Šlezingr: Sinkhole care in the Moravina Karst

12.05-12.20: Lenka Zvijáková, doc. Ing Martina Zeleňáková: EIA in V4 countries

12.20-12.35 Hozzászólások

12.35-14.00 Ebéd

A környezeti hatásvizsgálat módszertani fejlesztésének lehetőségei az Ipoly teljes vízgyűjtő-területének egységes vizsgálata alapján

Szekcióelnök: Verrasztó Zoltán

14.00-14.15: Brezsnyánszky Károly**:** A Föld Bolygó Nemzetközi Éve célkitűzéseinek érvényesülése az Ipoly-projektben

14.15-14.30: Németh Róbert: A térképi döntéstámogatás a környezetvédelem gyakorlatában

14.30-14.45: Gercsák Gábor: GIS for environmental monitoring system of the Ipoly (Ipel') River basin

14.45-15.00: Nyuli Éva**:** Animációs térképi modellezés az Ipoly vízgyűjtő területén várható klímaváltozás hidrológiai következményeiről

15.00-15.15: Penksza Károly, Házi Judit, Pintér Balázs, Laborczi Annamária, Nagy Anita: Szélsőséges vízjárási években végzett élőhelytérképezés az Ipoly vízgyűjtőjében

15.15-15.30: Cser Balázs, Tyahun Szabolcs: A makroszkopikus vízi gerinctelen fauna vizsgálatának eredményei az Ipoly folyó vízgyűjtőjén

15.30-15.45: Bakó Gábor**:** Távérzékeléses adatgyűjtés komplex környezetinformatikai rendszerekhez, eszközök, rendszerek és a levezetett adatok megbízhatósága

15.45-16.00: Németh Róbert, Dusan Kociczky, Verrasztó Zoltán**:** Development of environmental monitoring system using GIS tools in the Ipoly river catchment

16.00-16.15. Hozzászólások

16.15-16.30. Szünet

Szekcióelnök: Penksza Károly

16.30-16.45: Böhm Éva Irén: Homokpusztagyepek a Pilis nyugati peremén

16.45-17.00: Boksai Daniella: Élelmiszertermékek szénlábnyom számításának módszertana

17.00-17.15: Zimmermann Zita, Szabó Gábor, Szentes Szilárd, Miókovics Eszter, Penksza Károly, Házi Judit, Bartha Sándor: Comparison of the fine-scale patterns of grasslands grazed by different neat types on Hungarian meadow grasslands

17.15-17.30: Házi Judit, Bartha Sándor, Szentes Szilárd, Tóth Andrea, Penksza Károly: Seminatural grassland management by long-term mowing of *Calamagrostis epigeios* in Western-Cserhát

17.30-17.45: Szabó Gábor, Zimmermann Zita, Szentes Szilárd, Miókovics Eszter, Penksza Károly: Effects of the nature conservation management on the saline grasslands in Dinnyési Fertő

17.45-18.00: Penksza Péter, Juhász Réka, Barta József: A csicsókaliszt, mint többfunkciós természetes állománykialakító

18.00-18.15 Hozzászólások

18.15-18.45 Poszterszekció

Az előadások időtartama 15 perc, blokkonként 15 perc hozzászólás és vita

2013. február 26. kedd

Szekcióelnök: *Dancza István*

9.05-9.30: Verrasztó Zoltán**:** Térinformatikai alapú egységes monitoring kialakítása az Ipoly vízgyűjtő területén

9.30-11.30

Workshop "Assessment of the quality of the environment in the V4 Countries (AQE V4)" Standard Grant IVF 21210018 supported by the International Vysegrad Fund.

Workshop a Visegrádi V4 országok környezetállapot értékelési módszertanának megbeszélése.

A projekt résztvevőinek bemutatkozása, eddigi eredmények, további feladatok.

12.00-13.30. Ebéd

13.30 A Workshop folytatása

17.00. A konferencia bezárása

TARTALOMJEGYZÉK
CONTENT

ELŐADÁSOK
PRESENTATIONS

POSZTEREK

POSTERS

Előadások
Presentations

TÁVÉRZÉKELÉSES ADATGYŰJTÉS KOMPLEX KÖRNYEZETINFORMATIKAI RENDSZEREKHEZ, ESZKÖZÖK, RENDSZEREK ÉS A LEVEZETETT ADATOK MEGBÍZHATÓSÁGA

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Az előadásban a különböző légi távérzékelési eljárások alapjait, módszertanát tekintjük át, és a különböző paraméterekkel előállított állományok megbízhatóságának korlátait elemezzük. Milyen esetekben érdemes az optikai úton detektált, nagyfelbontású felvételekből levezetett adatok beszerzése, és mikor javasolhatóak a folyamatos színképű fotometriai módszerek, vagy mit tartogathat az elemzők számára ezek kombinációja. Milyen esetekben éri meg légi-, űr-, vagy terepi távérzékeléssel elkészíteni a terepmodellt, és hogyan biztosítható a különböző minőségű adatok megfelelő súlyú igénybevétele a térbeli folyamatmodellezésnél.
Azok a térinformatikai és döntéstámogató adatbázisok, amelyek átláthatóvá, megérthetővé teszik a környezetünkben végbemenő változásokat, térbeli adatmodellek segítségével teszik kézzelfoghatóvá az antropogén és természeti folyamatok időbeli lefolyását, egymásra hatását, mind valamilyen terepi mintavétellel vagy távérzékelési módszerekkel gyűjtött információkon alapulnak. Ezek a különböző forrásból származó adatok néha nehezen összeegyeztethetőek, sokszor a megbízhatóságuk, pontosságuk is különböző. Éppen ezért fontosnak tartjuk, hogy a döntéstámogató rendszerek alkalmazásakor a különböző szintű és célú adatok megfelelő súllyal és helyzetekben kerüljenek felhasználásra.

ARE HUNGARIAN SAND GRASSLANDS THREATENED BY CLIMATE AND LANDUSE CHANGES?

BARTHA SÁNDOR, ZIMMERMANN ZITA, HÁZI JUDIT, JUHÁSZ MELINDA, KOMOLY CECÍLIA, SZABÓ GÁBOR, HORVÁTH ANDRÁS, MOLNÁR ZSOLT

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Perennial sand grasslands component of the remnant natural forest-steppe vegetation of the Hungarian Plain are especially sensitive to disturbances and they are threatened by man-induced desertification. Therefore, there is an urgent need to understand mechanisms that drive succession and degradation in this ecosystem and to develop effective indicators for early warning about desertification processes. The spatial variability of open sand steppes (Festucetum vaginatae) was surveyed at regional scale along a 200 km long NW-SE transect in Hungary. Temporal variability was also monitored between 1996 and 2012. Vegetation was sampled at multiple scales and with various sampling designs. We applied repeated vegetation mapping (within 40 x 100 m areas with 5 x 5 m resolution), established 2 x 2 m permanent plots and monitored fine-scale vegetation patterns by line-intercept sampling (by recording the presence of plant species along 52 m long circular belt transects of 5 cm x 5 cm contiguous microquadrats).

Decreasing diversity, plant cover, and changing species composition with an increasing contribution of annuals were found along the 200 km long transect. Monitoring over 17 years revealed no trend but fluctuation in most community level attributes and in species composition. Comparing the magnitudes of fluctuations, five times higher relative interannual variability (CV%) was found at the degraded sand steppes. The larger temporal variability found in more arid and more degraded sites suggests larger vulnerability and highlights the importance of studying the thresholds of variability and resilience.

Sand grasslands were traditionally managed by grazing. Overgrazing and trampling of animals often resulted in desert like landscape. In contrast, recent abandonment of grazing resulted in litter accumulation and in decrease of diversity due to increasing competition of dominant grasses. Recurrent droughts results in local mass extinctions of dominant grasses (Festuca vaginata and Stipa borysthenica) and decrease grass dominance. Diversity decreases in extreme droughts. However, the scattered shrubs and tree components of forest steppe landscape make shelter and buffer the general increase in aridity providing refugees for species for surviving droughts, and also promote the local regeneration of steppe patches. Therefore, sand grasslands recover quickly after droughts and their diversity increase.

Our results suggest that the effects of land abandonment and the increase of aridity can counter-balance each-other in this landscape. Therefore proper land management based on the interaction of climate and land use might be able to conserve the naturalness of vegetation.

ÉLELMISZERTERMÉKEK SZÉNLÁBNYOM SZÁMÍTÁSÁNAK MÓDSZERTANA

BOKSAI DANIELLA

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Mennyiben járul hozzá egy élelmiszeripari termék a globális felmelegedéshez, illetve előállítása során hozzájárulhatunk-e a széndioxid kibocsátás csökkentéshez?
A szénlábnyom számítást egyfajta lánc analízisként kell elképzelni, melynek segítségével kimutatható azon üvegházhatású gázok mennyisége melyek egy termék előállítása során keletkeznek. Ez a módszer a nyersanyag megtermelésétől, a szállításon át az eladásig követi nyomon a termék által kibocsátott, pl. széndioxid mennyiségét. Használata számszerűen is mérhetővé teszi azt, hogy az adott tevékenység milyen mértékben járul hozzá a globális felmelegedéshez, tehát milyen mértékben terheli a környezetet.
Figyelembe kell venni az indikátorrendszer egyes elemeit, valamint a másodlagos indikátorokat, továbbá hogy mely értékek milyen mértékben befolyásolják a szénlábnyom nagyságát. A számítást, az általános alapelveket és lépéseket követve termék specifikusan kell végezni. Fel kell mérni a társadalmi-gazdasági szempontokat is, amelyek szerepet játszanak a folyamat során.
Munkánk során esettanulmányokat készítettünk különböző élelmiszertermékek szénlábnyomának alakulására. A számítás figyelembe vett állomásainak nagyságrendi alakulását, az egész folyamathoz képest illetve a különböző, pl. technológiai vagy szállítási alternatívák egymáshoz való viszonyát úgynevezett érzékenység vizsgálatokkal elemeztük.
A szénlábnyom számítás hatalmas előnye, hogy objektív, számszerűsíthető viszonyítási alapot ad, több azonos célt szolgáló, tehát egymás kiváltására is alkalmas termék vagy szolgáltatás összehasonlítására.

HOMOKPUSZTAGYEPEK A PILIS NYUGATI PEREMÉN

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Az utóbb tíz év több aszályos nyara és a nagyszámú, túltartott vadállomány (elsősorban a vaddisznók túrása) miatt a homoki gyepek a Sumlinon komoly károkat szenvedtek. A lédús szárú növényeket a muflon is kedveli, ezért például megritkultak a korábban gyakoribb *Peucedanum arenarium* és az *Iris humilis subsp. arenaria*, valamint az *Iris variegata* állományok.

Mivel gyakorlatilag a Sumlin nagyon nehezen megközelíthető (az esztergomi vasútvonal pályája választja el a Magdolnavölgyi lakóparktól), csupán egy, a pálya alatti áteresz vezet a területére, vagy nagy kerülővel a Piliscsévre vezető földútról leágazó földutak, a beépítésnek sok realitása nincs. Ennek ellenére erre több kísérlet is történt.

A piliscsabai Sumlin degradáltabb, mint a vele határos Pilisjászfalu feletti Nagy-Somlyó és a Nagy-Kopasz irányában, a vasúti pálya feletti homoki tölgyesek, amelyek országosan védettek, a Duna-Ipoly Nemzeti Parkhoz tartoznak, részben a Natura 2000 hálózat részei. De nem tartozik a Pilisi Parkerdő Zrt. kezelésében álló erdőkhöz sem. Mindennek ellenére, mint pufferzóna jelentős szerepet játszhat és amennyiben rendszeresen kezelnék, a gyepek is könnyen regenerálódhatnának. Ráadásul szakszerű kezeléssel a zavartabb homokpusztagyepek állapota jelentősen javulhatna. Ennek egyetlen akadálya van: a „nincs ott semmi" szemlélet.

A hivatalos TIR (Természetvédelmi Információs Rendszer) térképe szerint ugyanúgy pufferzóna, mint a Kis-Széna-hegy és a rétek is, azonban erről a tényről nem nagyon vesznek tudomást a beépítést erőltetők, noha a lakóparkokra már évek óta nincs fizetőképes kereslet.

A piliscsabai Kis-Széna-hegy nyugati lábánál élő tájseb maradt a MOL gázvezeték pásztája, mind a homoki gyepek, mind a dolomit sziklagyepek lesújtó látványt nyújtanak. A természetes szukcessziós folyamatokat nagy mértékben akadályozta a 2012-es, több hónapig tartó aszály. Sajnos a Zajnát-hegyek és vele együtt a Kis-Széna-rétek a védett növények tömeges előfordulásai ellenére sem védettek területileg, az özöngyomok terjedésének sincs semmiféle akadálya. A „pufferzóna" besorolást sajnos nem veszik komolyan.

A FÖLD BOLYGÓ NEMZETKÖZI ÉVE CÉLKITŰZÉSEINEK ÉRVÉNYESÜLÉSE AZ IPOLY-PROJEKTBEN

BREZSNYÁNSZKY KÁROLY

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A Föld Bolygó Nemzetközi Éve (International Year of Planet Earth 2007-2009) három évéből 2008 az Egyesült Nemzetek Szövetsége tematikus éve volt. A nemzetközi év jó alkalmat kínált a legfontosabb globális környezeti problémák rendszerbe foglalt áttekintésére, a földtudományi kutatás és eredményeinek népszerűsítésére. Felhívta a figyelmet arra a megbonthatatlan, szoros kapcsolatra, ami az emberi tevékenység és földi környezet között létezik. A program fókuszában a Föld természeti értékeinek, a természet szépségének, az élet sokszínűségének, az emberi kultúra megőrzésének szükségessége állt. A célok elérése érdekében ajánlott megoldások között első helyen szerepelt a föld- és környezettudományi oktatás (köz- és felsőoktatás), valamint a tudományos kutatás feltételeinek javítása. Hasonló súllyal jelent meg az ismeretterjesztés fontosságának hangsúlyozása.

A Föld Bolygó Nemzetközi Éve szellemiségét követi – más dimenzióban – az Ipoly vízgyűjtőjére kiterjedő környezeti hatásvizsgálati projekt. Ezt támasztja alá a határon átnyúló együttműködés ténye, valamint a téma egységes alapokon nyugvó, komplex, rendszer szemléletű természettudományos megközelítése.

Összefoglalásként megállapíthatjuk:

- Az Ipoly-projekt egyes elemei összhangban vannak, vagy követik a Föld Éve program tudományos célkitűzéseit.
- Az Ipoly-projekt ugyanúgy Földrendszer szemléletű, mint a Föld Éve program.
- Az Ipoly-projekt célja a térség fenntartható fejlesztése, a területen élők életminőségének javítása, ami a Föld Éve program alapvető célkitűzése, ehhez nyújt stratégiai döntéselőkészítő támogatást a térinformatikai alapú egységes környezeti monitoring rendszer kialakítása.

A MAKROSZKOPIKUS VÍZI GERINCTELEN FAUNA VIZSGÁLATA AZ IPOLY FOLYÓ VÍZGYŰJTŐJÉN

CSER BALÁZS, DR. TYAHUN SZABOLCS

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Az Ipoly-projekt kapcsán 48 mintavételi helyen vettünk jellemző makrozoobenton mintákat. A minták feldolgozása során mintegy 150 fajt (taxont) azonosítottunk a közel 50000 begyűjtött egyedből. A hozzáférhető szakirodalmi adatok alapján ismertettük az egyes fajok élőhelyi, táplálkozási, szaprobiológiai tulajdonságait.
A meghatározott fajok (taxonok) alapján kétféle biológiai vízminősítést végeztünk. A minősítések eredménye a mintavételi helyek többségének (62-75 %-ának) kedvező (kiváló, jó) biológiai állapotát mutatta. A párhuzamosan elvégzett minősítések rámutattak a kétféle megközelítés különbségeire, alkalmazhatóságára, hibáira.
A gyűjtések során mintegy 20 ritkább, értékes faj került elő. A jelenleg hatályos hazai természetvédelmi jogszabályok 3 fajt sorolnak védett kategóriába, ezek mind a szitakötők rendjébe tartoznak.
Az Ipoly folyó vízgyűjtőjéről mindezidáig kevés faunisztikai adattal rendelkeztünk, az elvégzett munka így számos értékes tapasztalattal, állatföldrajzi megfigyeléssel gazdagította ismereteinket. A jelen munka keretében elvégzett értékelések, minősítések érvényességének alátámasztására mindenképpen javasolható a vizsgálatok ismételt elvégzése más időszakokban, eltérő hidrológiai viszonyok esetén, illetve a vizsgálatok térbeni kiterjesztése más területekre, vízfolyásokra.

USING LOW DIVERSITY REGIONAL SEED MIXTURES IN LARGE-SCALE GRASSLAND RECOVERY AND WEED SUPPRESSION: A PROMISING EXAMPLE FROM HORTOBÁGY NATIONAL PARK.

DEÁK BALÁZS[1,2], VALKÓ ORSOLYA[3], TÖRÖK PÉTER[3], KELEMEN ANDRÁS[3], MIGLÉCZ TAMÁS[3], TÓTH KATALIN[3], TÓTHMÉRÉSZ BÉLA[3]

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Sowing of low-diversity seed mixtures is suggested when fast recovery of perennial grassland vegetation and rapid weed suppression are priority issues/objectives. Both objectives become increasingly important in Central and Eastern Europe because of the high rate of abandonment of arable lands recently. Our aim was to test the usefulness of a frequently used restoration technique (sowing two types of low-diversity seed mixtures followed by annual mowing) in weed suppression and recovery of grassland vegetation in 17 former crop fields. We found that sown grasses dominated vegetation can be recovered within three years. The rapidly forming cover of sown grasses effectively suppressed short-lived unwanted weeds and their germination from the second year after seed sowing, but detected dense seed bank of short-lived weeds stress the possibility of later weed infestation. Conversely, perennial weeds cannot be suppressed easily by sowing and annual mowing in the short run. The success of perennial weed suppression was affected by the last cultivated crop as the establishment of *Elymus repens* was only detected in former alfalfa fields; while that of *Cirsium arvense* in former cereal and sunflower fields but not in former alfalfa fields. It was found that the success of weed suppression was strongly dependent on the seed mixture used. In several alkali restorations high proportion of perennial weeds was detected even in Year 3. In loess restorations; however, much lower scores were typical. The loess seed mixture contained seeds of a clonally spreading tall-grass, *Bromus inermis*, which could compete more effectively with perennial weeds, than could short grass species with or without tussock forming. Our findings indicate that in a large-scale grassland restoration where different seed mixtures are applied in sites with different history, carefully designed actions are necessary which are fine-tuned to address specific threats at the site level.

SEMINATURAL GRASSLAND MANAGEMENT BY LONG-TERM MOWING OF *CALAMAGROSTIS EPIGEIOS* IN WESTERN-CSERHÁT

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Regeneration of seminatural grasslands are often threatened by the invasion of *Calamagrostis epigejos,* which can slow down or arrest secondary succession. Here we report the results of a 11-year mowing experiment designed to suppress the spread of *C. epigejos* in mid-successional grasslands in Hungary. The experimental design consisted of 16 permanent plots of 3x3 m. Half of the plots were mowed twice a year (in June and September), the other half was left as control. Vegetation was sampled in 2x2 m quadrats before mowing in each year between 2001-2011. The effects of mowing were tested using repeated–measure ANOVA and Tukey HSD for post-hoc tests. A significant decrease of *C. epigejos* appeared after two years of mowing. Species richness increased after four years, while diversity after eight years. By this time the target native species *Brachypodium pinnatum* had become dominant. Similar trends appeared in the control plots during spontaneous succession but at much slower rates. Our results suggest that *C. epigejos* disappears spontaneously in secondary grassland succession after ca. 40-50 years. However, mowing twice a year can speed up this process by opening a "colonization window" to the valuable target species. For successful control, mowing should be maintained for approximately eight years.

TECHNICAL MEASURES INCREASING THE RIVER BANK PROTECTION AND STABILIZATION

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Abstract
Bioengineering techniques include use of natural materials and certain riparian vegetation as a strategy to control bank erosion and promote longer-term stability of the river channel and banks, while attempting to minimize the adverse effects of stabilization when possible. The planting of herbaceous and woody vegetation is one of the simplest forms of stabilizing a riverbank. The grassland of a stream bank slope prevents the occurrence and development of erosion. Bank erosion is often caused by natural processes but it can also be due to by human activity, especially livestock management, vegetation management and river engineering. Bank erosion can result in a loss of land and can threaten property or structures. The deposition of eroded bank material further downstream can also cause damage, both to structures (e.g. sedimentation under bridges) and to the environment (e.g. smothering of spawning gravels by fine sediment). In areas that are subject to greater instability, such as where shear stress and channel velocities are particularly severe, bioengineering techniques are unlikely to succeed (at least by themselves), and thus traditional hardening methods (e.g. use of concrete, riprap, and gabion baskets) are necessary to prevent bank soil erosion.
A basic principle of good practice is to consider a range of alternatives in technical measures of bank protection proposal. There are often several solutions of river bank protection and stabilisation. In the draft proposal all these alternatives have to be considered with respect the best practical environmental option. In this paper the overview of relevant engineering options regards to the most suitable and sustainable type of bank protection and stabilisation will be described. Benefits and potential impact of using green or gray types of bank protection will be also presented in the paper.

1. Introduction

Rivers are natural open systems that adjust their morphology to transmit the flow and sediment load delivered from their watershed. Over periods of thousands of years, the supply of sediment from upstream is balanced by a river's ability to transport it.
However, over shorter time periods, natural and man-made changes in a river's flow and sediment transport regime can induce erosion or deposition and associated changes in the river channel form, as the river adjusts to increased or decreased sediment loads or flows.
The physical appearance and character of the river (or geomorphology) is a product of channel boundary and slope adjustment to the present flow and sediment regime. River form and fluvial processes evolve simultaneously and operate through mutual adjustments toward self-stabilization.
Because river systems are dynamic, their pattern, dimension, and profile are a function of numerous process variables, with the result that a change in one variable sets up a mutual adjustment in others (Leopold *et al.*, 1964). Channel stabilization methods must address these observable relationships to prevent the negative feedback mechanisms from the river from undermining the stabilization measures. In bank stabilization design, this is accomplished by comparing the observed morphological features of a river to those of known stable systems in

order to account for the natural tendency of a particular river system or segment to adjust to a more stable channel form.

2. River bank erosion

Bank erosion is often caused by natural processes but it can also be due to by human activity, especially livestock management, vegetation management and river engineering. Bank erosion can result in a loss of land and can threaten property or structures. The deposition of eroded bank material further downstream can also cause damage, both to structures (e.g. sedimentation under bridges) and to the environment (e.g. smothering of spawning gravels by fine sediment). Natural bank erosion fulfils several purposes: it renews ecological habitats; it is part of the natural balance of rivers; and, crucially, as sediment is eroded, moved downstream and deposited, river energy is dissipated. Significant funds and effort are spent on engineering and maintenance to control and alleviate bank erosion. Halting erosion by using engineering has a negative impact on habitats, disrupts the natural balance of the river and, crucially, can make the original problem worse because the river has more energy. Also, some of the effort is ineffective because activities often treat the symptoms of erosion, without addressing the underlying cause. Bank erosion may then move elsewhere, making the original problem worse, adding to the economic burden, and causing further ecological damage.
In order to identify the best solution to erosion it is therefore critical to identify its cause, its value in terms of ecology and river function, and its impact on human activities, resources or health (SEPA, 2008).

3. Description of Potential Stabilization Techniques

Bioengineering techniques include use of natural materials and certain riparian vegetation as a strategy to control bank erosion and promote longer-term stability of the river channel and banks, while attempting to minimize the adverse effects of stabilization when possible. Such techniques can be grouped into two basic categories: those that reduce the force of water against a riverbank, and those that increase a bank's resistance to the force of water (http://www.nrcs.usda.gov/technical/stream_restoration/newgra.html, 2002). Both categories of bioengineering techniques employ riparian vegetation as a means of erosion control.
Vegetative growth reduces local velocities against the bank, thereby reducing near bank shear stress. After time, as the vegetation grows and matures, the hard mass provided by plant roots can provide protection from erosion and collapse and increase internal bank strength (Rosgen, 2006; Wynn *et al.,* 2004).
Many of the techniques that are designed to reduce the force of water against a riverbank do so by directing flow away from banks. Techniques designed to increase a bank's resistance to the force of water function in much the same way as traditional hardening techniques, such as gabions, riprap and concrete, by "armoring" a riverbank with materials that are more resistant to the force of water than native, in situ soil. Natural materials, such as coir fiber, provide flow resistance while also serving as a substrate for plant growth, or incorporate interstitial space to provide ground contact for rooting plants.
It should be noted, however, that any technique for bank stabilization would be intended, by design, to prevent any significant bank soil erosion and lateral channel migration, which are two key geomorphic processes that produce a heterogeneous mix of riverbank types, including vertical and undercut banks, that are critically important to many of the plants and animals that use the banks. Thus, while efforts can be made to reduce ecological impacts, it must be recognized that any bank stabilization techniques, including bioengineering techniques, would have long-term or permanent adverse ecological consequences. In some cases, bank stabilization methods are applied to only discrete portions of the banks along a

given stretch of a river, which reduces the adverse ecological impacts compared to stabilizing the banks throughout the entire stretch of a river (AECOM Environment Westford, 2010).

3.1 Vegetation Measures (Green bank protection)

The planting of herbaceous and woody vegetation is one of the simplest forms of stabilizing a riverbank. The plant roots help stabilize the soil and control shallow mass movement by binding soil particles and by removing moisture from the soil.
One of typical vegetation measures are live stakes like dormant (but live) cuttings or branches feet in length that are inserted into the soil at or below bankfull elevation.
If correctly prepared, handled, and placed, the live stake will, under suitable conditions, root and grow. Only a few species will grow well from live stakes. Those species include willows, dogwoods, and elderberry. Live stakes can be used in conjunction with other techniques, including erosion control matting.
In Figure 3 a brush mattress is depicted (AECOM Environment Westford, 2010). It is a layer of live branch cuttings, placed perpendicular to the flow of the river on the bank, and held down in place with poultry netting or light gauge wire mesh to form a "mattress" of woody material (AECOM Environment Westford, 2010).

Fig. 1: Installed brush mattress

One-row or two-row branches hedge or willows cutting are very often used too and are depicted in Figure 2 and 3 (Sojková, Z., 2006).

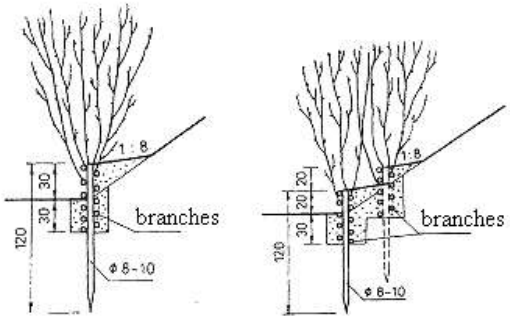

Fig. 2: One-row or two-row branches hedge

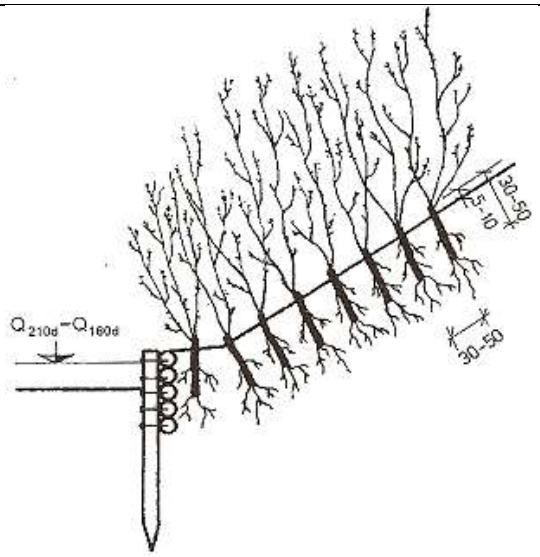

Fig. 3: Willow cuttings

Coir fabric or coir matting is erosion control matting constructed of coconut fibers (Fig. 4) (http://www.hellotrade.com/excelfiber/natural-knitted-coir-logs.html). The matting protects the banks while vegetation is established and biodegrades in about 5 years. Coir fabric is also used to construct a number of other bioengineering systems, including prevegetated mats, pre-planted coir pillow, and vegetated geogrid.

Fig. 4: Example of natural knitted coir logs

The most sophisticated use of coir matting is to construct vegetated geogrids. A vegetated geogrid consists of a wall composed of 1-foot "lifts" of compacted soil wrapped in coir fabric or geotextile (typically synthetic) fabric, with plugs, live stakes, or other plantings placed between each lift. This technique essentially replaces the riverbank with a newly constructed, reinforced wall that provides resistance to shear stress, while at the same time providing vegetative growth (AECOM Environment Westford, 2010).
Regardless of the technique employed, any trees and other vegetation on the banks would need to be removed to implement the remediation/stabilization. In addition, because any future windthrow and overtopping of trees would destabilize those banks and cause severe bank erosion, only herbaceous plants and shrubs, and not trees, would be planted in

connection with any bioengineering technique, and an ongoing program to prevent the growth of trees on the stabilized banks would be essential.

Spatial Arrangement of Bankside Trees and Shrubs

The planting of a riparian stand whose main function is the stabilization of the slope and of the crest of the lined ditch slope (passage between the lined pitch and the berm) and possible stabilization of berm slopes must be designed also in the flow profile.
Behind bank lines, accompanying stand species, both trees and shrubs, should be placed in a belt whose width corresponds to the possibilities of a particular locality. Tree kind of stabilization is often known: using of self-seeding species and naturally spreading vegetation, using of accompanying vegetation on waterways and establishment of grassland (Šlezingr, M., Úradníček, L., 2003).

Grassland

The grassland of a stream bank slope reinforces soil surface and, to a great extent, prevents the occurrence and development of erosion. It is necessary to realise that grassland composition, its endurance, overall involvement and consequential viability depends on the number of created and sufficiently developed individuals in the first two to three months after seeding. Although seeding is the most common method of establishing grassland, it is not the only one.

- Establishment of Grassland by Seeding

Prior to seeding, the laying of a humus layer on disturbed planed stream bank slope is expected. The follow-up seeding is manual, or mechanisms may be used, from early April to late August. Seeds need to be fertilised in the soil by rolling. If possible, watering in the first month and top dressing are important. To prevent the undesirable development of weed, one or two weeding treatments are necessary after approx. 8 to 12 weeks of seeding. The protective function of stands starts to work within only 2 to 3 months of seeding.

- Establishment of Grassland by Sodding

For fast and almost immediate effective grassing of banks, so-called sodding may be used. Sods can best be obtained from an adjacent site (meadow, pasture) that has approximately the same site conditions as the locality being reinforced. Sods shall be taken by means of special knives, cutting strips approx. 40 – 50 cm wide. Separate the strips from subsoil using a shovel to achieve optimal sod thickness. Thus removed grass strips shall be divided into squares with sides of 40 – 50 cm. The produced sod should immediately be placed on the site being reinforced.

- Establishment of Grassland by Hydro-seeding

This is a hydraulic method of seeding when a mixture of seeds, water, fertiliser, organic substance and anti-erosive additives are sprayed under pressure. In this way, inaccessible slopes and other places can be re-vegetated. Within seeds, the prescribed grass mixture or seeds of tree species can be used.

- Other technologies

In addition, pre-planted grass carpets, especially wherever an immediate aesthetic and stabilisation effect is requested, divided stabilisation strips, slope stabilisation by means of coconut or jute nets placed on the seeded area (prevents erosion) etc. can be used. (Šlezingr, M., Úradníček, L., 2003, Zeleňáková, M. *et al.*, 2012)

3.2 Traditional hardening methods (No-vegetation measures - Gray bank protection)

In areas that are subject to greater instability, such as where shear stress and channel velocities are particularly severe, vegetation (green bans protection) are unlikely to succeed (at least by themselves), and thus traditional hardening methods (e.g., use of concrete, riprap,

and gabion baskets) are necessary to prevent bank soil erosion. Other techniques are: articulated concrete, rock riprap, retaining walls, reinforced earth, stone revetments, concrete revetment or non-biodegradable geotextiles (SEPA, 2008).

4. Conclusion

SEPA (Scottish Environment Protection Agency) define two categories of engineering for bank protection: green and grey. Green options involve engineering with biodegradable or living materials or un-mortared rip-rap restricted to the bank toe only. Grey engineering involves major bank modification, often using artificial materials. The causes of bank erosion and the methods of protection and stabilization are highly variable Engineering has to consider all external factors participated on calculations regarding on appropriate bank erosion measures selection.

Acknowledgement

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SINKHOLE CARE IN THE MORAVINA KARST

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INTRODUCTION

Karst areas are quite a frequent phenomenon of the surface of the Earth – they form over 10% of the land. There are several karst areas in the Czech Republic; the most significant ones are the Moravian Karst and the Bohemian Karst. Agricultural usage of karst areas is limited by the bedrock solubility which leads to the partial washing away of the fertile surface layers of the soil. Therefore, these areas are susceptible to erosion which then leads to further fertility reduction. The thin layer of fertile soil cannot capture moisture and karst areas are thus quite dry. They are more susceptible to the weather conditions and more fragile than other areas. The unique nature of karst areas as a specific biotope diversifying the fauna and flora of the surroundings is the reason why these areas need to be taken care of and protected.

LITERATURE REVIEW

A sinkhole is a closed depression formed in karst conditions, such as in lime, dolomite, rock gypsum or rock salt. A sinkhole can have a circle, oval, elongated or irregular ground plan and several shapes, such as a funnel shape, can be cylindrical or dished. Diameters of sinkholes range from several metres to over a kilometre and depths from several decimetres to tens of meters. Usually there is 1:3 depth/diameter ratio. The slopes can have various angles and the bottom can be flat or undulating. Sinkholes are most often formed by the solution of the bedrock – erosion sinkholes – less often by a collapse of a cave roof – collapsed sinkholes. [1]

The sinkholes in the Czech Republic are located on limestone bedrocks. Rock gypsum only seldom occurs in the Czech Republic and dolomite is less soluble than limestone; therefore, karst phenomena appear there only rarely. [2]

A sinkhole can appear where cracks and rifts are surfaced. Rainwater leaks to the underground and erodes and solves the surroundings of the cracks and rifts. [3]

METHODOLOGY

The study was inspired by the Administration of the Protected Landscape Area Moravian Karst (hereinafter PLA Moravian Karst) and the focus of the study is care for sinkholes. The research area is the plateaus of the Moravian Karst, where sinkholes frequently appear. Literature on geology, fauna and flora was gained in the Library of the Mendel University in Brno, on the Internet, and from the PLA Moravian Karst Administration. The field work was conducted in 2010 and spring 2012. The aim was to examine the current condition and care for sinkholes in the research areas of the Moravian Karst. The field survey gave basic information on the provided care. Maps to establish the plots for budget calculations were created based on the data obtained through sinkhole mapping in Ostrovská plošina (Ostrov Plateau) in 2010 and data obtained from the Administration of the PLA Moravian Karst.

BASIC DATA ON THE AREA

The PLA Moravian Karst is located in the South Moravian Region. It is 25 km long and 3–6 km wide. The Moravian Karst is the most significant karst area of the Czech Republic. There are over 1,100 revealed caves in the Moravian Karst. It was proclaimed Protected Landscape Area in 1956, thus becoming the oldest protected landscape area in Moravia and the second oldest in the Czech Republic. There are 17 small special protection areas, out of which there are 4 national nature reserves, 2 national nature monuments and 11 nature reserves. [4]

RESULTS

The care for any area, including sinkholes, can be divided based on two basic methods: rehabilitation and regulation. First, rehabilitation measures are taken if necessary, then regulation measures. Rehabilitation measures concentrate on the return to a natural state by a removal of undesirable elements and phenomena. They are significant one-time interventions in the conditions of the area – remnants of old generations of stands and self-seeded woody plants are removed, plants are cut close to the ground (at best in May or June); if the land is grown with the nettle, it is necessary to do the cutting 3 to 4 times a year in the first years of rehabilitation – in spring and at the beginning of summer; grass is seeded.

Regulation measures serve to maintain the desirable state. They control the spontaneous succession and prevent or reduce undesirable surrounding effects. They are

repeated continuous biotechnical measures – regular cutting 1–2 times a year, grazing, treatment of woody plants.

The sinkholes in the research area are of two kinds: sinkholes in arable land and sinkholes in permanent grassland (meadows, pastures). The care for these sinkholes also depends on the surroundings. This can be a problem in the arable land mainly as the sinkholes there are more isolated. Arable land is a communication barrier between other locations, thus species diversity can be reduced. The PLA Moravian Karst has an area of about 92 km^2. 21% of the area is taken by agricultural land, 58% are forests and lands performing forest functions; a third of the agricultural land is meadows and pastures, the remaining two thirds are arable land.

To be able to make realistic budgets of the sinkhole care in the PLA Moravian Karst we needed data on the area and type of sinkholes. This data was not available. In 2009–2010 a field survey was conducted in the Ostrov Plateau. This data was used to create the sinkhole care budget. When creating the budget for sinkhole care in the agricultural land in the entire PLA, we assumed that the frequency of sinkholes in the agricultural land of other plateaus is 50% lower than in the Ostrov Plateau (most sinkholes are located in the northern part of the Moravian Karst and their number declines rapidly towards the south). The area of the agricultural land in the Ostrov Plateau is about 4.8 km^2. The sinkholes take an area of 15 ha (149,240 m^2), i.e. 3.1% of the area of agricultural land. Out of this, 8.5 ha are sinkholes in permanent grassland and 6.5 ha are sinkholes in arable land. The agricultural lands in the entire PLA take 19.82 km^2, out of which 6.6 km^2 (33%) is permanent grassland and 13.22 km^2 (67%) is arable land. We assumed that sinkholes in the PLA Moravian Karst take about 40 ha of agricultural land, out of which 15 ha is in permanent grassland and 25 ha in arable land. We disregarded the fact that some of the sinkholes in arable land had been ploughed. If the sinkholes in arable land were scythed manually twice every year, the care cost would be 1,000,000–1,400,000 Czk (without VAT) in dependence on the terrain profile, slopes, distance from roads and distance between individual sinkholes. For the purposes of the budget we considered the average – 1,200,000 Czk (without VAT). If a brushcutter was used, the costs would be about 10% lower, dropping to 900,000–1,100,000 Czk (without VAT).

The sinkholes in permanent grassland can be treated by either grazing or scything. For scything we calculated only the area of the sinkholes, not the area of the grassland where the sinkholes are located. Grazing cannot be performed in the sinkhole alone, the surrounding area needs to be taken into account. The grazing costs were calculated for 10 ha of the entire area. Only sheep and goats were considered, as cattle induce erosion. The lower limit of load

is 0.3 head of cattle/ha, which corresponds to approximately 2 sheep or goats per a hectare. I.e. for 10 ha of permanent grassland a herd of 20 heads would be needed. The costs would be 200,000 Czk (without VAT) for the livestock purchase and 63,000 Czk (without VAT) to organize grazing. The costs of cutting the remaining grass would be, based on conditions, 15,000–70,000 Czk (without VAT). Again, the average will be taken into account – 40,000 Czk (without VAT). Other expenses would go to fencing of the grazed areas. However, this cannot be included in the budget as it is unknown what amount of fencing would be necessary. The amount of heads could be doubled, reaching the upper limit of the grazing load. This would only raise the costs of livestock purchase, the other costs would remain the same.

Cutting an area of 15 ha twice a year would cost 540,000 Czk (without VAT). The cost could increase based on the terrain profile, slopes, distance from roads and distances between individual sinkholes by about 10–40%. This means that the cutting costs would range between 540,000 and 756,000 Czk (without VAT). The average – 650,000 Czk (without VAT) – will be considered for the purpose of the budget creation. In the case of scything, the costs would be 10% higher.

DISCUSSION

The effect of grazing on different meadow ecosystems is a hot issue that is frequently discussed. It has been proved [6] that stands maintained by grazing are related to a number of critically endangered species of plants and animals. However, it has not been clarified to what extent, in what time and with what amount of animals grazing should be performed. The results of most studies dealing with species diversity in grazed lands and lands left without any care for some time [6] show that there is the same amount of species in both but the grazed areas manifest a higher abundance of significant species. The studies on the Moravian Karst (e.g. [5]) show that the biodiversity of sinkholes of the Moravian Karst is constantly rising in most cases. The sinkholes in the agricultural land represent areas with a relatively varied species composition of plants and animals. With respect to the diverse requirements concerning life conditions of the significant species of plants and animals, no uniform care for the areas can be proposed. All plants and all animals can never be satisfied with the same type of management. [6] Therefore, it is necessary to keep the care diverse so that a broad range of conditions is provided to organisms, promoting thus biodiversity.

The above mentioned data show that at the current level of knowledge a combination of cutting and grazing appears to be optimum for the care of sinkholes in the PLA Moravian Karst. Both procedures need to be applied to a sensible extent as an excessive grazing or cutting leads to reductions in biodiversity and deterioration of conditions for animals and plants. As regards cutting, timely disposal of the cut biomass has to be emphasized and cutting in sections, not the entire areas, is to be recommended. As an auxiliary care, planting of suitable woody plants is recommended for loaded areas to reduce erosion and grass seeding by regional mixtures is recommended for areas with insufficient grass surface.

CONCLUSION

Based on the found information, the main objective of the care for sinkholes appears to be reinforcement of the surfaces as a way of protection against erosion and sustaining or increasing the biodiversity. Erosion prevention is important not only with respect to sinkhole sedimentation but also as a prevention of soil washing away to underground spaces. This is best provided through grassing by regional mixtures and planting of suitable woody plants to troublesome places. In the meadows, a combination of grazing and cutting is the most suitable. In this way biodiversity is promoted as well as natural succession of plants and animals. The financial aspect of the individual care elements should not have top priority when selecting types of care; yet it cannot be totally ignored. When the costs related to grazing are added up, this type of care is more expensive than grass cutting only.

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RESULTS OF A SMALL SCALE GRASSLAND RESTORATION EXPERIMENT IN THE GREAT-PLAIN

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In fragmented landscapes even a small restored site can help to connect habitats and to provide „shelter" to natural plant communities. Therefore it is important to enhance the regeneration of these sites, and find a solution to suppress weed species. For these reasons in grassland restoration projects sowing low-diversity seed mixtures is a frequently used technique. Contradictory, these mixtures often contain highly competitive species that may inhibit the regeneration and lead to a species poor state, instead of enhancing it and leading to a species rich state. Testing this hypothesis we have sown site-specific (*Festuca pseudovina*) and non-site specific (*Lolium perenne*) grass species on a recently abandoned field near Tiszaalpár which is surrounded by sand and loess-steppe meadows. We monitored the assembly of plant communities in the treated and spontaneous plots. We examined the changes in dominance structure, diversity, and sepecies composition from 2009 to 2012. We have found that the *Lolium perenne* lost its competitiveness by the fourth year, since it wasnt't adapted to the dry conditions of the site. The *Festuca* treated plots where species rich in the first two years, but the diversity decreased by the fourth year and the structure of *Festuca* treated plots became strongly hierarchical, such as the structure of the *Lolium* treated plots had been in the beginning of the study. Spontaneus sites were showing slower regeneration where the compositional diversity increased, and became the highest compared to the treated plots. We conclude, that on sites like this where the species pool is neigbouring and the size is not bigger than a few hectares, we can rely on spontaneous succession in regeneration, if there is no risk of spreading invasive species.

ANIMÁCIÓS TÉRKÉPI MODELLEZÉS AZ IPOLY VÍZGYŰJTŐ TERÜLETÉN VÁRHATÓ KLÍMAVÁLTOZÁS HIDROLÓGIAI KÖVETKEZMÉNYEIRŐL

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Az Ipoly folyó egyike a Kárpát-medence legszélsőségesebb vízjárású folyóinak. E szélsőségekhez történő alkalmazkodás időnként számos árvízvédelmi, környezetvédelmi illetve természetvédelmi problémát is generál. A folyószabályozásokhoz és árvízvédelmi munkálatokhoz elengedhetetlen foglalkozni a folyókon várható extrém vízállások előfordulásával.
Ennek szemléltetésére az Ipoly vízgyűjtő területének vízhozam adatait ábrázolom, amelyhez az adatokat a VITUKI Környezetvédelmi és Vízgazdálkodási Kutató Intézet Nonprofit Kft-től és a Szlovák Tudományos Akadémia Tájökológiai Intézetétől kaptam meg. Az általam elkészített térképi feldolgozás és animáció módszertani segítség kíván lenni ahhoz a jövőbeli felkészüléshez, amivel a globális klímaváltozás várható konkrét területi következményeihez kell alkalmazkodnia a társadalomnak. A hidrológiai állapotok tér- és időbeli változásainak térképi ábrázolása az egyik módszertani alapja a környezetben végbemenő folyamatok modellezésének, ami a térképtudomány számára igen nagy szakmai perspektívát jelent.

DEVELOPMENT OF ENVIRONMENTAL MONITORING SYSTEM USING GIS TOOLS IN THE IPOLY RIVER CATCHMENT

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Natural processes occurring in the environment and anthropogenic impacts on the landscape of interactive relations context factors, broken down into components analysis (Dr. Zoltán Verrasztó).
All the environmental process takes place in space, therefore, if the decomposed parts of our environment available information, the GIS of relations examined.
The information is structured according to the landscape system of factors, so it becomes possible to harmonize the layers, the spatial and temporal relationships to recognize, interpret or forecast environmental change processes, a dynamic analysis of relations.
Our goal is to,
- Achieving a harmonized GIS-based database and map system, which fixes the necessary and possible informations from the state of the environment;
- These systems are based on the characteristics of past environmental conditions, the empirical basis for understanding environmental change processes and their implications, promoting an active environment for the implementation of alternative scenarios for forecasting;
- Remote Sensing informations we can be selectively overlap the specified thematic mapping system, the relevant environmental processes aimed at determining the elements, the landscape elements inserted into the system;
- We have created the possibility that activation of remote sensing data sources that satisfy the requirements of the GMES is based on improvements.

WET HABITATS ALONG RIVER IPOLY (HUNGARY) IN 2000 (EXTREMELY DRY) AND 2010 (EXTREMELY WET)

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In this study we presents habitat maps from two different years in which precipitation was extreme – 2000 was one of the driest years while 2010 was one of the wettest years in the Carpathian Basin. The study area situated is in northern Hungary, beside the River Ipoly, in the municipality of Drégelypalánk, with a smaller proportion in Hont and Ipolyvece. Its extent is 621.5 hectares. During the field survey habitat polygons were recorded using a hand-held GPS (e-Trex Legende Garmin) device, with aerial photographs helping to identify the exact location. Processing of the data, establishment of a database of the mapped area, and editing of maps were performed using ESRI ArcView GIS 3.2 and ESRI ArcGIS 10.0. Maps were compiled in the Unified National Projection System of Hungary.
The maps, at a scale of 1:15,000, show vegetation and habitats of the study area. They display changes occurring within habitats, in habitat types determined by their nature, composition and changes that occurred along their polygon borders. Large vegetation changes caused by the changes in precipitation over the time period can be tracked with the maps which display habitat changes. The area of wetlands increased significantly, whilst areas of meadow and marsh decreased and in their place new complex aquatic habitat forms appeared. The number of habitat complexes also increased because of the presence of water linked to habitat types and fragments. In the humid period, a sustained floodplain groundwater-level increase was observed that resulted in a mosaic appearance in habitats, but led to species degradation.

CSICSÓKALISZT, MINT TERMÉSZETES ÁLLOMÁNYKIALAKÍTÓ

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A dolgozat célja az volt, hogy a csicsókából előállítsak egy olyan természetes állománykialakítót, amit sikerrel lehet felhasználni különböző élelmiszeripari termékekhez.
A kutatás elején 5 különböző csicsókafajta gumójából sikeresen készítettem darálással, szárítással és szitálással lisztet, amely magas inulin tartalommal rendelkezett.
Az így elkészített csicsókalisztet elsőként tejitalban alkalmaztam állománykialakítóként. A csicsókás minták elkészítését kereskedelmi forgalomban kapható inulinnal különböző koncentrációban készített minták reológiai vizsgálata előzte meg. A tejitalok reológiai jellemzését rotációs viszkozimetriás mérésekkel végeztem el. A folyásgörbékre a Herschel-Bulkley modellt illesztettem. Megállapítottam, hogy a modell megfelelően illeszkedett a mérési adatokra ($R^2>0,9800$), a minták dilatáns, nyírásra vastagodó reológiai viselkedést mutatnak ($n=1,5$) , tixotróp tulajdonságot, azaz időfüggőviselkedést nem mutatnak, folyáshatárral nem rendelkeznek. A viszkozitás értékek alapján arra következtettem, hogy tejes mintákban az csicsókaliszttel 5% koncentrációban jobb az állomány kialakító képessége, mint az inulinnak, azaz nagyobb viszkozitás növekedést lehet elérni vele. Az érzékszervi vizsgálatok során a csicsókaliszttel készült minták népszerősége elmaradt az inulinos mintáétól, de receptúrafejlesztés segítségével egy versenyképes terméket lehet előállítani, különösen azon fogyasztók számára, akik tudatosan választják a táplálkozás élettanilag előnyös, prebiotikummal és rosttal dúsított termékeket.
Második lépésben a csicsókalisztek vízzel készített keverékeit, mint kalóriaszegény zsírpótlót vizsgáltam. Az inulinos minták vizsgálatával kezdtem a mérést, ahol Rama margarint tekintettem referenciának, majd a megfelelő koncentráció kiválasztást követően csicsókaliszttel is készítettem mintákat A zsírpótló minták reológiai jellemzését oszcillációs technikával, amplitúdó söprés módszer segítségével végeztem el. A G’ (rugalmassági modulus) és G” (veszteségi modulus) kezdeti értéke, az LVE érték (linerási viszkoelasztikus tartomány vége), a □M (nyírófeszültség a metszéspontban), és a komplex viszkozitás az inulinnal készült minta esetén kimagaslóan nagyobb volt, mint a csicsókalisztes mintáknál, míg G’ és a G” meredeksége kisebbnek bizonyult. . A □M és a komplex viszkozitás alapján a csicsókafajták megkülönböztethetőek voltak. A csicsókaliszttel készült zsírpótlók legfőbb hátránya a színük volt, ezért kizárólag olyan élelmiszerekben használható fel állományjavítóként amelyek színvilága megengedi ezt, például a padlizsán krém.

EFFECTS OF THE NATURE CONSERVATION MANAGEMENT ON THE SALINE GRASSLANDS IN DINNYÉSI FERTŐ

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We made coenological and grassland management survey in the saline grassland of Dinnyési Fertő Nature Conservation Area to follow up the effects of the nature conservation management (grazing and mowing).
The coenological relevés were prepared in 5-5 quadrats, singly 2 by 2 meters fenced in two study areas in *Festucetum rupicolae Soó 1940 corr. 1964* association type. The survey was repeated four times, in April, May, June and August. In order to exaine the biomass production of the grassland we cut the grass in 1 by 1 m quadrats in both study areas with 2 cm stubble. The mowed grass was taken apart to the following groups: grasses, sedges, pulses, sticky species, and other dicotyledons. The analysis was carried out on the basis of certain relative ecological indicators (relative water and nitrogen requirement) , social behaviour types, the nature conservation values, the fodder value by Klapp and the biomass production estimation by Balázs.
It can be stated that the effects of grazing can be detected in the vegetation composition: higher proportion of grasses to the dicotyledons or the presence of the stinger, poisonous and weed species indicating the presence of grazing. These tendencies could not be seen in the case of the mowed area. On the basis of the ecological indicators we can state that the natural disturbance-tolerant species are dominant in contrary of the findings of a survey performed in 1996 which showed the dominance of subordinated species as a result of the increasing grazing activity in the area. The biomass production and the animal feeding capacity proved to be extraordinary low from the grassland management point of view.
With performing similar examinations it would be required to collect as much experience as possible about the nature conservation management of the saline grasslands. By means of this land usage methods could be elaborated which avoid the overgrazing of sensitive grass types besides contributing to diversity increasing effects of grazing.

SPONTANEOUS REGENERATION OF EXTENSIVELY MANAGED LUCERNE FIELDS – A PROMISING EXAMPLE OF GRASSLAND RECOVERY.

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Spontaneous succession in lack of restoration-focused case studies is often underappreciated in restoration; however it is a cost-effective alternative without active intervention. We studied the regeneration of loess grasslands in extensively managed (mown twice a year) lucerne fields using space for time substitutions in Hortobágy, East- Hungary. In our study we addressed the following questions: (i) How effective is lucerne in weed control? (ii) What are the temporal dynamics of the disappearance of lucerne? (iii) How fast is the recovery of grasslands in extensively managed lucerne fields? With the increasing age of fields, the cover of lucerne decreased (from 75.2 % to 2.2 %), and the cover of perennial graminoids increased (from 0.5 to 50.2 %). Mean total cover showed no significant differences between the age groups (mean cover >77 % in every age groups). No weed dominated stages were detected during the spontaneous grassland recovery in lucerne fields, the cover of weeds was low (<10 %) in all studied age groups. As the age of fields increased, no litter accumulation and no changes of mean total biomass were observed. We found that the recovery of basic loess grassland vegetation is possible within 10 years, but not the complete recovery of the characteristic species pool. We identified several advantages compared to technical reclamation: no early weed dominated stages and litter accumulation was found and only little cost can be expected. However, the recovery of species rich loess grasslands further management (e.g. propagule transfer by hay and/or moderate grazing) is required.

TÉRINFORMATIKAI ALAPÚ EGYSÉGES MONITORING KIALAKÍTÁSA AZ IPOLY VÍZGYŰJTŐ TERÜLETÉN

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Célunk e térinformatikai rendszerrel a térbeli illetve területi, a transzdiszciplináris és kronológiai összefüggések feltárása volt, így biztosítva az egységes monitoring-rendszer elvárásait kielégítő funkcionális megfeleltetést. A rendszer alapjainak kifejlesztését tekintettük elsődleges feladatnak, ebben a fázisban nem foglalkoztunk a környezetveszélyeztető objektumok, illetve a környezeti veszélyeknek kitett objektumokra vonatkozó információkkal.

A ’80-as évek információtechnológiai robbanása során korábban elképzelhetetlen eredmények születtek a hardver-fejlesztésekben, ezt követte a ’90-es években a szoftver-fejlesztés. Ezek birtokában ma már „mindent megcsinál” a számítógép.

Napjainkban már természetesen használunk az egész világot behálózó rendszerekben olyan szoftvereket, melyekben szakemberek sokaságának több ezer munkaórája van, ezekkel a társadalom számos ismert problémája, tervezési-szervezési feladata tipizált, homogenizált, globalizált, univerzális módon vizsgálható, tervezhető.

Mindezek mellett azonban hátramaradt - egyelőre megoldatlanul- az egyik legnagyobb feladat, a célorientált adatbázisok kialakítása, fejlesztése. Ezek hiánya az akadálya az információtechnológiában rejlő felhasználási lehetőségek kibővítésének! A „géppel” – beleértve a hardver és a szoftver együttesét- már szinte mindent meg lehet(ne) csinálni – ha lenne hozzá kellő mennyiségű rendezett adatunk, amikből meríthetnénk, amikre támaszkodhatnánk, amelyek célorientált (újra)rendezése segítene megérteni a természeti, társadalmi és gazdasági folyamatokat, különösen pedig segítene feltárni ezek bonyolult kapcsolatrendszereit.

A XX. század második felét döntően a rendkívül intenzív technikai-technológiai fejlesztések sokasága uralta, ami csupán nagymértékű specializációval vált lehetővé. Az egyes szakterületeken belül korábban elképzelhetetlen részletek váltak ismertté illetve megismerhetővé, ugyanakkor azonban ezek kutatása olyan elmélyülést igényelt, ami más dimenziókba helyezte a tudományos érdeklődést, mint annakelőtte. Önmagában a technikának a fejlődése növelte a fejlesztésre irányuló és a használatát biztosító ismereteket, de ezen keresztül újabb és újabb ablakok nyíltak a világ addig még ismeretlen részeire, részecskéire, összetevőire is, végülis azonban az informatikai részmegoldások között elveszett az információk közötti kapcsolat, a világról való ismeretek széthullottak.

Az „összekapcsolás” egyetlen közös pontja -valójában felülete- a közös tér, melyben a természeti, társadalmi és gazdasági folyamatok végbemennek. Ennek lehetősége az a módszer, melynek alkalmazásával a GIS jelenlegi gyakorlatát, a ***térképi vizualizálást*** meghaladóan biztosítjuk az információk, adatok, térképfedvények strukturálásával a valós térben, a földrajzi tájban végbemenő folyamatok, interaktivitások transzdiszciplináris kapcsolatainak felismerését, vizsgálatát, modellezését.

COMPARISON OF THE FINE-SCALE PATTERNS OF GRASSLANDS GRAZED BY DIFFERENT NEAT TYPES ON HUNGARIAN MEADOW GRASSLANDS

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In our study we compared two cattle pastures in the Káli-basin (Badacsonytördemic and Balatoncsicsó) on the basis of the differences appearing in the species composition and microcoenological characteristics. In addition, the nature conservation aspects of the effects of the grazing cattle have been taken into consideration. In Badacsonytördemic the pasture is grazed by Hungarian grey cattle, and in Balatoncsicsó, in turn, with milking cow.

We have made the coenological survey along 6-6, one by one 26 m long linear transects and we noticed the rooting species in 5 by 5 cm microquadrats within these transects. For the data analysis we used the relative ecological indicators of Borhidi and the nature conservation categories of Simon. The microcoenological studies were performed with JNP models (florula diversity), species-area curves and species density model.

It marks out from the species density and the maximums of florula diversity assessed from the data of the two study areas that the frequencies of the species combinations found in Balatoncsicsó were always lower than the similar values of Badacsonytördemic. From the aspects of the nature conservation values natural disturbance-tolerant species were dominant in both study areas, their proportion was higher in Badacsonytördemic. The drought-tolerant species were missing but the species indicates humidity occurred in a high proportion. In point of the nitrogen requirement mesophile species were dominant.

The structural changes of the vegetation intangible in larger scale are demonstrable with the help of the microcoenological methods. These methods are used for planning nature conservation management since the impact on the vegetation can be traceable in long-term monitoring.

EIA IN V4 COUNTRIES

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Abstract
New developments and projects often require an assessment of their environmental impact (EI), either to comply with planning and environmental regulations. Environmental impact assessment (EIA) is the process by which the environmental impacts of a project can be systematically collected, analysed and presented to inform a decision-making process. The environmental assessment (EA) process would usually, according to the various international approaches currently implemented, incorporate the following main stages: screening to determine applicability and level of detail of an EIA; scoping during which issues that should be taken into consideration are identified and the terms of reference for the EIA are completed; preparation of the EA report, including identification of impacts, evaluation of alternatives, and design of mitigation measures; and the preparation of the environmental management plan, which is usually part of the EA report, but can be a stand-alone piece for simple projects.
This paper analyzes EIA laws in light of a variety of issues relevant to all EIA process. It discusses such topics as establishing which activities require preparation of an EIA, preliminary assessment (screening) of proposed actions, timing and "scope" of the EIA, types of impacts to be considered, consideration of alternative actions, review and decision-making, and the role of the public. Each section begins with a short discussion of the issue under consideration, followed by descriptions of how the issue is treated in each of the four countries.

1. Introduction

Environmental degradation and the depletion of natural resources induced by human activities have attracted steadily growing concerns in the last decades. Such concerns made evident the necessity for the planning authorities to count on sound information about the possible environmental consequences of development actions. One of the tools available to satisfy this need is represented by the procedure of Environmental Impact Assessment (EIA).

This procedure involves the systematic identification and evaluation of the impacts on the environment caused by a proposed project. EIA is now applied worldwide. Its potential role in attaining sustainable development objectives was explicitly recognized during the 1992 Earth Summit held in Rio de Janeiro.

The EIA procedure generates a report, the Environmental Impact Statement (EIS) that summarizes the findings of the evaluation and discusses the acceptability of the predicted environmental impacts. Environmental Impact Assessment (EIA) aims at evaluating the full range of effects on the environment of a proposed project. It represents one of the tools that are employed during the authorization process to provide decision-makers with useful information for taking a decision (Fig. 1).

The overall goal of EIA is to encourage the consideration of environmental issues in decision-making so to "ultimately arrive at actions which are more environmentally compatible" [1].

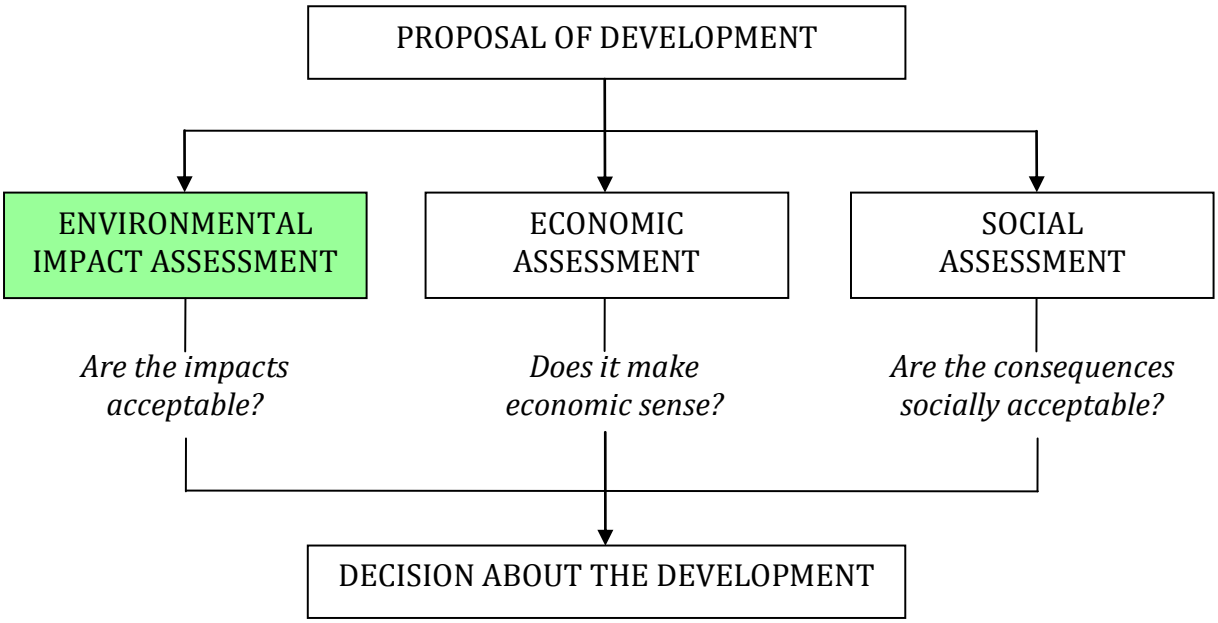

Fig. 1 The role of EIA in the decision process [2]

The procedure of EIA is regulated by legislation, and consequently it is generally different for different countries, or even between regions of the same country. EIA first appeared in a national legislation in the USA in 1969 (National Environmental Policy Act). Ever since, it has found its way in the legislation of many countries, within both the industrial and the developing regions of the world.

In the European Union the common principles for the environmental assessment of individual public and private projects were initially defined in the 1985 EIA Directive and amended in 1997, 2003 and 2009. To help Member States' authorities and developers manage the environmental consequences of construction projects more easily, the Commission has brought together all existing EU legislation governing EIA. The original EIA Directive and its three subsequent revisions have been combined to create a more compact, clearly translated and user-friendly version which came into force 17.02.2012

Despite the different legal prescriptions around the world, EIA consists of a rather standard set of logically organized stages (Fig. 2) that lead to the generation of a formal document, the Environmental Impact Statement (EIS).

The steps in bold must be followed under Directive 2011/92/EU. The steps which are not highlighted form part of good practice in EIA and have been formalised in some Member States.

Thanks to the European Union, investors in the Member States, including Slovak Republic, Czech Republic, Poland and Hungary, have to meet certain minimum requirements with a

view to protecting the environment. The regulations of Member States currently in force are fully in line with the directives and regulations of the European Union.

KEY STAGES	NOTES
Project Preparation	The developer prepares the proposals for the project.
Notification to Competent Authority	In some MS there is a requirement for the developer to notify the Competent Authority (CA) in advance of the application for development consent. The developer may also do this voluntarily and informally.
Screening	The CA makes a decision on whether EIA is required. This may happen when the CA receives notification of the intention to make a development consent application, or the developer may make an application for a screening opinion. The screening decision must be recorded and made public (Article 4).
Scoping	The Directive provides that developers may request a scoping opinion from the CA. The scoping opinion will identify the matters to be covered in the environmental information. It may also cover other aspects of the EIA process. In preparing the opinion the CA must consult the environmental authorities (Article 5 para. 2).
Environmental Studies	The developer carries out studies to collect and prepare the environmental information required by Article 5 of the Directive.
Submission of Environmental Information to Competent Authority	The developer submits the environmental information to the CA together with the application for development consent.
Review of Adequacy of the Environmental Information	In some MS there is a formal requirement for independent review of the adequacy of the environmental information before it is considered by the CA. In other MS the CA is responsible for determining whether the information is adequate. The developer may be required to provide further information if the submitted information is deemed to be inadequate.
Consultation with Statutory Environmental Authorities, Other Interested Parties and the Public	The environmental information and the results of consultations must be considered by the CA in reaching its decision on the application for development consent (Article 8).

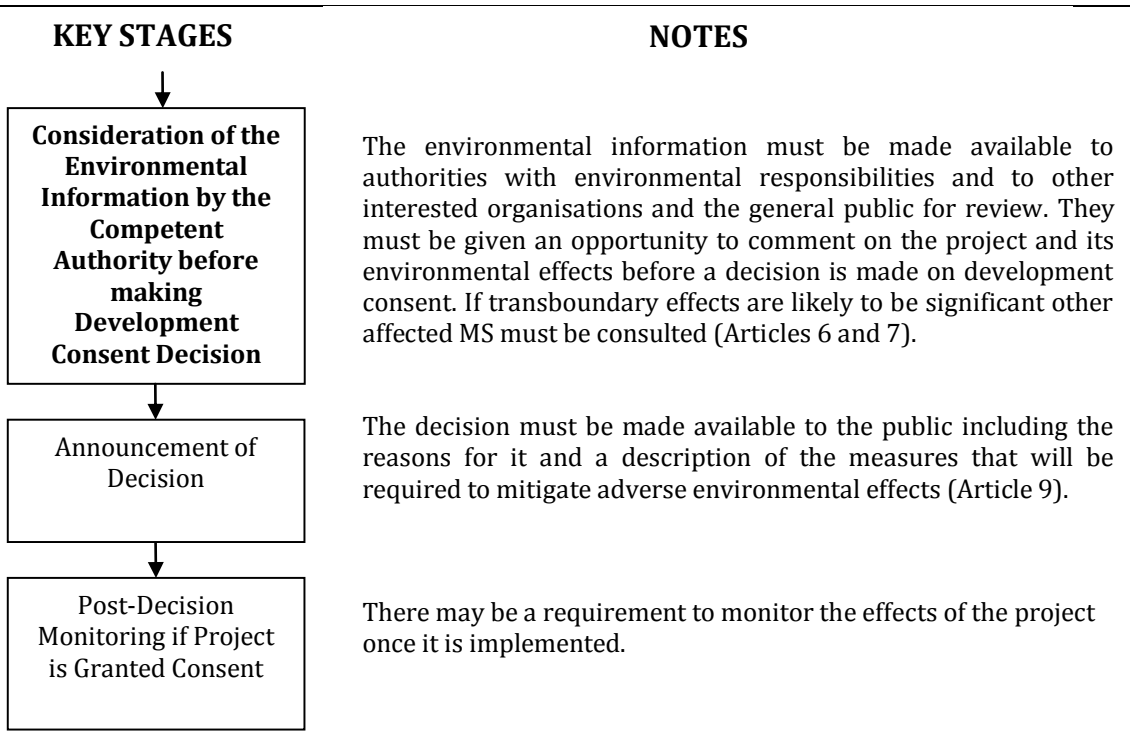

Fig. 2 Flow-chart of the different stages in a EIA [3]

According EIA Directive 2011/92/EU, the principles of the assessment of environmental effects should be harmonised, in particular with reference to the projects which should be subject to assessment, the main obligations of the developers and the content of the assessment. The Member States may lay down stricter rules to protect the environment.

In Slovakia EIA procedures for public and private projects that are likely to have significant effects on the environment have been in place since the adoption of the EIA Law in 1994. In 2006, a new EIA Law was approved, and EIA procedures began to be applied to buildings under the 2006 Planning Law [4]. At present Law No. 408/2011 Coll., amending and supplementing Law No. 24/2006 Coll. on the assessment of environmental influences, has been effective from 1st December 2011 [5].

EIA process was implemented into the Czech Republic's legal system on 1 July 1992, upon the entry into force of Czech National Council Act No. 244/1992 Coll., on environmental impact assessment [6]. The process constituted both an important element in the system of preventive environmental protection instruments and, simultaneously, a significant component of environmental policy. As of 1 January 2002, Czech National Council Act No. 244/1992 Coll., namely its section pertaining to impact assessment of projects, was superseded by Act No. 100/2001 Coll., on environmental impact assessment and amending some related regulations. At present is EIA in Czech Republic regulated by Act No. 38/2012 Coll., amending Act No. 100/2001 Coll., on EIA [7].

In Poland, the beginnings of a process of the EIA can be recognized by approval of the Law on Environmental Protection and Management of 1980, which regulated the investment process of constructions, which could have a negative impact on the environmental elements. Construction of such investments requires the discretion of the department of environmental protection, which may require the investor or investment owner to submit an expert opinion

on the impact of investment on the environment. Detailed scope and conditions for implementation of the EIA on the investment have been established in the Regulation of the Minister of the Environment. The work of the law forecasts and assessment of the environmental impact assessment began in Poland in 1994-1995 and in 2001; EIA became a part of a Law of environment protection. In 2008, the legislation was replaced by the new law on access to environmental information, public participation in environmental impact assessment, which has become a basic source of current legislation on EIA.

A comprehensive regulation of EIA came into force in Hungary in 1993 [8]. The first explicit requirement for EIA in Hungary was provided by the Government Decree on the Provisional Regulation of the Environmental Impact Assessment of Certain Private and Public Projects No. 86/1993. In Hungary the Government Decree No. 314/2005 (XII. 25.) on environmental impact assessment and the integrated environmental permit stipulates the necessity of the Environmental Impact Assessment [9].

2. Material and methods

This paper analyzes these laws in light of a variety of issues relevant to all EIA process. It discusses such topics as establishing which types of activities may require EIA and when the EIA process is carried out. The subjects of analyzes are preliminary assessment (screening) of proposed actions, timing and "scope" of the EIA, types of impacts to be considered, consideration of alternative actions, review and decision-making, and the role of the public. Each section begins with a short discussion of the issue under consideration, followed by descriptions of how the issue is treated in each of the four countries.

3. Results

3.1 Who pays for the EIA?

In principal, the costs incurred in preparing an EIA should be borne by the proponent of the project (i.e., the sponsor or developer). Thus, EIAs for private projects should not be paid for with public funds. In practice, however, preparation costs associated with private projects are frequently paid by the government agency. Even where the preparation costs are paid by a private party, the government agency is likely to incur costs of administering and supervising the EIA process.

Slovak Republic. Costs connected with the EIA of a strategic document are borne by the procurer, costs connected with the impact assessment of a proposed activity are borne by the proponent.

Czech Republic. The costs connected with EIA of plans, with the exception of costs connected with the public hearing and making information public, shall be borne by the notifier. The costs connected with the EIA of a conception, except for the costs connected with making information public, shall be borne by the submitter.

Poland. Costs connected with the impact assessment of a proposed activity are borne by the proponent.

Hungary. The costs connected with the participation of individual state authorities, civic association and non-governmental organisation in the assessment process of a strategic document and a proposed activity according to this Act are borne by individual subjects.

3.2 When does the EIA process begin?

The process should begin as early as possible. Because EIA is an important planning tool, it should be integrated into all stages of the planning process. Careful and early evaluation of environmental concerns can prevent costly mistakes later. The truth of this statement is attested to by the many projects that have had to be delayed, redesigned, or abandoned late in the planning process due to the discovery of unanticipated adverse environmental impacts.

Slovak Republic. The Slovak EIA law does not specify when the EIA process is to begin.

Czech Republic. The Czech EIA law does not specify when the EIA process is to begin.

Poland. The Poland EIA law does not specify when the EIA process is to begin.

Hungary. The Hungary EIA law does not specify when the EIA process is to begin.

3.3 What types of impacts must be considered?

A thorough understanding of the environmental impacts of the proposed action and its alternatives is essential to the success of the EIA process. Three types of impacts should be considered for each alternative: direct, indirect, and cumulative impacts.

Slovak Republic. EIA must to ascertain, describe and evaluate direct and indirect impacts of a strategic document and a proposed activity on the environment.

Czech Republic. The assessment shall include determining, description, assessment and evaluation of expected direct and indirect environmental impacts of implementing or not implementing the plan. The conception assessment shall include the identification, description and evaluation of expected direct and indirect impacts of implementing or not implementing the conception and its objectives for the whole period of its expected implementation.

Poland. The EIA involves the analysis and assessment direct and indirect impact of the project on the environment.

Hungary. The EIA must identify, describe, and assess the direct, indirect and combination direct and indirect impacts of the proposed activity.

3.4 Must mitigation measures be discussed or adopted?

The adverse impacts of a proposed activity can often be mitigated by limiting the size of the project, repairing or restoring aspects of the affected environment, performing maintenance activities during the life of the project, adding to or substituting for the affected environment, or by avoiding particularly harmful actions altogether.

Slovak Republic. EIA must to define the measures that will prevent the environmental pollution, mitigate the environmental pollution or prevent damage to the environment.

Czech Republic. Assessment of plans or conception shall also include a proposal for measures to prevent detrimental impacts on the environment through implementation of the plan, to prevent, reduce, mitigate or minimize such impacts, or to increase the favourable impacts on the environment of implementing the plan, including evaluation of the expected effects of the proposed measures.

Poland. Application for granting the permit for carrying out the project must contain the following information on the proposed project: Environmental protection measures;

Hungary. Is necessary to prescribe the measures to avoid adverse environmental impacts, reduce and - if possible - subject to termination.

4. Conclusion

The issue of environmental impact assessment in the Visegrad Group is currently much discussed topic and the protection of the environment has become an important obligation for any developing state. Thanks to the EU, investors in the Member States, including Slovakia, Czech Republic, Poland and Hungary, have to meet certain minimum requirements with a view to protecting the environment. The regulations of Member States currently in force are fully in line with the directives and regulations of the EU.

This paper has brought information to the some fundamental areas of environmental impact assessment process in V4 countries.The result is a comparison that can be supplemented by additional information about EIA process in Slovak Republic, Czech Republic, Poland and Hungary. Further research should bring as for EIA, the good examples found concern, for example: opportunities to challenge screening decisions; assessment of real alternatives;, sufficient time limits for Public Participation; information about opportunities for Public Participation, effective public notifications; information to the public on how and where their opinions were considered and if not why not.

Acknowledgments

The work was supported from the International Visegrad Fund's, Standard Grant No. 21210018 - „Assessment of the quality of the environment in the V4 Countries".

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[5] Zákon č. 408/2011 Z. z. ktorým sa mení a dopĺňa zákon č. 24/2006 Z. z. o posudzovaní vplyvov na životné prostredie a o zmene a doplnení niektorých zákonov v znení neskorších predpisov a o zmene a doplnení niektorých zákonov.

[6] Zákon České národní rady č. 244/1992 Sb. o posuzování vlivů na životní prostředí, ze dne 15. dubna 1992

[7] Zákon č. 38/2012 Sb., kterým se mění zákon č. 100/2001 Sb., o posuzování vlivů na životní prostředí a o změně některých souvisejících zákonů (zákon o posuzování vlivů na životní prostředí), ve znění pozdějších předpisů, ze dne 11. ledna 2012.

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Poszterek
Posters

TESTING SUSTAINABLE LANDUSE WITH EXPERIMENTAL GRAZING AND MOWING IN PROTECTED WET GRASSLAND LANDSCAPES

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The traditional managements established valuable semi-natural grasslands. Our aim was to investigate how the quality and stability of these human established valuable grasslands can be preserved and how is it possible to ameliorate them after abandonment by using traditional land management. We aim to develop optimal management when both biodiversity maintenance and the reliability of productivity are being considered.

In our survey we investigated the effects of different treatments on wet grasslands in West Hungary, next to Lake Kis-Balaton. The investigated treatments of the grasslands were mowing twice a year, grazing by water buffalo, grazing by Hungarian grey cattle, and abandonment of mowing and grazing. Every kind of treatments were replicated within three mowed and three grazed area. To investigate the vegetation structure at the different treatments we used the following methods: i) Braun-Blanquet method using 2×2 m plots, ii) fine scale sampling using 5×5 cm microplots along a 4 m long transect, iii) estimation of plant biomass. We assume that i) within a grassland the vegetation structure will shift due to the effects of the different treatments, ii) periodical mowing is sufficient to sustain reliable quantity of productivity and to improve the quality of hay production of grassland compared to grasslands managed only by long term grazing.

Our preliminary results show that the species composition of the three meadows were similar, however the species composition of the three pastures were variable likely due to the differences of the two animals' grazing behaviour and the various groundwater tables. However, no significant differences were found among the replicated plots within localities. We found that the estimated phytomass values correlates with the water supply. However, the high productivity does not necessary mean high quality of hay, therefore the importance of the vegetation composition should be emphasized. Short transect method could provide additional information about how the plants can coexist in a grassland according to frequency estimation in 2×2 m plots.

The study revealed good starting conditions for monitoring the shifts in species composition which will be caused by the different treatments.

AN EXCEPTIONAL PANNONIAN LOESS STEPPE REGENERATION THROUGH OLD FIELD SUCCESSION IN HUNGARY

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Nowadays the transformation of old fields into grasslands is receiving increased importance. In accordance of this we established a long-term project from 2010 on a strictly protected area in order to study the spontaneous old field succession adjacent to a natural loess meadow (Külső-gulya – Tompapusztai-löszgyep – steppe reservation near to Battonya, South-East Hungary). This area is unique in Hungary because of the excellent quality of soil and extension of the natural loess meadow. The project aims at exploring how the species composition of natural grassland effects on the manner and speed of secondary succession.

Temporal changes of species composition and the degree of the loess meadow regeneration will be monitored annually. Before performing examinations in the abandoned field and the meadow 13 and 4 large permanent quadrates (1000 m2) were established respectively. Within each plot we sampled a series of nested subplots of various sizes. Spatio-temporal pattern development will be monitored with four permanent 52 m long transects of units of 5 × 5 cm contiguous microquadrats. Our preliminary analyses show that diversity was increasing in succession (from 2011 to 2012). Ordination diagram shows strong compositional changes in oldfield vegetation while the loess steppe remained stabile between years. Distances to seed sources have important effect on species richness.

ASSESSMENT OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS IN V4 COUNTRIES - PARTIAL RESULTS

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Abstract

The article deals with presentation of partial results of project implementation: "Assessment of the quality of the environment in the V4 Countries (AQE V4)" Standard Grant IVF 21210018 supported by the International Visegrad Fund. The specific aims of project implementation are evaluation of e-survey in the field of environmental impact assessment (EIA) – analysis and comparisons, specification of interests. E-survey was implemented by questionnaires in order to identify the needs and current application of environmental impact assessment in practice in V4 countries.

The aim of the mentioned project is to promote the cooperation between the V4 countries in scientific, research, practical and educational level in the field of environmental assessment. Cooperation is focused on the transfer of a new scientific knowledge and experiences among partner countries and its practical application.

Introduction

Currently, the evaluation of environmental impacts is inevitable for sustainable development. Environmental impact assessment is implemented in various significant activities of country economy. Environmental impact assessment is applied through EIA Directive (Directive 85/337/EEC) and SEA (Directive 2001/42/EC), state environmental policy and implementing

programs of international conventions (e.g. the European Landscape Convention) and promoting the principles of sustainable development in partner countries.

The overall objective of this study is to review the current guidance materials in connection with the development of new techniques and methodologies as well as the practical experiences gained from the process of EIA/SEA in V4 countries: Poland (PL), Slovakia (SK), Czech republic (CZ) and Hungary (HU). The survey results will be compared in V4 countries and will be available on the project website: www.environ.agh.edu.pl and upcoming book after analysis.

Research Methodology

a) Preparation of the survey

The first step was a joint preparation of the questionnaire by all partners involved in the project. The final version of the questionnaire consisted of 20 questions: single-and multiple-choice answers and comments. The last two questions were dedicated to obtaining a respondents' answer or suggestion concerning improvement of the efficiency of the EIA / SEA process and comments, as well as suggestions on the problem.

The questionnaire can be divided into three thematic areas:

- characterizing the respondents; how many years they have been involved in the process, the number of EIA documents they have prepared and in which field of the economy,
- concerning their methods of work, characterizing types of instructions (guidelines), procedures, methods and software that respondents have applied for the EIA process,
- concerning the respondent's opinions regarding strengths and weaknesses of the EIA process, the main objectives of EIA, and publishing the about the process.

The process of obtaining a list of potential participants of the survey in the countries of the project partners was based on publicly available databases related to the EIA process.

b) The survey

The online surveys have been conducted simultaneously in the four countries in January-February 2013. About 200 people from each country were invited via e-mail to take part in the survey and 50 responses were expected (the 50 responses have already been obtained from

Poland, Slovakia and the Czech Republic, the survey in Hungary has not been completed yet, therefore, the charts presented below show responses of 31 respondents only).

The invited respondents completed the survey placed on the project website and the answers were anonymously sent to the e-mail addresses of the national coordinators of the project.

Currently an analysis and processing of the results is being carried on. Next the results from all V4 member states will be compared.

Preliminary results

On the basis of the survey results, a preliminary analysis of selected question has been carried out (table 1).

Table 1. A list of selected questions and answers from the questionnaire.

Questions	Answers
1. How many years have you worked with Environmental Impact Assessment (EIA)?	• 0-5 • 6-10 • 10+
4. How many EIA documentations have you been involved in the last three years?	• 0-5 • 6-10 • 11-15 • 16+
9. Which of the following stressors in the implementation of the EIA process do you specialize in?	• Air pollution • Water pollution • Waste • Noise and vibration • Radiation and other physical fields • Terrain deformation, changes to the landscape
14. In your opinion, what is the main purpose of EIA?	• Comply with the area development • Reducing the environmental impacts • Support for decision making • Tool for sustainable development • Assistance for investors

	• Reduce future costs • The basis for obtaining a building permit
16. What are the weaknesses of the current practice in EIA for the country?	• Insufficient assessment of alternatives • Limited consideration of cumulative impacts • Insufficient involvement of public • Subjectivity in predicting the environmental impacts • Insufficient monitoring • Limited quality control of EIA documentation • Poor coordination with land - planning documentation • Missing advisory department for the EIA process
17. Do you think the public is well informed on the steps of the EIA process?	• Yes • No • Partly
19. What procedures and methods do you use for identification and assessment of impacts?	• Methods Ad hoc • Checklists • Matrix • Networks • Mapping overlay • Forecasting methods • Multicriteria assessment • Environmental indicators

Partial results (Fig. 1,2,3,4,5,6,7) present general information about the EIA process, similarities and differences in methods of implementation and understanding of the process in all V4 countries.

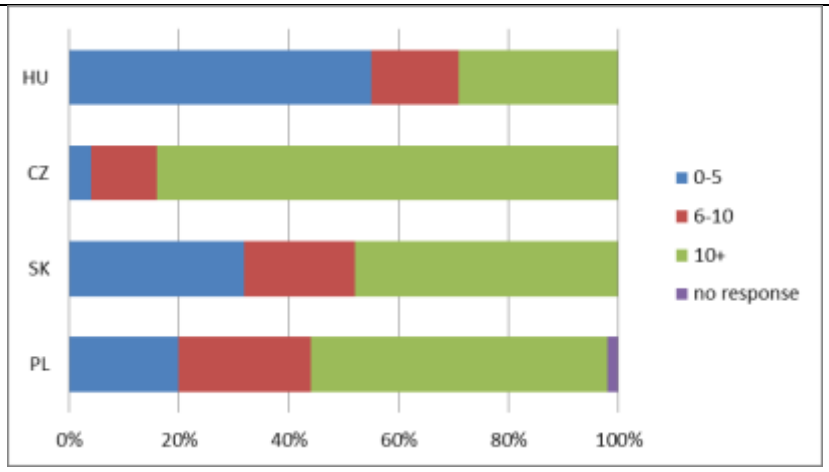

Fig.1: Respondent's answers to question No. 1: How many years have you worked with Environmental Impact Assessment (EIA)?

Most of the interviewees from all V4 countries have been taking part in the EIA process for more than 10 years, except Hungary, where respondents most often chose the time interval of 0-5 years.

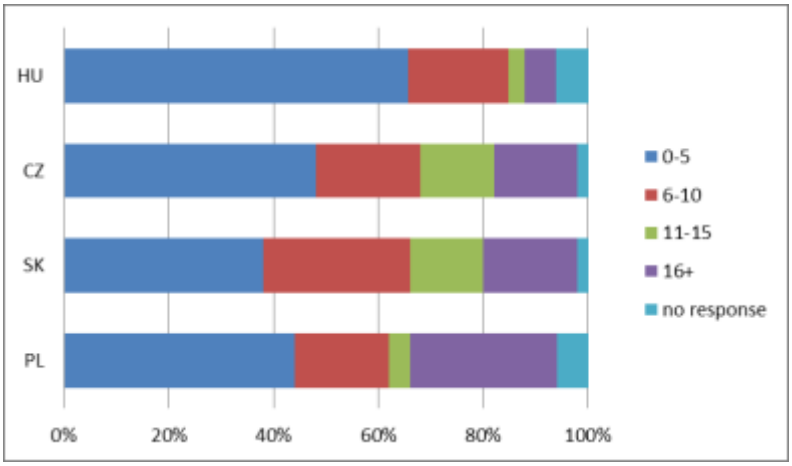

Fig.2: Respondent's answers to question No.4: How many EIA documentations have you been involved in the last three years?

In all countries, the highest number of respondents (38-65%) have been involved in preparation of up to 5 EIA studies during the last three years. The lowest percentage of the respondents have indicated the range of 11-15 of EIA studies (3-14%).

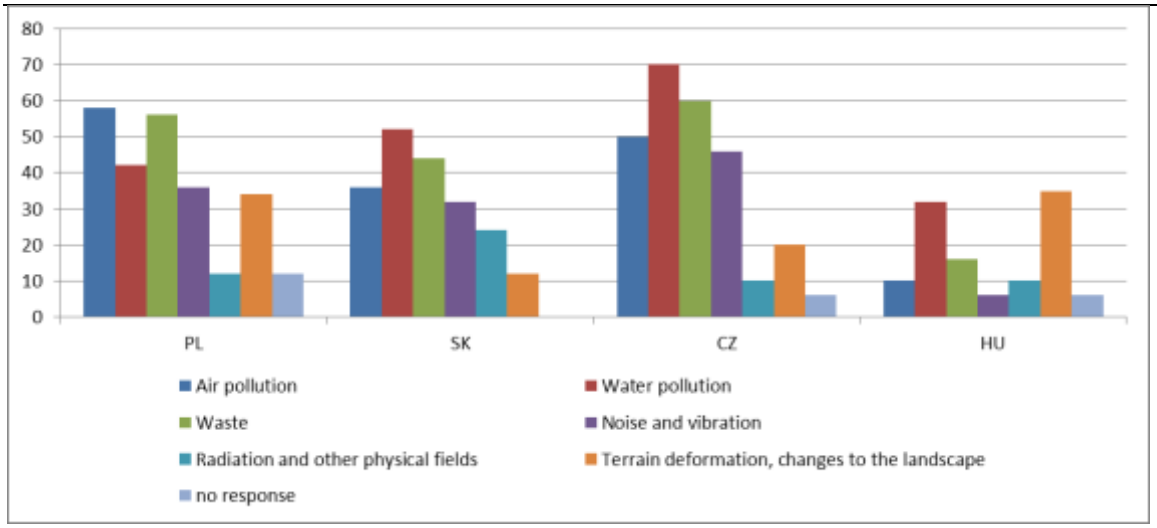

Fig.3: Respondent's answers to question No.9.: Which of the following stressors in the implementation of the EIA process do you specialize in?

On the basis of the results, similarities in response concerning types of emissions which the respondents specialise in when dealing with the EIA project, can be observed in all V4 countries. They include emission of pollution to air and water and waste production, while land deformation and landscape changes are more common in case of the respondents from Hungary. In Poland and the Czech Republic, the lowest percentage of the interviewees specialise in emission of radiation and other physical fields, in Slovakia land deformation and landscape changes are the least popular and noise emission and vibration in Hungary.

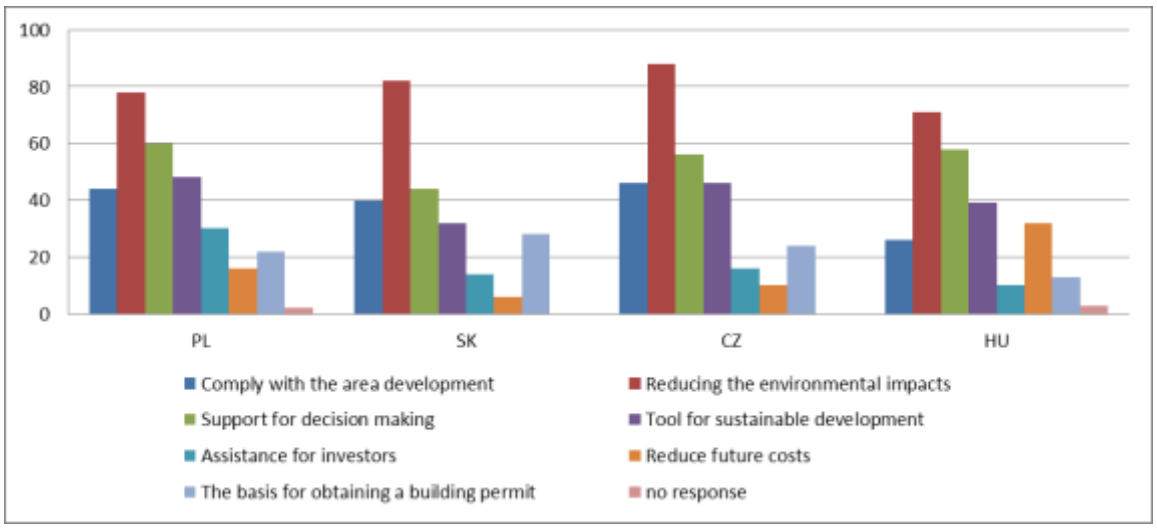

Fig.4: Respondent's answers to question No. 14.: In your opinion, what is the main purpose of EIA?

Elimination of the negative impact on the environment (71-88% of the interviewees) and support of a decision-making process (44-60% of the interviewees) was pointed as the main objectives of the EIA process by all the respondents. Reduction of future costs is the least popular answer in Poland, Slovakia and the Czech Republic and in case of Hungary it is the help for investors.

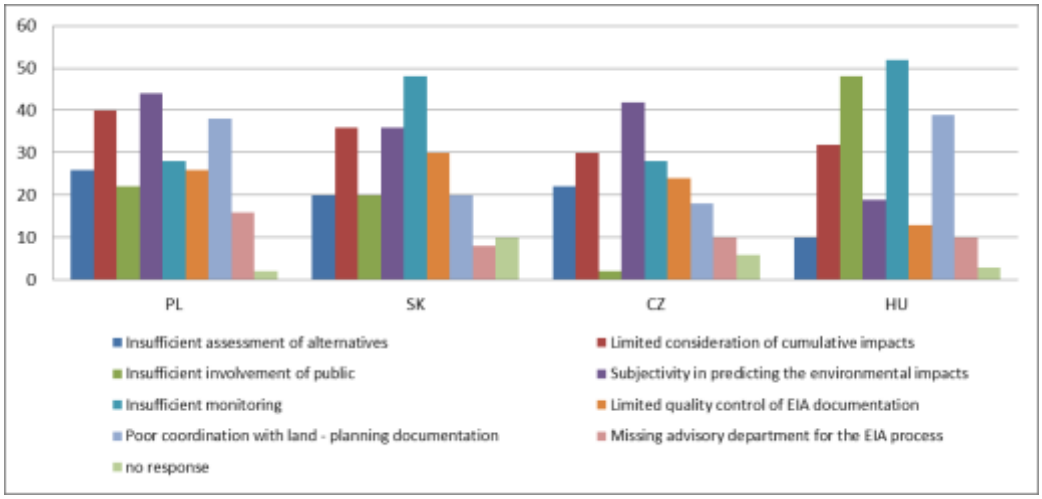

Fig.5: Respondent's answers to question No. 16.: What are the weaknesses of the current practice in EIA for the country?

Respondents from Poland and the Czech Republic indicated a subjective approach to assessing the impact (44-42%) and the cumulative impact (40-30%) poorly taken into account as the main weakness of the EIA process. In Slovakia, poor post-implementation analysis and monitoring (48%) was indicated as the most important problem.

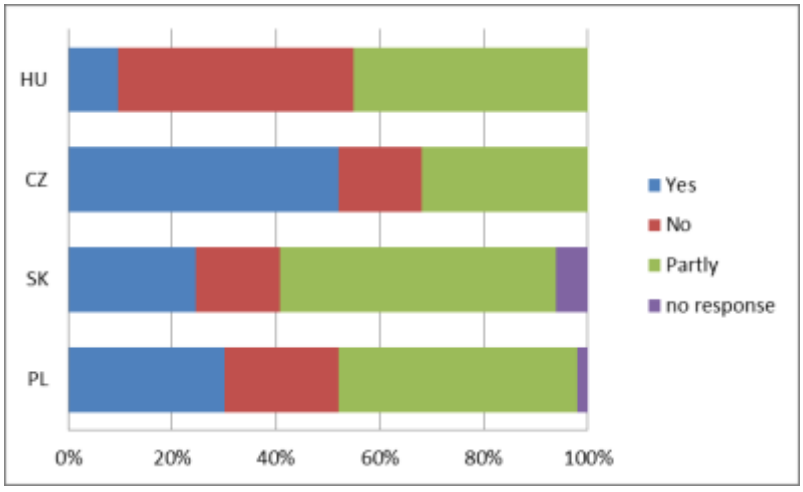

Fig.6: Respondent's answers to question No. 17.: Do you think the public is well informed on the steps of the EIA process?

Only respondents from the Czech Republic stated that the public was sufficiently informed about the stages of the EIA process (52%), the respondents from Slovakia and Poland answered that it was done partially (52-46%) and in every country there was a group of respondents (16-22%) who believed that the public was not sufficiently informed about the stages of the EIA process.

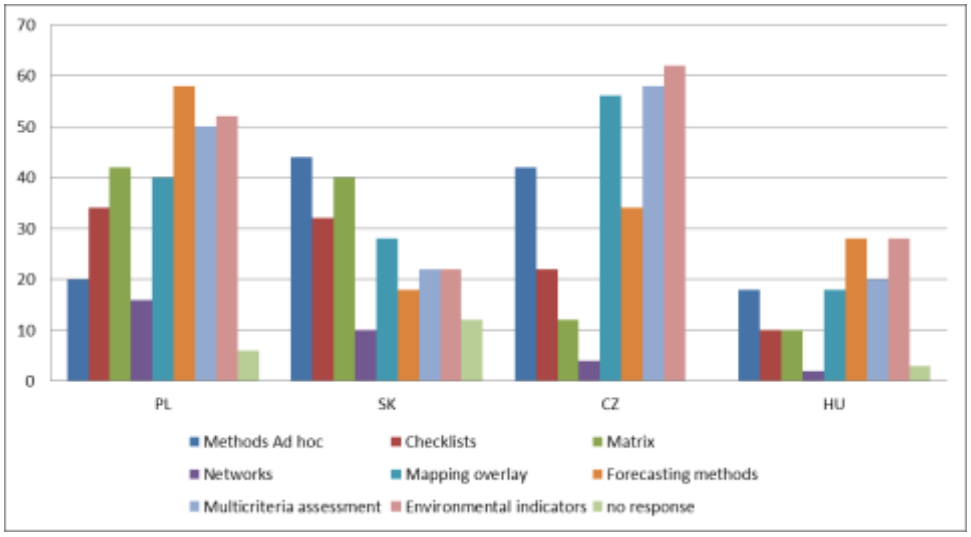

Fig.7: Respondent's answers to question No. 19.: What procedures and methods do you use for identification and assessment of impacts?

To identify and evaluate the impact of the planned activity on the environment, the survey respondents from Poland most frequently apply forecasting methods and environmental factors (52-58%), ad-hoc methods, tables and matrices are the most commonly applied in Slovakia (40-44%) and environmental indicators with comparative multi-criteria analysis and the method applying superimposing of maps are most often used in the Czech Republic (56-62%). Networks and system diagrams are the least popular among respondents in all V4 countries (4-16%).

Conclusions

Analysis of the data provided allows to draw the following conclusions:

- The EIA process mainly helps to eliminate the negative impact on the environment, supports a decision-making process and helps to achieve sustainable development of the area.
- Among the experts conducting EIA, specialists dealing with the emission of pollutions into the air, into water and waste production are in majority.
- The weak points of the EIA process in the V4 countries include a subjective approach to the impact assessment, insufficient considering of the cumulated impact and poor post-implementation analysis – monitoring,
- The level of information about the EIA available for the public is determined as partially good.

The above conclusions should be considered preliminary. Comprehensive results of the survey will be a part of the forthcoming joint publication, being prepared by the project partners, which main goal is to support the EIA in the V4 countries. The project will also include preparation of a lexicon of basic EIA/SEA terms in 5 languages.

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FELDARABOLÓDÓ HOMOKPUSZTAGYEPEK DUNAKESZIN ÉS KÖRNYÉKÉN

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Három homoki gyep maradványt vizsgáltunk Dunakeszin, a Szentendrei-szigeten és a Sződliget és Felsőgöd között található Debegió-hegyen. Mindhárom élőhely elszigetelt, fragmentált, de még őrzi az eredeti flóra és vegetáció képviselőit, a nyílt, évelő mészkedvelő homokpusztagyepet, homoki sztyeprétet, nyáras borókást és homoki tölgyest. Minden területen 9 darab 2 × 2 méteres cönológiai felvételt készítettünk, amelyek sarokpontjait GPS segítségével rögzítettük. A felmérés során előnyben részesítettük azokat a gyepeket, ahol az eredeti állapotú gyepszerkezet tanulmányozható volt. A területeken a következő védett és fokozottan védett növények élnek: csikófark *(Ephedra distachya)*, báránypirosító *(Alkanna tinctoria)*, homoki árvalányhaj *(Stipy borysthenica)*, homoki bakszakáll *(Tragopogon floccosus)*, Budai imola *(Centaurea sadleriana)*. A nyílt, évelő, mészkedvelő homokpusztagyep *(Festucetum vaginatae)* a Vörös Könyv szerint fokozott védelemre javasolt társulás, mindhárom mintaterületen ezzel a társulással találkozhatunk. Megfigyeléseink szerint a Debegió-hegyen lévő társulás volt a legszárazabb termőhelyen, míg a Dunakeszi termőhely a legüdébb volt. Végeredményül azt kaptuk, hogy mind a három élőhely jó természeti állapotú, bár kisebb zavarást okozó tényezők mindhárom termőhelyen előfordulnak. Dunakeszi Város Önkormányzata felismerte az élőhely fontosságát, elfogadta a benyújtott védelmi terv javaslatot és megkezdődött a terület helyi védetté nyilvánítása.

CHANGES OF THE BETA DIVERSITY ON GRAZED PANNONIAN GRASSLAND DUE TO C4 YELLOW BLUESTEM

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This study investigates how yellow bluestem affects biodiversity in a typical Pannonian grassland. The experiments were carried out on a sheep pasture (150 ha) situated in a northwest-southeast valley near Kisfüzes in the Mátra which is part of the North Hungarian Mountains.
Beta diversity (i.e. the fine-scale spatial variability of species compositions) was estimated by the realized number of species combinations sampled at various scales. Presences of rooting plant species were recorded along 52.2 m long belt transect of 1044 units of 0.05 m x 0.05 m contiguous microquadrats. To understand how individuals of different sizes interact, we used the space series analysis, i. e. we applied a series of increasing sampling unit sizes which fit to all sizes of plants and provide account of plant neighbourhood relationships at various relevant scales. The pairwise spatial associations between the spatial pattern of subordinate species richness, the patterns of rooting ramets of dominant grasses (*Bothriochloa ishaemum, Elymus repens, Poa angustifolia, Bromus inermis, Festuca rupicola* and *Festuca pseudovina*), and the pattern of local litter accumulations were also calculated.
According to the results alpha diversity was lower in all transects dominated by yellow bluestem. While ca. 30% of alpha diversity was lost due to yellow bluestem, beta diversity differences were much higher, 90% of compositional variability was lost due to *Bothriochloa ishaemum* invasion. Differences between Bothriochloa dominated and control transects showed a seasonal effect, because alpha and beta diversity were slightly lower in autumn. However, the negative effect of yellow bluestem on diversity was apparent in both seasons. We found positive association between the rooting yellow bluestem and the micro-scale presence of plant litter. Therefore, we assume that the effect of yellow bluestem is mediated by litter.

This study presents currently developed microhabitat types, forecasts and also draws attention to the danger that climate warming will probably enhance the spread of this detrimental C4 species.

WEED VEGETATION CHANGES IN GÖDÖLLŐ-HILL AREA RESPECTIVELY TO MARGINAL AND AGRICULTURAL AREAS

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Abstract

In our study 6-6 transects were made at the border of Kartal in the area of Gödöllő Hills area from 1994 to 2012. Relevés made-up from forest, grassland and mown edges. Coverage values of species recorded in 5 cases. For evaluation two-way cluster and DCA analysis were applied. Results indicate that species composition of transect of forest-grassland edge completely changed, impoverished and invasive *Ailanthus altissima* became dominant. Marginal area of lawn contained large amount of species. Its maintenance and mowing played an important role in conservation of species. In field quadrates, in general, the number of species decreased along from the edge. Edge effect prevailed in the first quadrate in case of woody turf quadrates, whereas in case of mowed roadside edges, larger number of species was detected in second quadrate.

Összefoglaló

A Gödöllői-dombság területén, Kartal határában 1994 és 2012-ben búzatáblában, erdős-gyepes és csak gyepes, kaszált szegélyben készítettünk érintkező kvadrátokból 6-6 transzszektet. A fajok borítási értékeit 5-ban jegyeztük fel. Az adatokat kétutas klaszter analízis és DCA analízis során értékeltük. Az eredmények alapján az erdős-gyepes transzszektek szegély fajkészlete teljesen átalakult, elszegényedett és az invazáziós bálványfa vált uralkodóvá. A gyepes szegély továbbra is nagy fajszámot tartalmazott. A gyep kezelése, kaszálása a fajszám megőrzésében jelentős szerepet játszott. A szántóföldi kvadrátokban általános, hogy a szegélytől haladva a fajszám csökken. A szegélyhatás erdős-gyepes társulásnál csak az első kvadrátban érvényesül, ezzel szemben a kaszált útszéli mezsgyében a 2. kvadrátban is kimutatható nagyobb fajszám.

COMPARISON OF SEMINATURAL AND MAN-MADE GRASSLAND

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We studied the vegetation of a 260 ha gray cattle pasture near Páskom, which can be found in Zámoly basin. We carried out our surveyes in May 2012. The pasture can be divided into five parts. One part, approximately the half of the area (150.83 ha), is an old-field grassland, which was overseeded 20 years ago. The other half of the pasture was restored (109.17 ha) in 4 different ways in 2009 and then was mowed until 2011. 7 relevés were made in each part of the pasture (the occurence of species and their cover value were recorded). The aim of our study was to compare the effects of the different restoration methods and mowing on the botanical composition of the pasture.

The results showed, that the grassland restored with hay transfer method was the most similar to the natural conditions. The greatest number of species was recorded in that part and the species of natural grasslands become dominant. The directly sowed and the spontaneous grassland parts separated chiefly from the semi-natural 20 years old grassland.

CSERJEIRTÁS HATÁSA A GYEPREGENERÁCIÓRA A KÜDŐI-HEGYEN

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Vizsgálataink célja az volt, hogy képet kapjunk, hogy egy másodlagos, emberi hatásra kialakult gyepen az egyszeri beavatkozás (cserjeirtás) után milyen folyamatok indulnak meg.

Kiválasztott helyszínünk, a Küdői-hegy, a Gödöllő-dombság délnyugati részén fekszik. Alapkőzete főként pleisztocén lösz, az eredeti vegetációnak, vagyis a száraz molyhos tölgyesnek és tatárjuharos-lösztölgyesnek csak maradványai találhatóak meg.

A mintavételi hely része a Natura2000 hálózatnak. Értékes löszgyep vegetáció található itt, ami több védett fajnak is otthont ad. Az 1970-es években a vizsgált területet még erdő fedte, körülötte szántóföld, legelő és cserjés. Valószínűleg az erdő kivágása után a területen legeltettek, a privatizáció során a gazdálkodással felhagytak, a gazdák többet nem foglalkoztak a területtel, mely most magántulajdonban van. Az elmúlt évek alatt az egykori erdő helyén galagonyás (*Crataegus monogyna* dominálta terület) alakult ki. 2007 decemberében önkéntesek a területet a cserjéktől részben megtisztították, azóta kezelést az új gyepen nem végeztek. A választott gyepfoltot galagonyás, vékony erdősáv és szántóföldek szegélyezik. A gyep É-ÉNY kitettségű, a tszf. magasság kb. 260 m, a lejtőszög 12-17% között változó. A területen 8-8 darab mintát vettünk fel a galagonyás és az irtott részeken, három alkalommal. 2x2 méteres mintanégyzetekkel dolgoztunk. A megtisztított területen létrejött gyepre átlagosan jellemző a magas fajszám, a változatos összetétel. Ezek a területek nagyon magas borítottságúak (átlagosan 90-100%), szemben a cserjés alatt talált alacsony, ingadozó borítottsági viszonyokkal (átlagosan 11%).

Az kialakult új élőhely zavartságát mutatja, hogy a zavarástűrők és generalisták dominálnak a tisztított területen és a specialista fajok távol maradnak. A gyep többszintű, zárt, fajgazdag, melyet széleslevelű pázsitfüvek (*Dactylis glomerata, Brachypodium pinnatum, Bromus erectus*), meddő rozsnok (*Bromus erectus*), közönséges tarackbúza (*Agropyron repens*) dominálnak. Ezeken kívül nagy borítással volt jelen még a sárgás sás (*Carex michelii*), pusztai csenkesz (*Festuca rupicola*) és a csattogó szamóca (*Fragaria viridis*) is.

A gyep a cserjésedés hatására elszegényedett, de az eredeti fajkészletet és dominanciaviszonyokat többé-kevésbé őrzi. Regenerációban előrehaladott, jó állapotú szekunder gyep. Az átlagos kvadrátonkénti fajszám csak 18 a tisztított területen, míg a galagonya alatt 11. Az összes fajszám 60 és 41 volt. A galagonya fedettsége teljes. Az itt élő fajok inkább erdőszélek, erdők jellegzetes növényei, mint a szárazgyepeké. Fajkészlete értéktelen, jellegtelen. A természetesebb gyepekben a fajgazdagsághoz hozzájárulnak a kétszikűek; jellemző magas arányuk. Itt, bár sokféle kétszikű képviselteti magát, mégis a pázsitfűfélék vannak túlnyomó többségben. Mindkét részen legmagasabb a kísérőfajok, a természetes zavarástűrők és a gyomfajok aránya. A társulásalkotók kis arányban képviseltetik magukat (*Bromus erectus, Festuca rupicola, Ligustrum vulgare, Brachypodium pinnatum)*.

A gyep értékét növelik az itt talált védett fajok: a tavaszi hérics (*Adonis vernalis*), a Janka-tarsóka (*Thlaspi jankae*) és a budai imola (*Centaurea sadleriana*).

Arra a következtetésre jutottunk, hogy a kialakult gyepet magára hagyni nem lehet, mert már most, néhány év elteltével láthatóan előretör a galagonya. A kaszálás meggátolná bizonyos egyszikűek dominánssá válását vagy az elcserjésedést. A gyepben nem okozna kárt, ha 5-6 évente lekaszálnák, valamint fékezhetné a gyominváziót is.

EFFECTS OF SHEEP PASTURING ON GRAZED AND ARABLE LANDS FROM NATURE CONSERVATION ASPECT

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In our study we analysed the vegetation of three areas with different grazing intensity (low-grazed lawn, low-grazed old field, intensely-grazed lawn). The areas are located in the Káli-basin in a sheep pasture near Kővágóörs, where we compared grasslands with similar soil and climate parameters but different state.

We noted the rooted plant species in 5x5 cm microquadrats along 3-3, one by one 26 m long transect in all areas. Moreover in 10-10 2x2 m quadrates we did coenological monitoring by Braun-Blanquet method.

According to the microcoenological examinations there seem to be an unambiguous variance between the areas: by the florula diversity the low-grazed grassland is the richest in species, while we got the lowest values in the intensely-grazed grassland. By studying the social behaviour types natural disturbance-suggering species dominate and in the low-grazed grassland the rate of the natural competitors was also high.

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