

ČESKÁ ZEMĚDĚLSKÁ UNIVERZITA V PRAZE

FAKULTA ŽIVOTNÍHO PROSTŘEDÍ

KOSTELECKÉ INSPIROVÁNÍ 2021

Sborník abstraktů

13. ročníku konference 18. - 19. listopadu 2021

Mahlerová Karolina & Harabiš Filip (Eds.)

Pořadatel konference:

Katedra ekologie, Fakulta životního prostředí,

Česká zemědělská univerzita v Praze, Kamýcká 129, 165 00 Praha 6 - Suchbát



978-80-213-3145-7

Seznam příspěvků

A

Aguilar-Palma

- Recycling of ZIF-8 and UiO-66-NH₂ nanoporous metal-organic compounds used for CO₂ separation in Mixed Matrix Membranes 11

Astray

- Pb isotopes as tracers of anthropogenic pollution. Influence of traffic from the D5 highway on a land plot 12

B

Bobotová

- Analysis of three convective storms using polarimetric X-band radar and satellite data 13

Buchtelík

- Sorption capabilities of biochar as a green roof substrate additive 37

D

Das

- Bonding Performance of CLT from Low-Grade Hardwood..... 38

Dvořáková

- Post project analysis in the sense of EIA efficiency for constructions of road transport infrastructure 39

Dagsson-Waldhauserova

- Updates on High Latitude Dust research and IceDust network 15

E

Elster

- Polar Ecology, Climate Change Biology and Czech Arctic Research Infrastructure in Svalbard 9

F

Floriančíčová

- Phylogenetic analysis of tardigrade tubulins 49

G

Gábová

Identification of the optimal ecological flow for macrozoobenthos of the Únětický creek.....	17
--	----

Gaigr

Fistful of Data information sources on Czech biodiversity monitoring and mapping, their integration and use	40
---	----

Gajdošová

Long-term trends and drivers of female body condition - implication for reproductive success in Common Pochard (<i>Aythya ferina</i>) and Tufted Duck (<i>Aythya fuligula</i>).....	18
---	----

Garguláková

Interspecies differences in the laterality of the hand that initiates allogrooming in two species of tribe Cercopithecini	41
---	----

H

Hanušová

Efficiency, Effectiveness and usefulness of the EIA proces: case meta-analysis	19
--	----

Hladík

Road transportation and its impact on bird diversity in fragmented agriculture landscape	42
--	----

Homolková

Adult sex ratio in duck breeding populations in Třeboň Biosphere Reserve.....	43
---	----

Hüttnerová

3D maps and spatial analysis in a forest stand	21
--	----

J

Jungová

Worldwide cooperation of scientists in the project BRESOV. Genetic analysis of downy mildew resistance and identification of molecular markers linked to resistance in <i>Brassica oleracea</i> varieties	44
Origin and genetic variability of populations an invasive plant <i>Rumex alpinus</i> L. in the Krkonoše Mountains <i>acea</i> varieties.....	59

K

Kleprlíková

Detection of newts in terrestrial environment by dog	21
--	----

Klimková

Small terrestrial mammals communities in spoil heaps - comparison of agricultural reclamation and spontaneous succession	22
--	----

Kumar

Synthesizing and characterizing the green nanocomposite for dual effect of adsorption and catalysis in wastewater treatment	23
---	----

Kutlvašr

From West to East and back again: Trans-Siberian Railway as a continental pathway of plant invasions	45
---	----

Kuželková

Do tree species affect the temperature and moisture regime of soil? A case study from silty-loam forest soil	46
--	----

L

Lehm

Allotments as a source of alien and invasive alien species	47
--	----

Leiner

Relation of the captured amount of <i>Ips typographus</i> in pheromone traps to the development of the population.....	24
--	----

Lewandowska

Isotopic fractionation of Cd and Zn in contaminated soils.....	48
--	----

M

Madhuswini

Analysis of significant attributes of preserved field patterns - Ústecký Region	25
---	----

Maslejová

Facebook as a tool for monitoring illegal trade of Hill Mynas (<i>Gracula</i>) in Indonesia.....	26
--	----

Merei

Enhancing the wastewater treatment in Tehovec by using a Constructed Wetland	27
--	----

O

Omara-Ojunga

Short-term incubation of microgranules in soil and its nutrient retention	50
---	----

P

Poláková

Effective precipitation water management on functional types of development areas of urbanized areas..	51
--	----

Pospíšilíková

Of Chenopodium and Man Covered traces of the most widespread weed today.....	28
--	----

Pracná

Effect of terrain and acquisition characteristics on ICESat-2 and GEDI laser altimetry data	29
---	----

Prajzlerová

Indices based on Earth observation data as indicators of bird diversity at multiple scales	52
--	----

Procházka

Tree species classification using multispectral data acquired by the WorldView-2 satellite in Doupovské hory	30
--	----

Provazník

Quantification of genetic variability of hyperspectral reflectance within local Scots pine populations	31
--	----

S

Seyedsadr

Biochar considerably increases the easily available water and nutrient content for plants in low organic soils amended with compost and manure	53
--	----

Siretckaia

Are Greater flamingos equally protected between breeding and migration seasons?	32
---	----

Š

Šrobár

Climate changes are complex and non-linear	54
--	----

T

Tugushev

Application of natural succession in the restoration of post-mining sites in the Moravian-Silesian region ...	33
---	----

Turková

Railways as a source of alien plants	55
--	----

Tyšer

Offspring development of the <i>Ips typographus</i> (L.) in various parts of the tree stem.....	34
---	----

V

Válová

Indoor air quality of museums and libraries	35
---	----

Venturo

Effects of natural and seminatural elements on the composition and dispersion of carabid beetles inhabiting an agroecosystem in Northern Italy	36
--	----

Vodrážková

Smell of fear: the presence of an invasive turtle influences embryonic and larval development in the common frog.....	56
---	----

Vondráček

Automatic insect identification - is the "machine" better than human?.....	10
--	----

Vostarek

Are disturbance regimes changing in European primary forests?	57
---	----

Z

Zemlerová

Occurrence of tree-related microhabitats in spruce primary forests	58
--	----

Polar Ecology, Climate Change Biology and Czech Arctic Research Infrastructure in Svalbard

Elster Josef

Centre for Polar Ecology, Faculty of Science, University of South Bohemia, Na Zlaté Stoce 3, České Budějovice and Centre for Phycology, Institute of Botany, Czech Academy of Science, Dukelská 135, Třeboň

Goals of our research embrace advancing fundamental knowledge on the ecology and evolution of polar species, formed by seasonal as well as long term interactions with the biotic and abiotic components characteristic of the Arctic and Antarctica environment, including human impact. Our research covers three over-arching interlinked themes:

- Climate change biology
- Seasonal ecology
- Spatio-temporal dynamics of species and systems

In these ecological studies of this complex ecological problem we are using evolutionary very old photosynthetic microorganisms, the prokaryotic cyanobacteria and eukaryotic microalgae as indicators of these changes.

Automatic insect identification - is the "machine" better than human?

Vondráček Dominik

Department of Entomology, National Museum, Cirkusová 1740, 193 00 Prague;
Department of Zoology, Faculty of Science, Charles University, Viničná 7, 128 00
Prague, dominik.vondracek@nm.cz

Museums accumulate unquantifiable amount of insect material, but the identification of each specimen is very time consuming, even if it is a primary and fundamental need for subsequent faunistic, taxonomic, phylogenetic, or ecological studies, including subsequent application in nature conservation and its diversity. Sorting into orders and families takes a huge amount of time, and identification at the genus and species level is then still strongly dependent on the number of experts dealing with chosen groups. How to get out of it? What about using the "artificial intelligence"? More precisely, convolutional neural networks together with the so-called computer vision, deep- and transfer-learning and image classification. At the end of the 20th century some of these elements began to be used, but it was the combination of all of these, and the enormous technological shift associated with sufficient computing power that pushed the use of "artificial intelligence" significantly forward. Currently, there is a plenty of studies with high success in identifying insects from photographs. Many mobile applications using machine learning are also in use all over the world, which collect enormously large amounts of data from the public. So, the question is not whether it works. The question is: What can we achieve with these new tools in facilitating our never-ending work, that is, the identification of captured organisms?

Keywords: insect identification, image classification, artificial intelligence, machine learning, convolution neural networks

Recycling of ZIF-8 and UiO-66-NH₂ nanoporous metal-organic compounds used for CO₂ separation in Mixed Matrix Membranes

Aguilar-Palma Roy

Universidad de Salamanca, 37008 Salamanca, Spain, aguilar_palma@fzp.czu.cz

Carbon dioxide is the most common and undesired impurity in several processes. In natural energy gases there is a reduction in the total energy content for the CO₂ contamination. In industrial pipelines CO₂ and water vapor mixtures can produce a corrosive acid and damage metal equipments. Certainly, the impact that CO₂ can exert on the environment is one of the main reasons to consider a separation of gases. Traditionally the gas separation includes methods like the amine-based absorption with a high energy consumption, a complex operation and with considerable impact on the environment. Here is where membrane-based separation is being considered as a promising alternative. The Mixed Matrix Membranes (MMMs) are a high technology concept that combines Metal Organic Framework (MOFs) with polymeric or ceramic supports to increase the selectivity and adsorption efficiency in gas separations. ZIF-8 and UiO-66-NH₂ are one of the most mentioned MOFs compounds used for CO₂ separation and adsorption due to their structural properties, chemical stability and recyclability. In the present document an extended revision about desirable characteristics in nanoporous crystalline materials incorporated in MMMs for CO₂ adsorption is realized. ZIF-8 and UiO-66-NH₂ are studied regarding chemical structure, characterization, synthesis and recycling methods. Finally, a conceptual comparison between these two materials are discussed for the specific case of separation of CO₂ from a CH₄/CO₂ mixture.

Keywords: MOF, Mixed Matrix Membrane, ZIF-8, UiO-66-NH₂, CO₂ adsorption, nanoporous crystalline material recycling.

Pb isotopes as tracers of anthropogenic pollution. Influence of traffic from the D5 highway on a land plot

Astray Uceda Blanca, Šípková Adéla, Chrastný Vladislav

FES CULS Prague, Kamýcká 1176, 165 00 Praha-Suchdol, astray_ucedab@fzp.czu.cz

Emissions from human activities can severely deteriorate the health and quality of the environment. The release of potentially toxic metals is of special concern since they can be highly dangerous to fauna and flora. The combination of metal concentration and lead isotope analyses is a useful tool for the identification of human metal pollution in the environment. The presented study case aimed to determine whether a plot of land alongside the D5 highway (Czech Republic) is affected by metal pollution from traffic. To investigate this, we took samples at different distances from the road and analyzed their metal content and Pb isotopic signal. Our hypothesis was that the concentration of metals such as Pb, Cd, Zn, Sb, Pt or Re should show a trend according to the distance to the road, and the Pb isotopic composition should help confirm traffic as a source of metals. Lead from gasoline emissions should present lower $^{206}/^{207}\text{Pb}$ isotopic ratio, while lead from coal burning, or bedrock should have a higher ratio. The concentration of lead in soil was quite high, while the background was about 40.9-70.1 mg/kg (400 m from the road), near the road we found 302-491 mg/kg. There was a slight increasing trend in the first 100 m to decrease again in the last 100 m, which could be justified by the flying distance of metal-bearing particles from the emission source. The $^{206}/^{207}\text{Pb}$ ratios lied between 1.180 and 1.196, far from the 1.11 average signal related to gasoline in Czech Republic. This could indicate that the lead from gasoline is well mixed with the “newer” lead in the atmosphere such as coal burning, or that there is another predominant source of fertilizing. The next step will be the determination of lead signal from the local bedrock to confirm the origin of lead in the field and to calculate the relative contribution of each source.

Keywords: anthropogenic metal pollution, source tracing, lead isotopic analysis

Analysis of three convective storms using polarimetric X-band radar and satellite data

Bobotová Gabriela

Faculty of Environmental Sciences, Czech University of Life Sciences, Kamýcká 1176, 165 00 Prague, bobotova@ufa.cas.cz

Convective weather brings severe meteorological phenomena that can endanger human lives and cause significant economic damage every year. Convective severe phenomena that occur in Central Europe include, in particular, intense rainfall accompanied by flash floods, strong winds and extreme wind gusts, lightning and, in exceptional cases, tornadoes. Therefore, considerable attention has been paid to the research of convection, and due to the nature of convection, radar and satellite remote sensing devices play a crucial role in this research. Radars and satellite measurements, including airborne radars, complement each other because they see storms from different directions. The mutual use of radar and satellite data in cloud and storm research can be found in a number of papers and they are also used in weather forecasting. Meteorological satellites and radars are suitable for monitoring current state of the atmosphere and for remote exploration of clouds and cloud-related phenomena such as storm structures, for instance Mesoscale convective systems, and the relationships between clouds and lightning in the atmosphere. The joint use of radar and satellite measurements began in the 1970s and 1980s and has further continued with the technological advancement of measuring instruments. Examples of the use of radar and satellite measurements for remote atmospheric research are publications. The presentation focused analyze three convective events where a severe convective storm passed near or over Milešovka meteorological station. Events were based on data from the Meteosat Second Generation (MSG) satellite, the FURUNO X-band radar and standard meteorological observations. The observatory is located at the top of hill and a new polarimetric and Doppler X-band radar FURUNO has been installed and put into operation as a device for cloud investigations. The analysis was based mainly on polarimetric and Doppler radar data measured in vertical cross-sections (RHI - Range-Height Indicator). Radar data were used also for the classification of hydrometeors by a newly developed XCLASS algorithm. In addition to radar measurements, rapid scan data from the geostationary satellite Meteosat of Second Generation were used. The obtained results confirmed that the FURUNO radar is a suitable tool for the study

of convective storms. At the same time, the results of the XCLASS algorithm show its usability for determining the types of hydrometeors in the cloud, however further development is needed. One of the goals is to validate data, measured by newly installed radar, and their use in investigations focused on cloud research, because the year 2021 was the first year of operation of the radar on Milešovka observatory.

Keywords: X-band radar; MSG; convective storm; hydrometeor classification

Updates on High Latitude Dust research and IceDust network

Dagsson Waldhauserova Pavla^{1,2}, Olafur Arnalds¹, Renard Jean-Baptiste³, Meinander Outi⁴, Moroni Bea⁵, Kavan Jan⁶, Vitek Alex², Burdova Nathalie^{2,7}

¹Agricultural University of Iceland, Faculty of Environmental Sciences, Hvanneyri, Iceland; ² Czech University of Life Sciences Prague, Faculty of Environmental Sciences, Czech Republic; ³ LPC2E-CNRS / Université d'Orléans, Orléans, France; ⁴ Finnish Meteorological Institute, Helsinki, Finland; ⁵ Università di Perugia, Italy; ⁶ Faculty of Science, Masaryk University, Brno, Czech Republic; ⁷ Mittuniversitetet Sweden, Sweden

HLD was recognized as an important climate driver in Polar Regions in the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate in 2019. Volcanic dust has similar impacts on snow/ice as Black Carbon in terms of albedo reduction and water retention capacity of snow. In atmosphere, Icelandic dust is an efficient ice-nucleating particle (INP) having impacts on the mid- to high-latitude mixed phase clouds, exhibiting an activity comparable or exceeding common desert dust. HLD providing increased INP concentrations can lead to a reduction in supercooled water and a decrease in shortwave reflectivity of clouds to produce a positive climate feedback. Icelandic dust has impacts on atmosphere, cryosphere, marine and terrestrial environments, as well as socio-economic sectors. Extreme dust storms in Iceland showed that air quality can be impaired, PM₁₀ concentrations exceeding 50,000 µg m⁻³ (one-min mean) while aeolian transport of 11 tons m⁻¹ during a single storm measured. There is also an evidence that volcanic dust particles scavenge efficiently SO₂ and NO₂ to form sulphites/sulfates and nitrous acid. High concentrations of volcanic dust and Eyjafjallajökull ash were associated with up to 20% decline in ozone concentrations in 2010. In marine environment, Icelandic dust with high total Fe content (10-13 wt%) and the initial Fe solubility of 0.08-0.6%, can impact primary productivity and nitrogen fixation in the N Atlantic Ocean, leading to additional carbon uptake. Recently, first operational dust forecast for Icelandic dust is available at the World Meteorological Organization Sand/Dust Storm Warning Advisory and Assessment System (WMO SDS-WAS) at <https://sds-was.aemet.es/forecast-products/dust-forecasts/icelandic-dust-forecast>. HLD has become to be a part of discussion of the coalition of the United Nations (UN) Convention to Combat Desertification. New UN global dust source base map includes large active areas of HLD sources. The largest dust field campaign has been organized in Iceland in 2021 where 11 international institutions with > 70

instruments cooperated (Barcelona Supercomputing Centre, Darmstadt, Berlin and Karlsruhe Universities, NASA, Czech Uni of Life sciences, Agricultural Uni of Iceland etc.). Icelandic Aerosol and Dust Association (IceDust) has grown and has 99 members from 47 institutions in 18 countries. More info about the activities can be found on the IceDust website: <https://icedustblog.wordpress.com/>.

Keywords: Volcanic dust, air pollution, cold deserts, aerosol, Arctic, albedo and melt.

Identification of the optimal ecological flow for macrozoobenthos of the Únětický creek

Gábová Šárka

Czech University of Life Science Prague, Faculty of Environmental Sciences,
Department of applied ecology, Kamýcká 129, Prague-Suchdol, 165 00,
gabovas@fzp.czu.cz

This contribution presents my research from 2016 which evaluates optimal ecological flow of Únětický creek. IFIM methodology and PHABSIM software was used for evaluation. PHABSIM simulates changes in habitat taking on account changes in discharge for evaluated species and their life stages. The result of simulation is WUA - weighted usable area which describes usable area for selected species and their life stages depending on discharge. Input data were collected during the year 2014. Únětický creek is left affluent of river Vltava within Roztoky city limits. Únětický creek is approx. 15 km long and its spring is close to Letiště Václava Havla airport in Kněževes village. There were 4 cycles of measuring on 9 sites during this study and 7 out of these 9 sites were used for suitable ecological discharge evaluation. There were *Gammarus fossarum*, *Baetis rhodani*, *Cheumatopsyche lepida*, *Erpobdella octocollata* indentified as the most frequent species in evaluated sites and were used for suitable ecological discharge evaluation. As biological input for PHABSIM, suitability index of these species, which evaluates population from microhabitat perspective (velocity, depth and channel index), was used. Suitability curves are based on approx. 260 collected samples. Optimal ecological flow for macrozoobenthos of Únětický creek is range 0,05 - 0,07 m³/s, maximal flow 1,3 - 1,8 m³/s (which corresponds to 20 % of WUA maximum value), minimal value is possible to set only for *Baetis rhodani* and *Gammarus fossarum* and corresponds to 0,03 - 0,04 m³/s (50-70 % optimal discharge).

Key words: optimal ecological flow, urbanization, stream, urban drainage, macrozoobenthos

Long-term trends and drivers of female body condition - implication for reproductive success in Common Pochard (*Aythya ferina*) and Tufted Duck (*Aythya fuligula*)

Gajdošová Dorota *, Musil Petr, Zouhar Jan, Musilová Zuzana, Neužilová Šárka

Department of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, Praha - Suchbát, CZ-165 21, Czech Republic, *gajdosovad@fzp.czu.cz

Body condition is an important driver of adult survival and consequent fitness of individual bird. The long-term changes in body condition are likely affected by recent shifts in climatic and environmental conditions and even result in changes in population dynamic of the species. To help explain the mechanism shaping body condition and its consequences for reproductive success, we analysed the long-term pattern in body condition of breeding females of declining sympatric diving duck species Common Pochard *Aythya ferina* and Tufted Duck *Aythya fuligula*. We used the data obtained from 194 females of Common Pochard and 322 females of Tufted Duck breeding on fishponds in South Bohemia, Czechia between 2004 and 2020. We calculated two indices of body condition based on the residuals of relationship between body mass and two linear skeletal dimensions (wing and tarsus length). The long-term increase in body condition was confirmed in both Common Pochard (wing and tarsus - based indices) and Tufted Duck (tarsus - based index). The effect of weather conditions in previous winter (NAO Index), water transparency, coloniality gradient and reproductive investment on body condition was not confirmed. Female body condition affected mean egg mass in both species, i.e., females in better body condition laid larger eggs. Positive correlation between body condition and hatching success was found in Common Pochard. Our results did not provide evidence for decreasing hatching success in studied species, directly affected by loss of body condition in breeding females. The above-mentioned population changes could be more likely related to changes in duckling survival and recruitment to the breeding population, closely connected to limited food availability. This relationship seems important for further study of Common Pochard and Tufted Duck population decline.

Keywords: body condition index, diving ducks, climate change, egg mass, hatching success

Efficiency, Effectiveness and usefulness of the EIA proces: case meta-analysis

Hanušová Tereza

Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, Praha - Suchbát, 165 00, Czech Republic, hanusovat@fzp.czu.cz

The diploma thesis assesses the issue of the Environmental Impact Assessment process (EIA), with an emphasis on evaluating the efficiency and effectiveness of the process. The analytical part of the thesis then focuses on the cumulative effects of the categories of projects and their impact on the environment and evaluation within the territory of the regions of the Czech Republic. The theoretical part of the thesis describes the historical development of the EIA process, its legislative anchorage and the basic steps applied in the Czech Republic. Furthermore, the effectiveness of the EIA process is explained, which can be evaluated on the basis of four historically given dimensions - procedural, substantive, transactive and normative. Similarly, this section describes efficiency, which is much more difficult to evaluate than efficiency. The problematic aspect of evaluating the effectiveness of the EIA process is the lack of methodology. Even so, key indicators of the efficiency of the EIA process, which are used by most states that carried out the EIA process efficiency assessment, have been defined. It is about determining the significance of impacts, participation during the EIA process and post-project analysis/monitoring. The result of the diploma thesis is an analysis of the data provided by CENIA, which is supplemented by additional data concerning the impacts of individual categories of projects. A partial result of the thesis is the aforementioned overview of cumulative influences in individual regions of the Czech Republic.

Keywords: Evalution, indicators, assessment, post-auditing, environmental protection

3D maps and spatial analysis in a forest stand

Hüttnerová Tereza, Surový Peter

Department of Forest management, Faculty of Forestry and Wood Sciences, Czech University of Life Sciences, Kamýcká 129, Prague 165 21, Czech Republic; huttnerovat@fld.czu.cz; surov@fld.czu.cz

3D mapping and unmanned aerial vehicles (UAVs) are important components for the future development of forest technologies. The use of UAVs for forestry applications is still under investigation but with great potential in the future. In manual (conventional) planting, a forester modifies the plots for afforestation; it is necessary to level soil substrate for water accumulation. Using UAV is possible to locate suitable plots for future reforestation without manual labour immediately. This can save time and finances; it is negligible with a small afforestation plot but noticeable with afforestation of large clearing areas. Data was collected in forest stands near Kostelec nad Černými Lesy; specifically, four plots after logging were selected. This case study is based on spatial analysis and 3D mapping to study microrelief and the surroundings of the clearing areas. For this purpose, it was used a multicopter Phantom 4 Pro with an RGB camera due to the possibility of coordinating flight speed and hovering. Data collection was taken place on two levels of detail: i) at the level of microrelief in very high spatial resolution, ii) in forest stands after thinning in medium spatial resolution. The resulting data was processed using spatial analysis in the GIS. At the level of microrelief was determination of water accumulation sites, in forest stands after thinning was simulated the position of the Sun and determined solar radiation of the terrain. The main goal of this research is to create methodology, which will be financially affordable and user-friendly for the foresters. Terrain analysis using UAV could provide faster and more accurate information of suitable plots for planting. This research will be further followed by study focused on the restoration of forest stands using UAVs with a specially designed planting superstructure.

Keywords: unmanned aerial vehicle, 3D maps, spatial analysis, GIS, forest stands

Detection of newts in terrestrial environment by dog

Kleprlíková Lucie

Czech University of Life Sciences Prague, Faculty of Forestry and Wood Sciences,
Kamýcká 129, Praha 6 - Suchbátka, 165 00, Czech Republic; kleprlikova@fld.czu.cz

There has been a decrease in the number of amphibians all over the world and in the Czech Republic in recent decades. The great newt (*Triturus cristatus*) is islet-concentrated in only a few areas due to the fragmentation of the landscape. The alpine newt (*Ichthyosaura alpestris*) is currently threatened by factors such as large-scale felling in bark beetle-damaged areas and the extinction of breeding habitats. Implemented protection of both species is based on monitoring the localities of their occurrence and on the knowledge of their ethology. Due to the hidden way of life in which newts migrate circularly between the aquatic and terrestrial environments, it is currently based mainly on the data from aquatic environment. Some popular articles mentioning a new method of biomonitoring amphibians in a terrestrial environment with the help of the dog's sense of smell. We decided to train an Australian Shepherd female dog. Our training methodology lasted 18 months and was divided into 4 phases and subsequent short verification of the dog's abilities in a real environment. During the training, we found that the smell of newts was successfully imprinted and generalized. The dog underwent training during the final testing at each stage with an average accuracy of 0.97 (0.93 - 1.00) and demonstrated high specificity in discriminating target species from deceptive odors of related species in a row (0.99) and in the field (0.96). We found that for a dog there is a difference in odor intensity between the sex of newts (95 % male vs. 65 % female). We determined the detection distance up to 280 cm if the great newt was placed on a surface in low vegetation. Finally the dog was able to find individuals or newt shelters in the locality of their occurrence. The application of this method can help to refine the population data for the monitored or studied species. Last but not least, it can be used, for example, to translocate newts from areas affected by construction.

Keywords: amphibians, protect nature, biomonitoring, training, scent work

Small terrestrial mammals communities in spoil heaps - comparison of agricultural reclamation and spontaneous succession

Klimková Zdeňka

Czech University of Life Sciences Prague, Faculty of Agrobiological Sciences, Department of Zoology and Fisheries, Kamýcká 129, 165 00 Praha-Suchbát, Czech Republic, e-mail: klimkova@af.czu.cz

The research has been focused on the problematic of small terrestrial mammals (STM) succession in post-mining areas, especially in sites created by agricultural reclamation and left to spontaneous succession. Attention was paid to spoil heaps after surface lignite mining in NW Bohemia in the Sokolov Basin. The communities succession is important especially in order to understand the principles of anthropogenically affected areas recolonization. STM monitoring was carried out at 7 sites using a combination of live and snap traps placed in squares. A total of 189 individuals were captured (38 at succession sites, 125 at reclaimed sites and 26 at the control site). Six species of STM were captured; comprising *Apodemus sylvaticus*, *Apodemus flavicollis*, *Arvicola amphibius*, *Microtus arvalis*, *Myodes glareolus* and *Sorex raneus*, with *M. arvalis* being the most frequently captured species (131 individuals). The result of Kruskal-Wallis test ($p = 0.67$) indicates that there is no statistically significant difference in the abundance of STM communities between sites that arose from spontaneous succession and those created by agricultural reclamation. The values of the similarity indices (Jaccard's = 0.6 and Sørensen's = 0.75) showed the similarity of the species spectrum of STM. Based on these results, it can be concluded that the spontaneous succession and agricultural reclamation localities are similarly valuable for STM communities in terms of habitat quality.

Keywords: post-mining area, colonization, diversity, abundance, rodents, insectivores

This work was supported by the grant project GA FAPPZ SV21-17-21260.

Synthesizing and characterizing the green nanocomposite for dual effect of adsorption and catalysis in wastewater treatment

Kumar Nayan

Department of Water Resources and Environmental Modeling, Czech University of Life Sciences, Kamýcka 129, 16500, Praha-Suchbát, kumarn@fzp.czu.cz

Presence emerging contaminants mainly from pharmaceutical and personal care products in wastewater is growing concern with rapid industrialization and urbanization. Conventional wastewater treatment systems are inefficient in its decontamination. A growing need of sustainable hybrid system needs to be developed with existing wastewater treatment facility to combat the growing concern for humans and environment health. Present study focus over the development of hybrid system for these emerging contaminants with combining the potential of adsorption and catalysis techniques for treating the multicomponent pollutant system and can be a subsidiary part of main wastewater treatment system. As adsorption is the most economical and efficient technique for removing the pollutants which can be enhanced and can mineralize more recalcitrant pollutants. Synthesis of nanocomposites from waste egg shell and citrus peel with its activation with organic acid could serve the purpose of adsorption and catalysis simultaneously. Its surface can be characterized with SEM, XRD AND FTIR analysis. Experimental results can be well described with different kinetics and adsorption model. This study can help in designing an economical and practical hybrid subsidiary system in treating emerging contaminants being part of main wastewater system.

Keywords: Adsorption, Catalysis, Emerging contaminants, wastewater treatment

Relation of the captured amount of *Ips typographus* in pheromone traps to the development of the population

Leiner Martin, Klinovský M., Matějka K., Modlinger R.

EXTEMIT-K, Faculty of Forestry and Wood Sciences, Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Praha 6

In recent years, forests in the Czech republic are influenced by outbreak of bark beetles. One of the often-used methods for monitoring bark beetles and protection of the spruce stands are pheromone traps. The using pheromone traps is regulated by law and despite low ability estimate population level and low efficiency to decreasing population density of the bark beetle are pheromone traps still recommended in practice. We aimed to compare the flight activity of *Ips typographus* based on catches from pheromone traps, regarding the offspring development under the bark. We questioned if the number of caught beetles in the pheromone traps is in relation to the offspring development or influenced by other factors, such as temperature. In the vegetation season 2020, we established pheromone traps of the Theysohn type, baited by aggregation pheromone Pheroprax A in the 8 localities of Kostelec nad Černými lesy. The traps were weekly controlled, and caught individuals were counted. The phenological model PHENIPS estimated the development of the bark beetle offspring in the surrounding forest stands. The PHENIPS was calculated based on measuring the six meteorological stations evenly distributed along the study area. The number of caught individuals corresponds to the severe outbreak situation in all studied localities. Higher amounts of bark beetles were captured during the first generation. Individual localities showed significant differences in catches; there was a different onset of swarming and completion of development, almost 14 days. During the development of the first generation of the bark beetle, the highest numbers of traps caught in most localities corresponded to the stage of the 2nd instar larva. In the second generation, the catches in pheromone traps were significantly lower; the largest part of the bark beetles was caught in the larvae stages 2 and 3. The results show a good ability of pheromone traps to record an increased proportion of reemerged adults.

Keywords: *Ips typographus*, pheromone traps, bark beetle outbreak, PHENIPS, flight activity

Analysis of significant attributes of preserved field patterns - Ústecký Region

Madhuswini Monisha

Czech University of life Sciences, Prague: Kamycka 129, Praha- Suchbát, 16500;
madhuswini@fzp.czu.cz

In the Czech Republic, pluzinas belong to the medieval time during the period of great colonization of the 13th century. Pluzinas are hedgerows that were mostly used to border farmlands. Today the word pluzina is used for the remnants of these medieval field structures in the Czech Republic. Due to increasing production demand, modern mechanization, and collectivization of farmland, many pluzinas have disappeared. Identifying the remnants of pluzinas is a crucial step to proceed with their protection. This study focuses on identifying and analysing the morphological characteristics of pluzinas and their physical environment in the Ústecký region. ArcGIS along with stable cadastre map (1840 - 1860) was used to identify and map the pluzinas. Other layers such as BPEJ_2019, AOPK_CHU, DIST_POP100k_5km, DIST_POP10k_5km, DMR_po100m were overlapped with the database to analyse the physical properties of the pluzinas such as soil, climate, slope, altitude area under protected zones, and distance from major and minor cities. The pluzinas in the Ústecký region have shown properties similar to the ones found in other researches. The location of the Ústecký region matches all the characteristics favourable for the remnants of pluzinas to be found in an agricultural landscape. This study confirms that there is a lot of potential in the remnants of pluzinas to be protected as they have high aesthetic, cultural, historical, and ecological value.

Keywords: pluzina, hedgerows, historic landscape pattern

Facebook as a tool for monitoring illegal trade of Hill Mynas (*Gracula*) in Indonesia

Maslejová Martina

Faculty of Environmental Sciences, Czech University of Life Sciences Prague;
Kamýcká 129, Praha - Suchbátka, 165 00, Czech Republic, e-mail:
mmaslejova@icloud.com

Hill Mynas of the genus *Gracula* (Linné, 1758) have a large range across Southeast Asia. Due to their ability to imitate various sounds of the environment, including the human voice, Mynas have become very popular pets. Massive demand for these species has a negative impact on their wild populations across their range. The aim of this work was not only to describe their complex taxonomic classification, distribution range, biology, morphology and issues of illegal trade in Indonesia, which expanded outside physical markets to the online world. In order to understand the mechanisms of the online trade with Hill Mynas, fictitious Facebook profile was created and used to obtain information about the total extent of the trade, its hotspots, prices per individual and total sales during years. Data were collected manually across 50 public and private Facebook groups from 2019 to September 2020. Altogether 3,185 advertisements were recorded with 6,137 individuals of genus *Gracula*. The total revenue for individuals recorded between 2014 and 2021 was IDR 2,989,654,000 (CZK 4,592,109). During the monitoring we also recorded Nias Hill Myna - *Gracula robusta*, which is critically endangered, in a total of 155 individuals. Illegal wildlife trade taking place on social networks deserves far more attention, not only from scientists but also from the general public.

Keywords: Common Hill Myna, trade with endangered species, species conservation

Enhancing the wastewater treatment in Tehovec by using a Constructed Wetland

Merei Muhammad

Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Prague, Czech Republic, Kamýcká 129, 165 00 Praha-Suchbát

Constructed wetlands have a lot of potential for wastewater treatment, and they're used for a variety of things like farm wastewater, stormwater runoff, and mine drainage. Their application is for small communities and developments that lack wastewater treatment or to improve any type of wastewater treatment that already exists. In accordance with the requirements of sustainable development and decentralized systems, constructed wetlands can be an appropriate alternative to traditional centralized treatment plants. This thesis aims to raise the quality of wastewater treatment in Tehovec to the highest possible level at the lowest possible cost and with the least amount of environmental impact. The literature review section summarizes the design and implementation of the constructed wetlands, as well as the cleansing processes and procedures that exist in the treatment medium and plants. A short history of the Czech Republic's use of the constructed wetlands concept is also included. The practical section of the thesis examines the current state of wastewater treatment in Tehovec before proposing a design for the new constructed wetland. The design is based on the village's current circumstances. A field survey was conducted before the design was proposed to assess the quantity and quality of wastewater generated by the village population. The next step is to choose a location for the new constructed wetland, which includes a detailed description of all plot features that affect the constructed wetland's function and, as a result, the entire surrounding area. The thesis concludes with a detailed proposal for a new constructed wetland as well as preliminary drawings to implement the new design.

Keywords: constructed wetland, wastewater, sewage, organics, nutrients

Of *Chenopodium* and Man: Covered traces of the most widespread weed today

Pospíšilíková Tereza

Česká zemědělská univerzita, Kamýcká 129, Praha, 160 00,
pospisilikova@fzp.czu.cz

Most European species are believed to have been restricted to southern refugia during the Last Pleniglacial (24-15 kyr BP) in the peninsulas of Iberia, Italy and the Balkans. After the Last Ice age (i.e. c. 12 kyr BP), these species expanded their ranges northwards. Pleistocene climatic oscillations have had strong effects on the genetic structures of populations of many species. Nevertheless, during the Holocene, the distributions of species such as crop weeds, to some extent relate to those of cultivated crop species, and these have been significantly influenced by human activity. In Eurasia, human mediated Holocene dispersal has been confirmed as the main driver of the genetic diversity of many weed species. The genetic diversity of weedy species and their geographical distributions may be correlated with both human-associated and climate-associated migrations. One of the main weedy species group in Europe is *Chenopodium album* aggregate. As a typical weed species, their distribution is put into relationship with human colonisation of the European continent and the history of its spread could be representative of the spread of the whole group of species with the first Neolithic agriculturalists. Many studies have shown the abundant presence of *C. album* in archaeobotanical profiles associated with Neolithic settlements in different parts of Europe. There is no consensus regarding their original distribution ranges and hence the origins of the European populations. The western Asian region is considered a cradle of Neolithic agriculture and could, therefore, be an important centre of diversity that could well have been the source for the colonisation of the European parts of *C. album* aggregate's distribution range. On the other hand, south-central Asia has been recognised as one of the main centres of diversity for the family Chenopodiaceae and thus this region is another potentially important source for the expansion of the *C. album* aggregate into Europe.

Keywords: Plant genetics, HyRAD, herbarium, libraries

Effect of terrain and acquisition characteristics on ICESat-2 and GEDI laser altimetry data

Pracná Petra

Czech University of Life Sciences, Faculty of Environmental Sciences, Kamycka 129, 165 00, Prague, Czechia. Mail: pracna@fzp.czu.cz

Role of satellite remote sensing in environmental monitoring is continuously growing. Remotely sensed data become a crucial source of information for global change research and important discoveries would not have been possible without them. However, some information, such as aboveground biomass of forests, is still difficult to acquire, which hinders our ability to develop accurate climate simulations and forecast. In late 2018 two space-based laser altimetry missions were launched by NASA. Ice, Cloud and Land Elevation Satellite-2 (ICESat-2) and Global Ecosystem Dynamics Investigation (GEDI). The goal of GEDI mission is to make precise measurement of surface elevation, forest canopy height and canopy vertical structure. It is the first space-based LIDAR explicitly optimized to measure vertical vegetation structure. Although ICESat-2 is primarily oriented on cryosphere, it also measures terrain and vegetation heights and provides complementary data to GEDI mission. These two missions bring several freely available global products, including ground elevation, canopy height and biomass density which are needed to estimate forest carbon stock or identify priority areas for conservation. As both GEDI and ICESat-2 are based on new technology, validation of their quality and usability is necessary. In this contribution, I will focus on terrain and acquisition characteristics that may affect the quality of ATL08 and L2A products provided by ICESat-2 and GEDI, respectively.

Keywords: ICESat-2, GEDI, laser altimetry, biomass, carbon stock, terrain characteristics

Tree species classification using multispectral data acquired by the WorldView-2 satellite in Doupovské hory

Procházka Jan

Faculty of Environmental Sciences, Czech University of Life Sciences Prague,
Kamýcká 129, Praha - Suchbát, 165 00, Czech Republic, prochazka5@czu.fzp.cz

The thesis deals with object-oriented classification of multispectral images acquired by the WorldView-2 satellite in Doupovské hory. The aim of the thesis was to classify forest stands. The sub-objectives were to evaluate the suitability of WorldView-2 satellite images for species classification of forest stands and the influence of pansharpening and added elevation data on classification accuracy. The first part of the thesis summarized the basic theoretical knowledge about remote sensing and tree species classification. The practical part of the thesis contains methodological information on supervised object-oriented image classification in ENVI software using Support Vector Machine algorithm. Forest stands were classified into 11 classes. The classification was performed three times in total, the first time over a multispectral image, the second time over sharpened image using pansharpening method and the third time using fusion of multispectral image and elevation data. The training and validation data used for classification were taken from the forest management plan and field measurements. The most accurate classification was achieved for the multispectral image alone, with an overall accuracy of 64.77 %. Due to the heterogeneous area of 100 km² the achieved overall accuracy is a relatively good result. The second best result was achieved by the classification with added elevation data with 49.29 % accuracy. The assumption of improved accuracy with the addition of elevation data was not fulfilled here. The worst performer was the classification of the image enhanced with the pansharpening method, which achieved a final accuracy of 23.62%. Based on the results, it can be concluded that the WorldView-2 satellite data is useful for classification of forest stands over large areas, but the benefits of adding elevation data and pansharpening for refining the classification cannot be confirmed.

Keywords: Doupovské hory; object-based classification; forest stands; WorldView-2

Quantification of genetic variability of hyperspectral reflectance within local Scots pine populations

Provazník Daniel

Czech University of Life Sciences Prague; Faculty of Forestry and Wood Sciences;
Kamýcká 129 165 00 Praha - Suchbát; Czech Republic; email:
provaznik@fd.czu.cz

The aim of this study was to obtain information about genetically dependent variability of hyperspectral reflectance, qualitative parameters, and the development of graftings in seed orchards of Scots pine (*Pinus sylvestris*). The hyperspectral reflectance of pine needles was measured in three seed orchards, each representing a single local population of interest - Plzeňsko, Třeboňsko and Děčínsko. To demonstrate the genetic differences, two case studies were arranged - a case study for the comparison of provenances in the seed orchard Doubrava and a case study for the comparison of two clones in the seed orchard Holíčkovna. Statistically significant differences in spectral properties of Scots pine needles were proven between individual seed orchards. The differences also manifested itself via needle nitrogen and phosphorus content. The comparison of different seed orchards cannot be considered rigorous. The environmental and genotypic factors cannot be accurately and objectively differentiated. A statistically significant difference was proven in the case of the provenance comparison in both spectral reflectance of pine needles and its interpretation by vegetation indices. In the interpretation of hyperspectral reflectance by vegetation indices the two compared clones also appeared to be significantly different. The information about hyperspectral reflectance of tree needles could be used for breeding resistant individuals, making existing methods for genetic evaluation cheaper and more accurate. In following studies, it would be desirable to compare seed orchards containing the same genotypes which would make the process of getting the information of genetically dependent variability of physiological traits easier.

Key words: Scots pine, seed orchards, reflectance, chlorophyll

Are Greater flamingos equally protected between breeding and migration seasons?

Siretckaia Anastasiia

Czech University of Life Sciences in Prague, Kamýcká 129, 165 00 Prague - Suchbát
siretckaia@fzp.czu.cz

This study represents an analysis of the Mediterranean population of the Greater flamingo (*Phoenicopterus roseus*) movement during breeding and migration seasons. Georeferenced data of the ringed individuals was used in combination with the protection areas dataset. Map of these areas was obtained from the <https://www.protectedplanet.net> as an authoritative source of data. The aim of the study was to test the level of flamingo protection ringed in Italy during different phenological seasons (breeding and non-breeding) to identify the places with the lowest and highest vulnerability degree for the community. Additional analysis was performed to investigate the vulnerability risk of males and females while breeding or wintering in different countries. According to the statistical analysis during both seasons males are more prone to be found outside of the protected areas, therefore are more exposed to danger. The analysis showed that the main factors influencing vulnerability of species are phenological periods, country where the individuals located and sex of species. Generally speaking, under the biggest protection are flamingos found in Italy, France, Spain and Tunisia. However, the lowest protection of species is in such countries as Algeria, Greece, Libya, Turkey. During breeding period flamingos are mostly protected in the south of Europe and during winter period potentially dangerous places are countries of Africa, Greece and Turkey. The results show that the metapopulation of the Greater flamingo in the Mediterranean area, is overall better protected during the breeding season than during non-breeding season. The species located in vulnerable places represent a huge conservation gap in Greater Flamingo protection. These results could be further applied by ecologists for the development of conservation strategies.

Keywords: Greater flamingo, spatial distribution, ecological community, protected areas

Application of natural succession in the restoration of post-mining sites in the Moravian-Silesian region

Tugushev Gleb

Czech University of Life Sciences Prague, Faculty of Environmental Sciences,
Kamycka 129, 16500 Prague-suchdol, Czech Republic, tugushev@fzp.czu.cz

Mineral extraction often leads to significant environmental disturbances such as distraction of habitats and changes of the geomorphological and hydrological conditions in the affected areas. One of the possible development paths for post-mining sites is the creation of non-productive, ecologically valuable biotopes using natural succession. Whether natural processes will be used to restore mining areas is usually determined in reclamation plans. Which factors influence the presence of areas designated in reclamation plans for rehabilitation through spontaneous succession was studied within the Moravian-Silesian region, Czech Republic. Relevant documents were collected from local authorities and open sources. Subsequently, vectorization of the map attachments was performed, and the relative proportions of the successional areas were calculated for each post-mining site. Evaluations of the effects of rock type, extraction method, site area, mining company, proximity to protected areas and settlements and local nature protection status were conducted using statistical methods. Rock type, extraction method and mining company turned out to have a significant effect on the extent to which spontaneous succession has been represented in the reclamation plans studied. Post-mining sites often become valuable biotopes that serve as a refuge for endangered species, so it is important which method of restoration will be chosen. This choice is influenced by various factors. For a more complete understanding of the issue, a broader study is needed.

Keywords: restoration, mining, spontaneous succession, Moravian-Silesian region

Offspring development of the *Ips typographus* (L.) in various parts of the tree stem

Tyšer Daniel, Leiner Martin, Rouč Zdeněk, Modlinger Roman

Czech University of Life Sciences Prague, Kamýcká 129, 165 00 Praha-Suchbát, tyserd@fld.czu.cz

Bark beetles (Coleoptera: Scolytinae) has a specific ecological niche for their breeding and development. Different factors influence the use of particular microhabitats, for example, size of the species, phloem freshness, aggressivity and competition ability of the species. European spruce bark beetle is one of the most destructive forest pests in the Palaearctic region, which can colonise a broad spectrum of the spruce niches. Selection appropriate place for establishing the gallery is more important during the endemic population phase. We try to find a preference pattern in the epidemic phase of the bark beetle population in the occupancy of the Norway spruce tree stem. For the evaluation, 25 trees (in groups of 5 tree) near the Stříbrná Skalice small town was artificially baited by the Pheroprax A aggregation pheromone. The lures were in trees for three days and all of the trees were successfully attacked by *Ips typographus*. After that, regular cutting down every 14 days was realized; one tree from each attacked plot was cut down, and bark samples for characterising the population of bark beetles were taken. We took bark samples with a diameter of 12 cm from eight tree heights and four directions, approximately 50 bark samples from the tree. For each bark sample, maximum a most often developmental stadium of bark beetle was recorded, and phloem width was measured. For displaying the relationships, the percentage of the full of bark beetle development was used. Development of the *I. typographus* offspring was different according to the tree height, contrary to the tree directions. Most of the *I. typographus* preferable parts of the tree stem resp. tree parts with quicker development were between 8 -15 meters, representing most insulated parts of the tree stem.

Keywords: European spruce bark beetle, reproductive success, outbreak, ecological niche

Indoor air quality of museums and libraries

Válová Marie, Wimmerová Lenka

Department of Applied Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, Prague 6 CZ-165 00, Czech Republic, e-mail: valovam@fzp.czu.cz

Spaces such as museums and libraries may suffer from deteriorating indoor air quality, partly due to greater accumulation and circulation of people, but also due to unsuitable, insufficient or poor quality of air conditioning, ventilation and heating systems. The unknown in this issue is effect of the exhibited objects on air quality, especially if we focus on biodegradable objects, dermoplastic mount, alcohol mount, etc., which are not treated and cleaned of dust, grease and pests. The research has so far assessed air quality of the selected areas located at the Czech University of Life Sciences, namely the area of MCEV I and II entrances, the passage to the Faculty of Forestry and Wood Technology with a measuring air sampling pump device near a dermoplastic mount, the secretariat at the Faculty of the Environmental Sciences and in the laboratory D314 belonging of the Department of Applied Science. The active air pumping for 5 to 30 minutes (flow rate 20 l/hrs) was used directly on selective agars (SA = Sabouraud, PCA = "Plate-Count" agar, TSA = Trypton soy agar) together with a passive sedimentation sampling. The results CFU / m³ were evaluated as very low and low pollution (according to the standards of the European Protection Agency - EUR 14988, 1993). The obtained values in the showcases with dermoplastics did not confirmed, that there was pollution due to the presence of these mount. The results for offices and spaces, where people move frequently, showed higher levels of pollution than just the closed display cases with presence of biodegradable material. The PhD work will be further followed by a research using other techniques for observation of present microbiota (e.g. ATP, which is commonly used for monitoring drinking water, and Ergosterol, the sterol found in the cell membranes of fungi and protozoa). At the same time, the optimization of sampling by active and passive techniques be continued. Other spaces, such as museums and libraries will be selected.

Keywords: indoor air quality, pollution, microbiota, dermoplastic mount, air sampling

Effects of natural and seminatural elements on the composition and dispersion of carabid beetles inhabiting an agroecosystem in Northern Italy

Della Rocca Francesca, Venturo Alfredo, Milanesi Pietro, Bracco Francesco

Department of Ecology, Czech University of Life Sciences Prague | Kamýcká 129 - 16500, alfredoventuro93@gmail.com

The natural and seminatural components of agricultural landscapes play a crucial role in maintaining a high level of biodiversity. Being the Po Valley one of the most human-dominated and intensively cultivated landscapes in Europe, we investigated the effect of non-crop habitats on carabid richness and composition, and we evaluated the role of tree rows as corridors for forest carabid dispersion. Carabids were sampled with 70 pitfall traps arranged in 35 sampling plots along three parallel transects (80, 100, and 140 m long) and encompassing five different habitats: tree row, tree row edge, grassland, forest edge, and forest. We found 5,615 individuals belonging to 55 species. Despite the similarity in species richness, all the habitats investigated showed a peculiar and distinct species assemblage. The main distinction was between the "open habitat" cluster composed of grassland and tree row edge and the "forest" cluster composed of forest, tree row, and forest edge. We found that forest species can penetrate the grassland matrix up to 30 m from the forest edge and that a distance of no more than 60 m between tree row and forest can allow the passage of up to 50% of the forest species. Beyond this distance, the grassland matrix becomes a barrier, preventing them from reaching other suitable habitats. Our findings confirm the importance of maintaining different natural habitats to significantly increase biodiversity in an intensively cultivated agroecosystem and demonstrated the role of linear elements as a corridor and "stepping stones" for many forest species.

Keywords: agricultural landscape, biodiversity, dispersal, line transects, multimodel inference

Sorption capabilities of biochar as a green roof substrate additive

Buchtelík Stanislav ¹, Petreje Marek ², Punčochář Jan ¹

¹ Czech University of Life Sciences Prague, buchtelik@fzp.czu.cz, puncochar@fzp.czu.cz; ² Czech Technical University in Prague, marek.petreje@fsv.cvut.cz

In the context of the ever-increasing efforts of the modern world to solve urban-climatic problems, individual elements of green infrastructure are coming to the forefront of research trends. One of these elements is green roofs. Systems that offer a wide range of ecological but also economic benefits in addition to aesthetic aspects are being extensively researched and improved. One of the ways that research is now taking is the improvement of roof substrates to create the best possible conditions for the growth of the vegetation they house. Biochar, used as a sorbent in a wide range of applications, appears to be a suitable additive for substrates as it increases water and nutrient retention in the soil in general. Model green roof arrays were created on a high-rise building in Stodůlky, Prague. For the extensive roof model a 9 cm high layer of substrate was used, and for the intensive roof model a 29 cm high layer was used. A reference, commercially available substrate without added biochar, was then compared with a homogeneous substrate mixture with added biochar at a concentration of 5% (v/v). TEREOS 32 tensiometers measuring water potential were placed in all arrays. Climatic conditions were monitored with a module weather station. The measurements showed that the addition of biochar to the roof substrate has a significant effect on the water retention of the green roof system and therefore a positive effect on the growth of the vegetation grown on it.

Bonding Performance of CLT from Low-Grade Hardwood

Das Sumanta, Gašparík Miroslav, Kytka Tomáš, Kumar Sethy Anil

Department of Wood Processing and Biomaterials, Faculty of Forestry and Wood Sciences, Czech University of Life Sciences Prague, Suchbátka, 16500, Czech Republic, *email*: dass@fd.czu.cz

Cross Laminated Timber (CLT) evolved as an excellent building material for load-bearing structures like buildings, bridges, and other structural applications worldwide. However, this Engineered Wood Product is mainly developed from softwood species like Norway spruce, White fir, Scots pine, European larch, Douglas fir, and Swiss stone pine. In the recent decade, most research is being carried out for the practical uses of hardwoods in manufacturing CLT panels and effectively using them for construction purposes. It is necessary to evaluate the bonding properties when preparing CLT panels from hardwoods. The primary objective of the research is to find out the suitability of lower grade hardwoods like aspen (*Populus tremula*) for the manufacturing of load-bearing CLT panels and find out the problems associated with bonding. In recent years, mostly in indoor applications, formaldehyde emission has been considered a global concern due to its carcinogenic and neurotoxic effect. In our research, the melamine adhesive which is used is free from formaldehyde. The three-layered CLT panel was prepared from aspen (*Populus tremula*) species glued with Melamine adhesive with a glue spread rate of 250 g/m². The adhesive and hardener were mixed in the ratio of 100: 30, and the pressure applied during pressing was 0.6 N/mm². The delamination and bond shear tests were carried out as per EN 16351:2015. The results showed that the melamine adhesive, free from formaldehyde, possessed less resistance to water, and hence most of the sample failed during the delamination test. However, the obtained values met the minimum requirement mentioned in EN 16351:2015 standard in the bond shear strength test. This study also revealed that aspen, a lower grade hardwood, can be efficiently used in load-bearing structural application.

Keywords: Aspen, Cross-laminated timber, Delamination, Formaldehyde Emission, Shear Strength, Wood Failure Percentage

Post project analysis in the sence of EIA efficiency for constructions of road transport infrastructure

Dvořáková Petra, Hanušová Tereza, Keken Zdeněk

Faculty of Environmental Sciences, Czech University of Life Sciences Prague,
Kamýcká 129, Praha - Suchdol, 165 00, Czech Republic, email:
petradvorakova@fzp.czu.cz

Motorways and expressways always lead to a better quality of life for the populations who are dependent on transport in a given area and to improved accessibility between individual destinations, but at the same time they have a very significant impact on the wildlife and environment. In the context of environmental protection to prevent, eliminate, minimize, or compensate significant adverse effect, the Environmental Impact Assessment process is used. Providing of these process helps to predict the individual category and quantifications of a significant adverse environmental impacts of a specific project in a given area and helps to identify potential measures to mitigate negative environmental impacts. The mitigation measures should cover both phase of constructions and even operation phase when the structure is completely done. The question remains how effective this tool is? EIA post - project analysis is one of the tools for evaluating the efficiency or effectiveness of the EIA process. As part of my research, I will be focused on the application of the principles of EIA post-project analysis in selected road transport infrastructure constructions. For the research will be selected same categories of constructions of road transport infrastructure in three different stages of the construction process:, i) one project in the stage of designing; ii) one project in the stage of construction; and iii) one project in stage of operation In case of all project will be monitored the selected parameters. All of this results will be evaluated and the eventual measures will be recommended.

Keywords: Environment, Motorways. Expressways, Impact, EIA Follow up

Fistful of Data: Information sources on Czech biodiversity monitoring and mapping, their integration and use

Gaigr Jonáš¹, Vojík Martin^{1,2}, Levashova Alena¹, Chobot Karel¹

¹Nature Conservation Agency of the Czech Republic, Kaplanova 1, CZ-140 00 Prague 4, Czech Republic; jonas.gaigr@nature.cz, martin.vojik@nature.cz, alena.levashova@nature.cz, karel.chobot@nature.cz; ²Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Prague 6, Czech Republic

Modern approaches in conservation biology are largely based upon the use of ecological and environmental data. Information about the occurrence and distribution of species and habitats, as well as their underlying abiotic factors. The Nature Conservation Agency of the Czech Republic (NCA) currently presents a major driver of collecting and providing ecological data in the country. A large part of the data is collected for the national species and habitat surveillance schemes following a well-defined mapping or monitoring methodology consistent in time and space. An increasing amount of information is also provided by the public participating in various monitoring schemes and from a number of observation sharing platforms using citizen science potential. NCA also integrates the data it collects with external sources, synthesising the information into new data layers like the Consolidated layer of ecosystems of the Czech Republic. The knowledge of information collected and administered by the NCA, its strengths and limits can be highly valuable for both practical conservation purposes and ecological research. The use of already existing data can present a way of reducing costs for research projects. Current conservation measures should take into account the results of the integration of collected data. As an example of this approach, we present a semi-automatic system evaluating target feature status in the Natura 2000 framework based on the integration of multiple data sources. The framework combines information from the species occurrence and habitat mapping databases with environmental data (eg. nitrogen depositions, presence of pollutants in river habitats). Ultimately, the framework is designed to assess the state of species populations and habitats on a site level allowing an effective evaluation of implemented management practices.

Keywords: conservation biology, data collection, multi-species indicators, Natura 2000, species occurrence, adaptive management

Interspecies differences in the laterality of the hand that initiates allogrooming in two species of tribe Cercopithecini

Garguláková Andrea ^{1,2}, Pluháček Jan ^{1,2,3}

¹University of Ostrava, Faculty of Science, Chittussiho 10, 710 00, Ostrava;

²Ostrava Zoological Garden and Botanical park, Michálkovická 2081/197, 710 00 Ostrava;

³Institute of Animal Science, Přátelství 815, 104 00, Prague - Uhřetěves

Hand laterality is an intensively studied phenomenon. In most studies it is determined by foraging behavior or gesticulation. However, only a few studies determined hand laterality through allogrooming. Despite the fact that primates are an ideal group for such research, empirical studies remain very rare. The difference in hand laterality across species could be explained by MacNeilage's (1991) theory. It states that arboreal species should prefer the left hand because they use the right hand to maintain posture. Terrestrial species should prefer the right hand for manipulations and tasks that need to be trained, while the left hand should be used for simple tasks. Patas monkeys (*Erythrocebus patas*; n = 7, terrestrial species) were observed in the Olomouc Zoo. Diana monkeys (*Cercopithecus diana*; n = 23, arboreal species) were observed in the Ostrava Zoo. The size of troops ranged from 4 to 13 individuals. Allogrooming and the hand that initiated grooming were recorded non-invasively for two seasons (2015-2016). We collected 2829 cases of allogrooming during 489 hours of observation. In 1977 cases, hand preference was noted. Only data collected from adult females and juveniles (n = 23) were analyzed by logistic regression (GENMOD, SAS procedure). Our results showed a significant difference between species in hand preference ($\chi^2 = 5.66$, DF = 1, P = 0.0174), but MacNeilage's theory has not been confirmed. Diana monkeys started allogrooming with the right hand in 71% of cases. In patas monkeys we found a tendency towards ambilaterality. Our results could be explained by Task complexity theory (Fagot and Vauclair 1991) according to which allogrooming in patas monkeys could be perceived as a simpler task that does not require hand specialization, while for the arboreal species it may represent a more complex task that requires hand specialization. To reach a conclusion, it is necessary to observe it in other phylogenetically related species and increase the sample.

Keywords: laterality, diana monkeys, patas monkeys, allogrooming

Road transportation and its impact on bird diversity in fragmented agriculture landscape

Hladík Štěpán

Faculty of Environmental Sciences, Czech University of Life Sciences, Kamýcká
129,
165 00 Prague - Suchbát, Czech Republic, hladiks@fzp.czu.cz

Road infrastructure creates an ecological barrier for many species. The increasing pressure of a road transportation brings a great negative impact on birds which inhabit surrounding environment. The road infrastructure interrupts bird's migration routes, causes bird's collisions with vehicles and disturbs the surrounding environment by noise and pollution. The negative effect of the road infrastructure has been already worldwide described. Although it hasn't been studied in Czech Republic deeply, especial in the agricultural landscape. This research analyses and evaluates impact of four selected highways in the Czech Republic on qualitative and quantitative characteristics of bird communities. It was settled 79 transects with 298 plots along four highways. Each transect included 4 plots (except highway D1- 3 plots) of size 50x50 m in the distances of 25 m, 125 ± 50 m, 500 ± 100 m and 1000 ± 100 m from highway. It was found 1266 records of birds which were belonged to 74 species. Results from this research confirm negative impact on the bird diversity along the highways in fragmented agriculture landscape. The bird species diversity is significantly decreasing towards highway. It's supposed that the main factor causing the decrease of bird diversity is a noise producing by the road transportation.

Keywords: birds and transportation, noise pollution, agricultural landscape, highway

Adult sex ratio in duck breeding populations in Třeboň Biosphere Reserve

Homolková Monika, Musil Petr, Musilová Zuzana, Gajdošová Dorota, Zouhar Jan

Department of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, Praha - Suchbát, CZ-165 21, Czech Republic; * corresponding author e-mail: homolkova.monika@centrum.cz

The adult sex ratio of waterfowl often shows male bias. These male - biased populations could have significant consequences for the population dynamics, viability, demography and could relate to line of physiological or behavioural marks because of male bias populations are more common endangered. The main affected and most studied one duck species with higher proportion of males in breeding populations is Common Pochard *Aythya ferina*. This species showed a significant decline in numbers over the last 30 years and due to that was included among Vulnerable species in Red List of IUCN. Data sets included females and males of 6 common duck species on 175 fishponds between 2004 - 2020 in Třeboň Biosphere Reserve (South Bohemia, Czech Republic). The census is based on the monitoring of duck females prior to their incubation, which allows selection of a suitable counting time for females and thus minimize the risk that the female will be attend on the nest at the time of counting. We formulated three predictions based on earlier hypotheses and on previous findings. (1) We expect long-term decrease in proportions of females in the breeding population of the Common Pochard and the Tufted Duck *Aythya fuligula*. Further, (2) we expect effect of mean water transparency of breeding area in breeding season before female catching (mean values recorded in May). (3) Climate conditions (expressed by the NAO index) of previous winter such as water transparency should affect the condition of females, respectively females' mortality. The long term decrease in proportion of breeding females was found in Gadwall *Mareca strepera*, Mallard *Anas platyrhynchos* and Common Pochard populations. Increase was found in Common Goldeneye *Bucephala clangula* population between 2004-2020. Water transparency has no significant effect on proportion of females in any studied species. The proportion of breeding females of Tufted Duck was the only negatively affected by climate conditions previous winter.

Keywords: Ducks, adult sex ratio, survival, climate conditions, water transparency

Worldwide cooperation of scientists in the project BRESOV. Genetic analysis of downy mildew resistance and identification of molecular markers linked to resistance in *Brassica oleracea* varieties

Ovesná Jaroslava ^a, Petrželová Irena ^b, Jungová Michaela ^{a*}

^aCrop Research Institute, Drnovská 507/73, 161 06 Prague 6 - Ruzyně, Czech Republic, ^bCrop research Institute, Šlechtitelů 29, Holice, 779 00 Olomouc

*Corresponding author jungova.michaela@vurv.cz

Brassica oleracea L. is one of the most important species in the *Brassicaceae* family because the species include the most economically important vegetables in the world, including cauliflower, broccoli, cabbages, brussels sprout, kohlrabi, and kale. Currently, growers worldwide are bothered by a fungal disease caused by the *Hyaloperenospora parasitica* Pers.: Fr. (downy mildew), which attacks young seedlings and significantly reduces the yield and quality of agricultural crops. Using fungicides also failed to control downy mildew and has led to the evolution of more virulent pathogens. Resistant cultivars represent a desirable control method to provide a practical, environmentally benign and long-term means of limiting damage from this disease. Molecular marker technology is integrated into the existing plant breeding programs, the selected resistant genotypes according to molecular markers can be used for hybridization. Breeding for disease resistance is one of the primary objectives in most crop-breeding programs. The present study was undertaken to test molecular markers linked to the downy mildew resistance in cotyledon and adult plant *Brassica oleracea* varieties. According to Carlier et al. (2012) and Saha et al. (2020), 4 SSR markers were chosen (locus *Pp* 523 and *Ppa* 207) and tested on 200 *Brassica oleracea* varieties, inoculated by spraying with a conidial suspension of the *Hyaloperenospora parasitica* isolate. Preliminary results showed, that different parental lines and different environmental conditions during the year or specific reactions to the isolate may explain the difference in our results.

Keywords: *Brassicaceae*; Disease; Downy mildew; SSR Marker

Acknowledgment: This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. 774244. INFO: <https://bresov.eu>

From West to East and back again: Trans-Siberian Railway as a continental pathway of plant invasions; project overview

Pergl Jan ¹, Vinogradova Yulia K. ², Tokhtar Valeriy ³, Galkina Maria. A. ², Chrtek Jindřich ¹, Kotenko Olga. V. ⁴, Kurskoj Andrej ³, **Kutlvašr Josef** ^{1,5}, Perglová Irena ¹, Sádlo Jiří ¹, Tretjakov Michail ³, Zelenkova Viktoria ³, Pyšek Petr ^{1,6}

¹ Institute of Botany, Czech Academy of Sciences, 252 43 Průhonice, Czech Republic

² NV Tsitsin Main Botanical Garden, Russian Academy of Sciences, 127276 Moscow, Russia; ³ Belgorod State National Research University, Pobeda-str., 85, Belgorod, 308 015, Russia; ⁴ Amur branch of the Botanical Garden Institute, FEB Russian Academy of Sciences, 675000, Russia; ⁵ Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, Praha - Suchbátka, 165 00, Czech Republic; ⁶ Department of Ecology, Faculty of Science, Charles University, Viničná 7, 128 44 Prague, Czech Republic

The project “From West to East and back again: Trans-Siberian Railway as a continental pathway of plant invasions” focuses on analyzing the role of human-mediated pathways. It uses the Trans-Siberian railway TSR as the model system, and is based on studying floras at individual TSR stops. The railway, which spans across much of Eurasia, provides a unique opportunity for analyzing the spread of alien plants at a continental scale. It connects two continents differing in their native species pools, and because more than 50% of foreign trade and transit cargo in Russia is transported via the TSR, its role in the unintentional movement of plant species is crucial. Because TSR is so isolated, there is little interaction with other traffic networks in contrast to e.g. Europe, where it is nearly impossible to disentangle the influence of road and railway networks on species introductions. We aim at studying the transported plant species and biogeographical patterns of their spread. The project also aims to predict the invasion risk of alien species along TSR in the future. Within the project, we will combine (i) field inventories of alien and native plants along the TSR corridor, (ii) laboratory experiments aimed at the identification of plant species’ reproductive and dispersal traits, and (iii) analysis of socioeconomic vectors and biogeographical drivers associated with alien species dispersal. The project will thus contribute to understanding the role of human-mediated pathways (based on the model system of TSR) in transporting plant species, elucidating the biogeographical patterns of their spread, and predicting the invasion risk of alien species spreading along TSR in the future. Lastly, this study will improve the knowledge about alien plant species in temperate Asia.

Keywords: alien species; ferroviatic migration; naturalization; unintentional introduction

Do tree species affect the temperature and moisture regime of soil? A case study from silty-loam forest soil

Kuželková Marta, Jačka Lukáš, Kovář Martin, Hradilek Václav

Czech University of Life Sciences Prague (CZU), Kamýcká 129, 165 00, Praha 6 - Suchbát, Czech Republic, kuzelkova@fzp.czu.cz

Forests are one of the most important ecosystems in the meaning of the hydrological cycle. They are known for having an extraordinary water retention ability which is substantial for dealing with periods of serious droughts as well as flash floods. In accordance with current studies of climate changes those events will be more frequent in the future. Therefore, it is necessary to build up a comprehensive strategy that can improve the water management stability in landscape. One part of this approach is to support the soil retention ability and its improvement which is still little explored in the forest environment. The purpose of this study is to investigate the connection between the tree species and water management of forests with focus on soil moisture and temperature microclimate. So far, this research conducted in cooperation with the Smart Landscape project: Amálie II - forest soil, brings an early-stage view to data obtained from continual monitoring of soil moisture and temperature with respect to tree species monocultures. A set of 55 TDT (time domain transmission) soil moisture and temperature sensors were installed into three nearby locations. In each of those a planted monoculture patches of beech, spruce, and larch encounters. For every of those patches 6 to 7 sensors were inserted into soil. Three of them are used for measuring the mineral soil moisture in depth of -15 to -29 cm below ground and point temperature of -23, -15, +5 cm relative to the ground surface, the rest is used for measuring the organic layer in level from surface to the depth of -14 cm and point temperatures in levels of -8, 0 and +15 cm. Obtained data are interconnected with precipitation monitoring from field meteorological station creating an overview of access and distribution of water in forest soil. Based on the initial observation gathered in the period of May to September there is a clear difference in between the tree species monocultures and their microclimatic conditions.

Keywords: forest hydrology, tree species, soil moisture, soil temperature, TDT sensor, Smart Landscape

Allotments as a source of alien and invasive alien species

Lehm Helga, Berchová Kateřina

Czech University of Life Sciences Prague, Faculty of Environmental Sciences,
Kamýcká 129, Prague - Suchbát, 165 00, Czech Republic, lehm@fzp.czu.cz

The objective of the research was to give a conclusion about an assumption of the gardener's colonies, whether these are sources of non-native and invasive kinds of plant, or not. The further target of the research was to give a very detailed list of conditions, which causes potential escape, and to determine, which kinds do escape. The data needed for the evaluation were gained in the field research, in the area of 26 gardener's colonies of the south, the south-east, and the eastern parts of Prague. There is information about the place of finding, date of gathering, type of gardener's colonies, biotope, species name, name of the kind, name of the family, sorting archeophyte/neophyte, potential inclusion in the blacklist of the Czech Republic, the way of reproduction and spreading recorded for each incidence. Kinds of black, gray and watch categories of the blacklist were studied from the ecological point of view. The Hypothesis about the count of kinds' occurrence in dependence on the type of gardener's colonies and the kind of biotope was tested based on the data gathered from the field research, via the "studioR" software. An assumption about the spread of non-native and invasive kinds of plants from the gardener's colonies was validated by the GLM test. The most occupied types of gardener's colonies were open-countryside and built-up areas. The most occupied types of biotopes were the rubble site and non-farmed land. There was also confirmed, that the count of kinds does depend on the interaction between the type of gardener's colonies and the surroundings biotopes. There is a significant impact on the spread of non-native/invasive kinds, where the following combination exists: gardeners' colonies ("GC") type: built-up area with biotope: non-farmed land; GC: housing estate with biotope: non-farmed land; and GC: open countryside with biotope: rubble site.

Key words: Prague, evaluation, spread, escape, planting, spread within the landscape

Isotopic fractionation of Cd and Zn in contaminated soils

Lewandowska Šárka, Vaňková Zuzana

Czech University of Life Sciences Prague, Faculty of Environmental Sciences,
Kamýcká 129, 165 00, Prague - Suchbát, lewandowska@fzp.czu.cz

Soil acts as a major sink for contaminants, gathering significant amounts of environmental pollution. The investigation of mobility of potentially toxic elements can be a suitable way to understand and evaluate the potential risks for the ecosystems in the contaminated environment due to the possibility of subsequent plant uptake and biomagnification through a food chain. The isotopic data can provide an insight into the biogeochemical cycling of metals. The study investigated 5 soil samples collected in the vicinity of Czech town Příbram, known for its historical mining, processing, and smelting of polymetallic ores, resulting in pollution of surrounding soils and streams. The total metal(loid) concentrations and the potential mobility of selected elements (As, Cd, Cu, Pb, Zn) were determined using different extracting procedures. The isotopic compositions of Zn and Cd in bulk soil and extracted solutions were investigated using multi-collector-inductively coupled plasma mass spectrometry (MC-ICP-MS) and thermal ionisation mass spectrometry (TIMS), respectively. Based on the total metal concentrations, the soils were particularly enriched with Pb (up to $16\,907 \pm 1\,963$ mg/kg), followed by (in order of decreasing concentration) the Zn, As, Cu, and Cd. Relatively the most mobile element was Cd, and the least mobile element was As. The highest extraction efficiency was obtained using a mixture of DTPA with CaCl_2 . The DGT technique was able to extract just the most exchangeable metal pool. Isotopic data disclosed that the soil samples were depleted in heavy Cd and Zn isotopes relative to standards. The Cd isotopes in the extracts were heavier than those in the bulk soil, suggesting that heavier Cd isotopes are favourably partitioned into the soil solution, hence being exchangeable and available to plants. A similar trend was observed for Zn isotopes. However, DGT measurements propose that lighter Zn isotopes may be more available to plants.

Keywords: soil contamination, isotopic fractionation, mass spectrometry, cadmium, zinc

Phylogenetic analysis of tardigrade tubulins

Novotná Floriančířová Kamila¹, Baltzis Athanasios², Czerneková Michaela¹,
Smejkal Jiří¹, Notredame Cedric^{2,3}, Vinopal Stanislav¹

¹Department of Biology, Faculty of Science, Jan Evangelista Purkyně University, Pasteurova 3632/15, 400 96 Ústí nad Labem, Czech Republic; kamca.flori@seznam.cz, stanislav.vinopal@ujep.cz; ²Comparative Bioinformatics group, Centre for Genomic Regulation (CRG), The Barcelona Institute of Science and Technology, Dr. Aiguader 88, 08003 Barcelona, Spain; ³Universitat Pompeu Fabra (UPF), Plaça de la Mercè 10-12, 08002 Barcelona, Spain

Tardigrades are microscopic ecdysozoans found in various ecosystems. Some species can withstand extreme environmental conditions and transition to an ametabolic state, called cryptobiosis. This greatly increases their survival abilities. However, underlying molecular mechanisms are mostly unknown. Microtubule cytoskeleton is critical for many cellular processes. Nevertheless, any specific knowledge about tubulins in tardigrades is lacking. We hypothesize that microtubules play an important role in tardigrade physiology including the cryptobiosis. Therefore, we decided to analyze tardigrade tubulins. We prepared a local BLAST database from available genomes and transcriptomes of eight tardigrade species. Using tubulin protein sequences from four model organisms, we performed tblastn search and after removing multiplicates, we gained unique putative tardigrade tubulins. We also extracted tubulin domains from the database using HMMER. We ran multiple sequence alignments (MSA) of newly found tubulins or their tubulin domains together with a previously published dataset of more than 3200 eukaryotic tubulins from more than 500 species (Findeisen, 2014) using the regressive mode of tcoffee MSA algorithm. The resulting alignments served for phylogenetic inference based on both maximum likelihood (IQTree2) and minimum evolution (FastME) methods allowing us to assign the newly found tubulins to individual tubulin isotypes. We identified 90 unique tardigrade tubulin sequences including three ϵ -tubulins. We were able to amplify 8 out of 10 predicted coding sequences from *Hypsibius exemplaris* adults cDNA including the ϵ -tubulin so far. The phylogenetic position of tardigrades within the Ecdysozoa is still controversial. Although Nematoda lost their δ - and ϵ -tubulin, some groups of Arthropoda still possess them. Thus, our current data support the placement of tardigrades to Panarthropoda.

Keywords: tardigrades, tubulin, tcoffee, phylogenetic analysis

The work was supported by an SGC grant (UJEP-SGS-2021-53-003-2) at UJEP in Ústí n.L.

Short-term incubation of microgranules in soil and its nutrient retention

Omara-Ojunga Carol^{1,*}, Mill Luasano Sebastian Eduardo¹, Bouček Jiri^{1,2}, Trkal Lukáš¹, Lukac Martin^{3,4}

¹Department of Environmental Geosciences, Faculty of Environmental Sciences, ²Faculty of Applied Ecology, Czech University of Life Sciences Prague, Kamýcká 129, 16500 Praha 6, Suchbát, Czech Republic; ³School of Agriculture, Policy and Development, University of Reading, Reading RG6 6EU, UK; ⁴Faculty of Forestry and Wood Sciences, Czech University of Life Science Prague, Kamýcká 129, CZ-165 00 Praha 6 - Suchbát, Czech Republic; *Corresponding author: omara-ojunga@fzp.czu.cz

A short-term incubation experiment was conducted to investigate the nutrient retention of biochar microgranules in soil. We made use of two types of soil with low organic matter affected by drought: regosol and forest soil and incubated both as soil only and soil + 2% microchar treatments. Periodic leaching tests were conducted throughout the incubation period lasting 126 days, we analysed the leachate for pH, selected macro and micronutrients, and dissolved carbon content. A total of 18 leaching events was conducted. In all treatments, the concentration of nutrients and carbon declined with time, after having peaked immediately after the establishment of the experiment. Regosol was shown to be more nutrient-rich compared to the forest soil. The addition of biochar microgranule has resulted in a significant reduction of nitrogen (N) availability, a process likely to reduce N leaching in agricultural soils. In addition, the microgranules prolonged the availability of nutrients in the soil and reduced the amount of carbon leaving in the soil, with an average pH of 4.6 in the water soluble. Biochar microgranules also positively improved the soil properties. The application of biochar microgranules to managed soils appears a viable solution for improving soil conditions and for reducing nutrient and carbon losses. This imposes that biochar microgranules could be a suitable solution to low carbon matter soil and an additive in posing the balance of microbial activity and retaining a stable nutrient availability in soil. A possible solution to the pending EU climate-resilient target of 2050, European Green Deal initiatives such as biodiversity strategy, zero pollution Action Plans, Soil Strategy and Smart & Sustainable Mobility Strategy, biochar microgranules would resolve agricultural drought soil fertility issues and reasonable economic solution for farmers.

Keywords: Biochar; Nutrients; Leaching; Dissolved carbon; Drought Soil

Effective precipitation water management on functional types of development areas of urbanized areas

Poláková Lucie

Česká Zemědělská univerzita v Praze, Kamýcká 129, 165 00 Praha-Suchbát, polakoval@fzp.czu.cz

The aim of the project is to create support for the promotion of effective precipitation water management in developing areas of cities and municipalities through a multidisciplinary approach. The support will be created in the form of a catalog for optimizing the selection or assessment of suitable measures for individual functional types of development areas. The results will combine knowledge from research and practice in the areas of spatial planning, economics, urban planning, hydrology, landscape engineering, water supply and sewerage. The partial goal is to prepare specialized maps as model variant solutions for five pilot sites of different types of development areas. Pilot studies will serve the specific practical needs of cities and municipalities.

Key words: urban adaptation, precipitation water management, development areas, spatial planning

Indices based on Earth observation data as indicators of bird diversity at multiple scales

Prajzlerová Dominika

Department of Spatial Science, Faculty of Environmental Sciences, Czech University of Life Sciences, Kamýcká 129, Prague, Czech Republic, prajzlerova@fzp.czu.cz

For effective protection of bird biodiversity at multiple scales is necessary to understand drivers, that determine species richness patterns. As useful and traditionally used application of remote sensing, in explaining species richness, have become image classification. Our main goal was to test, if it is possible to substitute image classification with unclassified remote sensed data from Landsat 8, which is, in opposite to classification, inexpensive and timesaving method. However, most of studies, which used unclassified remote sensed data in explaining bird species richness, are over small geographical extents and focused on a single habitat type. In our study we used species data from Breeding Birds Monitoring in the Czech Republic (2014 - 2017). We used two spatial extent - basic squares in KMFE network which were further subdivided into 16 small squares. We used 4 types of predictors, classified land cover data from CORINE 2018 and heterogeneity of habitats derived from unclassified remote sensed reflectance and vegetation indices. Furthermore, we also examined another traditionally used predictors: mean values from reflectance and vegetation indices and bioclimatic predictors from Worldclim (Hijmans et al., 2005). Our results showed, that in basic squares, the land cover predictors explain 47% variation in species richness and heterogeneity predictors up to 38%. In small squares land cover predictors explain 24% and heterogeneity predictors up to 26% variation in species richness. Our results also showed, that in explaining bird species richness probably play important role the type of environment and chosen spatial extent. We conclude that unclassified remote sensed data can explain almost the same amount of bird species richness as predictors derived from classified land cover data and that it is possible to use them in explaining bird species richness, however, it is necessary to take into account the type of environment and spatial extent.

Key words: biodiversity conservation, bird species richness, Landsat 8, remote sensing, habitat modelling, spectral heterogeneity

Biochar considerably increases the easily available water and nutrient content for plants in low organic soils amended with compost and manure

**Seyedsadr Samar, Šípek Václav, Jačka Lukáš, Sněhota Michal, Beesley Luke,
Pohořelý Michael, Kovář Martin, Bouček Jiří, Trakal Lukáš**

Faculty of Environmental Sciences, Czech University of Life Sciences Prague
Kamýcká 129, 165 00 Prague - Suchbát, samar.seyedsadr@gmail.com

Soil hydraulic properties of Fluvisol and Regosol, which are characterized as low-organic soils, were investigated following the application of biochar and two commonly available organic amendments (manure and compost). The primary aim of this study was to utilize soil amendments to enhance water retention and availability for plants during deficiency of water. Undisturbed soil samples collected by sample rings from special self-irrigated boxes. The soil samples, with and without amendment by biochar, manure and compost were used for analysis of bulk density, total porosity, soil water retention curves and saturated hydraulic conductivity. In addition, one tensiometer, plus two volumetric water content sensors (both for continuous moisture measuring) as well as three rhizons to collect porewater (for nutrients leaching) were installed to each box. The results showed that biochar significantly decreased bulk density and increased total porosity compared to compost in the Fluvisol, however manure caused the greatest changes in the Regosol. All the amendments extent the soil water retention curves but biochar resulted in the highest proportion of plant readily available water content for both amended soils (increase by 48.4 % in comparison to control soil). However, saturated hydraulic conductivity was not changed by any of the amendments which kept infiltration unchanged. Soil pore water sampling revealed improvement of nutrient retention that occurred in some of the amendment configurations (e.g., for co-composted biochar at 2% dosage and 5% manure-biochar mixture). In summary, the utilization of biochar with/without additional compost and manure can enhance soil water retention in drought sensitive low organic soils and improve soil nutrient retention/decrease nutrient leaching. Such finding supports the application of mixed organic amendment in drought-prone soils to enhance crops growth.

Keywords: Biochar; Organic matter; Retention curve; Hydraulic conductivity; Available water content; Coarse soil

Climate changes are complex and non-linear

Šrobár Štefan

Ecology is a science dealing with the study of connections in the system of life. It is thus about the system of all being and life (i.e. the biosphere) as a whole and the place of humans in it. Unless all of us are able to surmise intuitively that our Earth is a *living system* and to realise that we are a part of it, we will not be able to respond automatically in its interest and, as a consequence, to our own protection and safety. The most critical issue related to *climate change* is how intensely and how rapidly the *Earth is warming*. Let us not anticipate that the climate will run a *smooth course* of slowly and steadily rising temperatures, in which changes *slowly* move up and allow us to peacefully remain in the *established way of life* for a sufficiently long time. The real Earth is changing *intermittently*, with periods of stability, even a slight decrease, between temperature rises. Climate change is not at all like a highway rising steadily through a mountain pass, but more *the mountain itself*, which represents an aggregate of steep slopes, valleys, flat meadows, rocky outcrops and gorges. Perhaps it is desired that we believe that the temperature will rise steadily for another forty years, obviously, if we don't somewhere remove carbon dioxide from the atmosphere. It may seem that *climate and economic* forecasts have little in common, but this is not the case. Both systems are *complex and non-linear* and can change *suddenly and unexpectedly*. We are in the midst of a catastrophic drought, which signals that the subtropical climate is beginning to take root in our country as well. Therefore, we will have to adapt the national economy and the *distribution of drinking water* to this change.

Key words: ecology, biosphere, man, climate changes, non-linear, drought, drinking water.

Railways as a source of alien plants

Kutlvař Josef^{1,2}, Turková Simona¹, Vojík Martin¹, Kadlecová Martina¹, Pyšek Petr^{2,3}, Pergl Jan²

¹ Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, Praha - Suchbátka, 165 00, Czech Republic, e-mail: simona.turkova@email.cz; ² Institute of Botany, Czech Academy of Sciences, 252 43 Průhonice, Czech Republic; ³ Department of Ecology, Faculty of Science, Charles University, Viničná 7, 128 44 Prague, Czech Republic

Invasion of alien species is one of the current threats to biodiversity, affecting also human well-being. Invasive species have a negative impact on the structure and functioning of entire ecosystems; many of them spread in the new regions by escaping from cultivation or are being introduced as an admixture of various commodities. One of the main pathways of spread is railway traffic. We conducted a field survey along the freight railway corridor Břeclav - Kolín - Praha - Děčín in 39 railway stations and neighbouring areas during vegetation seasons 2020 and 2021. At each station, the site was divided into three zones differing in management: (i) rails and embankments, (ii) wider surroundings of the station, and (iii) surroundings of buildings. The abundance of each species in each zone was recorded using semi-quantitative scale of occurrence: 1 = occasional, 2 = rare, 3 = scattered, 4 = abundant, 5 = dominant. The inventory at stations was compared with historical data to determine (i) whether alien species continue to spread, (ii) is there a relationship between the time of introduction and the invasion stage, and (iii) to record newly introduced species. Preliminary results from part of the studied railway corridor show that the number of alien plants is increasing and some invasive species spread along the rails in past years. In total, we found 13 new invasive species compared to historical data. Several invasive species frequently form dominant stands (*Ailanthus altissima*, *Solidago canadensis*, *Conyza canadensis*) in the wider surroundings of the railway stations. The presented data are only a fraction of the larger picture as the research is still ongoing. The aim is to cover all freight corridors in the Czech Republic to predict the spread of alien species and their invasive potential.

Keywords: corridor, introduction pathways, non-native plants, railway tracks

Smell of fear: the presence of an invasive turtle influences embryonic and larval development in the common frog

Vodrážková M., Šetlíková I., Berec M.

Faculty of Agriculture, University of South Bohemia, Studentská 1668, 370 05 České Budějovice, Czech Republic, Vodram02@zf.jcu.cz

An increasing amount of attention is devoted to studying the impact of non-native animal species on native fauna. Non-native red-eared sliders (*Trachemys scripta elegans*) have the potential to disrupt aquatic ecosystems in Central Europe because of their competitive abilities and omnivorous diet. Our study focuses on influencing a red-eared slider on the embryonic and larval development of the common frog (*Rana temporaria*) and changes in the time dynamics of the larval growth. 1) We found that in the absence of the slider, the embryos hatched in 12 days, while hatching was accelerated by two days in the treatment with the slider. Similarly, the embryos hatched smaller and at a lower developmental stage with the slider than without it. 2) Tadpoles in the permanent presence of turtle grew faster, metamorphosed earlier, and reached a smaller size at metamorphosis. The presence of turtles shortened the time at metamorphosis of the tadpoles from 110 days to 93 days. The froglets were significantly smaller in the presence of the predator than in the control 3) The coexistence of species in a given community depends on species composition and the timing of their interactions. The responses of the tadpoles were also examined in the alternating presence of the red-eared slider. The tadpoles developed for a longer time and were smaller in size and lower in body mass when the predator was present in early development than when the tadpoles developed without a predator. The presence of a predator in late tadpole development reduced only body mass at metamorphosis. The reactions mentioned may affect the survival and fitness of a metamorphosed individual. Our study extends the range of predators studied, including the effect on different phases of development of potential amphibian prey. The study was supported by a project of the Grant Agency of the University of South Bohemia in České Budějovice 045/2019/Z

Keywords: antipredator response, chemical cues, development time, phenotypic plasticity

Are disturbance regimes changing in European primary forests?

Vostarek Ondřej

Czech University of Life Sciences Prague, Faculty of Forestry and Wood Sciences,
Department of Forest Ecology, Kamýcká 129, Praha 6 - Suchbát, 165 00, Czech
Republic, vostareko@fd.czu.cz

Ongoing global climate change emphasizes the need for up-to-date information on the development of forest ecosystems as a rational basis for policy and management decisions, and primary forests can serve as a “laboratory” for observing of natural processes, such as disturbance regimes, under changing climatic conditions. Understanding of these processes and their drivers could be beneficial for assessing the impact of climate change on the future of forest ecosystems and for establishing a framework for their sustainable management and preservation. With the advances in technology, satellite remote sensing has become a useful tool, providing the ability to acquire data at large spatial scales with the possibility of continuous updating. Combining this information together with traditional dendroecological approaches can help answer the question of whether the disturbance regime of primary temperate mountain forests has changed in recent decades, and if so, address what the main drivers of these changes are, and can we then use this knowledge to predict them?

Keywords: climate change, dendroecology, remote sensing

Occurrence of tree-related microhabitats in spruce primary forests

Zemlerová Veronika

Czech University of Life Sciences Prague, Faculty of Forestry and Wood Sciences
Department of Forest Ecology; Kamýcká 129, 16521 Prague, Czech Republic; e-mail: silhanova@fld.czu.cz

Forests support the greatest proportion of Earth's terrestrial biodiversity however, these ecosystems are facing numerous threats, including from human-induced climate change. Yet, spatially-explicit information is required to make realistic predictions of forests' responses to global change, including historical variation in forest dynamics, which are mostly driven by natural disturbances. This presentation focuses on the effect of long-term natural disturbance variability on biodiversity indicators (tree-related microhabitats) in contrasting forest communities at an unprecedented scale in Europe's largest remaining assemblage of temperate primary forests. Tree-related microhabitats (TreMs) are distinct, well delineated structures occurring on living or dead standing trees, that form a particular and essential substrate or habitat for a great number of species from various taxa. TreMs are gaining increasing attention in forest management, conservation and research and have been widely recognized as important biodiversity indicators in both protected and commercial forests. A potentially important driver of TreM density and diversity can be natural disturbance regimes, however this relationship has not yet been well documented. Natural disturbance regimes play a key role in shaping the structural heterogeneity of forest ecosystems and habitats for biodiversity, with standing deadwood and deadwood density formed by disturbances being crucial for the presence of TreMs.

Keywords: Tree-related microhabitats, biodiversity, primary forests, disturbance history

Origin and genetic variability of populations an invasive plant *Rumex alpinus* L. in the Krkonoše Mountains

^{a,c}Michaela Jungová, ^aMichal Hejcman, ^aLeona Svobodová, ^aPavel Svoboda, ^bPetra Hlásná Čepková, ^aVladimíra Jurasová

^aDepartment of Ecology, Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamýcká 129, CZ 165 21 Prague 6 - Suchbátka, Czech Republic

^bGene Bank, Crop Research Institute, Drnovská 507/73, 161 06 Prague 6 - Ruzyně, Czech Republic

^cMolecular biology, Crop Research Institute, Drnovská 507/73, 161 06 Prague 6 - Ruzyně, Czech Republic

*Corresponding author jungovam@fzp.czu.cz

The Monk's rhubarb, *Rumex alpinus* L., is a perennial plant inhabiting nutrient-rich areas. It is native in the mountains of Central and Southern Europe. Still, its current distribution has been partly affected by its utilization as a vegetable and a medicinal herb in the past. In the mountains of the Czech Republic is an invasive plant, probably introduced into the Krkonoš Mts. by colonists from the Alps in the 16th century as a food plant. This study aimed to verify, using molecular markers, whether was *Rumex alpinus* introduced into the Krkonoše Mts. by alpine colonists or whether it naturally migrated from the Carpathians, where it is the native species.

For the evaluation of the genetic structure, in total, 417 individuals from 31 populations of *Rumex alpinus* were collected from the Alps, Carpathians, Balkan, Pyrenees, and 4 Czech mountain areas, and 12 simple sequence repeat (SSR) markers were applied.

The results of AMOVA showed high 60 % variation within the population, 27 % variation among groups, and 13 % among the population within groups. A higher level of genetic differentiation among populations ($F_{ST} = 0.39$; $p < 0.01$) indicated restricted gene flow between populations, , but mostly Alpines populations. In comparison with native populations, a limited gene flow between nonnative populations was observed. It was concluded that local adaptation, low gene exchange, and genetic drift affect the genetic diversity of *Rumex alpinus*. Low genetic variability in all Czech populations was found, consistent with the vegetative reproduction system of *Rumex alpinus*.

The results proved a genetic link between Alpine and Czech genotypes of *Rumex alpinus*, while the Carpathians genotypes corresponded to the Balkan genotypes.

Keywords: Alpine dock; weed; genetic variability; microsatellite analysis; invasive plant

Acknowledgment: This work received funding from the Internal Grant Agency (IGA) of the Czech University of Life Sciences Prague under grant agreement No 20184218.

Seznam účastníků konference

Last Name	First Name	Company Name	
Abou zeid	Farah	CZU	Faculty of environmental sciences
Aguilar-Palma	Roy	CZU	Faculty of environmental sciences
Astray	Blanca	CZU	Faculty of environmental sciences
Audyová	Stefanie	CZU	Faculty of environmental sciences
Bandak	Isa	CZU	Faculty of environmental sciences
BAYLET	AMANDINE	CZU	Faculty of environmental sciences
Bobotová	Gabriela	CZU	Faculty of environmental sciences
Budská	Daniela	CZU	Faculty of environmental sciences
Buchtelík	Stanislav	CZU	Faculty of environmental sciences
Černá	Marie	CZU	Faculty of environmental sciences
Dagsson-Waldhauserova	Pavla	CZU	Faculty of environmental sciences Faculty of Forestry and Wood Sciences
Das	Sumanta	CZU	
Dvořák	Vít	CZU	Faculty of environmental sciences
Dvořáková	Petra	CZU	Faculty of environmental sciences
		Centrum polární ekologie, Přírodovědecká fakulta, Jihočeská univerzita v Českých Budějovicích	
Elster	Josef		Botanický ústav AV ČR v Třeboni
Filippi	Gabrielle	CZU	Faculty of environmental sciences
Gábová	Šárka	CZU	Faculty of environmental sciences
Gaigr	Jonáš	AOPK ČR	AOPK ČR (Odbor monitoringu biodiverzity)
Gajdošová	Dorota	CZU	Faculty of environmental sciences Přírodovědecká fakulta, Katedra biologie a ekologie
Garguláková	Andrea	University of Ostrava	
Gramanová	Nikola	CZU	Faculty of environmental sciences
Guth	Jiří	Ministerstvo životního prostředí	Oddělení dobrovolných nástrojů, výzkumu a vývoje
Hanušová	Tereza	CZU	Faculty of environmental sciences
Harabiš	Filip	CZU	Faculty of environmental sciences
Häusler	Jan	CZU	Faculty of environmental sciences
Havlíček	Jan	Jihočeská univerzita v Českých Budějovicích	Zemědělská fakulta, Katedra biologických disciplín
Hladík	Štěpán	CZU	Faculty of environmental sciences
Homolková	Monika	CZU	Faculty of environmental sciences
Hronková	Jana	CZU	Faculty of environmental sciences
Hüttnerová	Tereza	CZU	Faculty of Forestry and Wood Sciences
Isakhanian	Alisa	Charles University	FTVS

Jor	Tomáš	Charles University	Přírodovědecká fakulta
Jůnek	Tomáš	CZU	Faculty of environmental sciences
Jungová	Michaela	Výzkumný ústav rostlinné výroby v.v.i. Ruzyně	Molekulární biologie
Jungová	Michaela	CZU	Faculty of environmental sciences
Kadlec	Jakub	CZU	Faculty of environmental sciences
Kadlecová	Martina	CZU	Faculty of environmental sciences
Kebrle	Dominik	CZU	Faculty of environmental sciences
Kleprlíková	Lucie	CZU	Faculty of Forestry and Wood Sciences
Klimková	Zdeňka	CZU	Faculty of Agrobiology, Food and Natural Resources
Knapp	Michal	CZU	Faculty of environmental sciences
Kočárková	Tereza	AOPK ČR	Oddělení péče o terestrické ekosystémy
Korejs	Kryštof	Jihočeská Univerzita v Českých Budějovicích	Přírodovědecká fakulta
KUMAR	NAYAN	CZU	Faculty of environmental sciences
Kutlvašr	Josef	CZU	Faculty of environmental sciences
Kuželková	Marta	CZU	Faculty of environmental sciences
Labajová	Veronika	University of Ostrava	Přírodovědecká fakulta, Katedra biologie a ekologie
Lehm	Helga	CZU	Faculty of environmental sciences
Leiner	Martin	CZU	Faculty of Forestry and Wood Sciences
Lewandowská	Šárka	CZU	Faculty of environmental sciences
Lojdová	Šárka	Česká asociace doktorandek a doktorandů	Česká asociace doktorandek a doktorandů
Madhuswini	Monisha	CZU	Faculty of environmental sciences
Mahlerová	Karolina	CZU	Faculty of environmental sciences
Maršíková	Sarah	CZU	Faculty of environmental sciences
Maslejová	Martina	CZU	Faculty of environmental sciences
Merei	Muhammad	CZU	Faculty of environmental sciences
Montoya-Molina	Santiago	CZU	Faculty of environmental sciences
Mouchová	Veronika	CZU	Faculty of environmental sciences
Multušová	Linda	CZU	Faculty of environmental sciences
Musil	Petr	CZU	Faculty of environmental sciences
Musilová	Zuzana	CZU	Faculty of environmental sciences
Novotná Floriančíčová	Kamila Miroslav	Univerzita Jana Evangelisty Purkyně, Ústí nad Labem	Přírodovědecká fakulta
Novotný	Daniël	ForRest Café CPTO UJEP	ForRest Café CPTO UJEP
Omara-Ojangu	Carol	CZU	Faculty of environmental sciences
Pardus	Ivo	CZU	Faculty of environmental sciences
Pařízek	Vojtěch	CZU	Faculty of environmental sciences

Pešková	Lucie	CZU	Faculty of environmental sciences
Poláková	Lucie	CZU	Faculty of environmental sciences
Pospíšilíková	Tereza	CZU	Faculty of environmental sciences
Pracná	Petra	CZU	Faculty of environmental sciences
Prajzlerová	Dominika	CZU	Faculty of environmental sciences
Procházka	Jan	CZU	Faculty of environmental sciences
Provazník	Daniel	CZU	Faculty of Forestry and Wood Sciences
Růžička	Jan	CZU	Faculty of environmental sciences
Rybářová	Dominika	CZU	Faculty of environmental sciences
Řeřicha	Michal	CZU	Faculty of environmental sciences Faculty of Forestry and Wood Sciences
Sarkar	Shatarupa	CZU	Faculty of environmental sciences
Seidl	Miroslav	CZU	Faculty of environmental sciences
Seyedsadr	Samar	CZU	Faculty of environmental sciences
Schwarzbacherová	Anna	CZU	Institut vzdělávání a poradenství Faculty of Forestry and Wood Sciences
Singh	Vivek	CZU	Faculty of environmental sciences
Siretckaia	Anastasiia	CZU	Faculty of environmental sciences
Solský	Milič	Magistrát hlavního města Prahy	Odbor ochrany prostředí
Součková	Markéta	CZU	Faculty of environmental sciences
Šeiner	Jiří	Společnost pro zahradní a krajinářskou tvorbu	Sekce péče o dřeviny
Šíkola	Martin	Ministerstvo životního prostředí	OPVŽPIP
Šindelář	Jakub	Česká asociace doktorandek a doktorandů	Katedra evropských studií IMS FSV UK
Škarydová	Denisa	CZU	Faculty of environmental sciences
Šrobár	Štefan		
Švejcarová	Tereza	CZU	Faculty of environmental sciences
Toulec	Tadeáš	CZU	Faculty of environmental sciences
Tugushev	Gleb	CZU	Faculty of environmental sciences
Turková	Simona	CZU	Faculty of environmental sciences Faculty of Forestry and Wood Sciences,
Tyšer	Daniel	CZU	EXTEMIT-K
Valešová	Martina	CZU	Faculty of environmental sciences
Válová	Marie	CZU	Faculty of environmental sciences
Vargas Godoy	Mijael Rodrigo	CZU	Faculty of environmental sciences
Venturo	Alfredo	CZU	Faculty of environmental sciences
Veselská	Zuzana	CZU	Faculty of environmental sciences
Vodrážková	Magda	Jihočeská univerzita v Českých Budějovicích	Zemědělská fakulta
Vojar	Jiří	CZU	Faculty of environmental sciences
Vojík	Martin	CZU	Faculty of environmental sciences
Vojkůvková	Sabina	CZU	Faculty of environmental sciences

Vondráček	Dominik	National museum	Department of Entomology
Vostarek	Ondřej	CZU	Faculty of Forestry and Wood Sciences
Wallererová	Jitka	CZU	Faculty of environmental sciences
Zarzsevszkij	Szimana	CZU	Faculty of environmental sciences
Zemlerová	Veronika	CZU	Faculty of Forestry and Wood Sciences