Integrated Management of Environmental Resources

Suceava, November 23-24 **2023**

Book of abstracts

Integrated management of Environmental Resources

Edited by:
Iulian Dănilă, Liviu Nichiforel, Cătălin-Constantin Roibu

Conference Program

November 23th, 2023 - Thursday

Joseph Smith Auditorium of the "Stefan cel Mare" University		
09.30-10.30	Opening session	

Plenary session - Joseph Smith Auditorium of the "Stefan cel Mare" University		
10.30-10.55	The response of the common oak (*Quercus robur*) and the grayish oak (*Quercus pedunculiflora*) to climate in the forest-steppe area of southeastern Romania	Popa Ionel[1,2], Popa Andrei[1,3], Balabasciuc Mihai[1] *1 National Institute for Research and Development in Forestry 'Marin Dracea', Bucharest, Romania* *2 Center for Mountain Economy (CE–MONT), Vatra Dornei, Romania* *3 Faculty of Silviculture and Forest Engineering, Transilvania University of Brasov, Brasov, Romania*
10.55-11.20	Socioecological Dynamics and Forest Dependent Communities' Wellbeing: The Case of Yasuní National Park, Ecuador	Isabel Domingues[1], Coman Claudiu[2], Popa Bogdan[1] *1Faculty of Silviculture and Forest Engineering,* *2. Faculty of Sociology and Communication, "Transilvania" University of Brașov, Romania*
11.20-11.45	Aspects regarding the contribution of the National Forest Extension and Rehabilitation Program to the sustainable development of the Republic of Moldova	Dumitru Galupa, Talmaci Ion, Florenta Gheorghe *National Forest Research Institute , Republic of Moldova*
11.45-12.00	Conclusions	

Session: Environmental Economics and Policy   Room: E 105

Moderator: Laura Bouriaud

Time	Title	Authors
13.00-13.15	The music of wood - the connection between the forest ecosystem, the manufacturing technology and art	Mariana Domnica Stanciu[1], Florin Dinulica[2], Vasile Ghiorghe Gliga[1,3], Mihaela Campean[4], Adriana Savin[1,5], Silviu Marian Nastac[1,6], Alina Marian Nauncef[7] *1 Department of Mechanical Engineering, Transilvania University of Brasov* *2 Department of Forest Engineering, Forest Management Planning and Terrestrial Measurements, Transilvania University of Brașov,* *3 S.C. Gliga Musical Instruments S.A., Reghin, Romania;* *4 Faculty of Furniture Design and Wood Engineering, Transilvania University of Brasov,* *5 Institute of Research and Development for Technical Physics,* *6 Faculty of Engineering and Agronomy, Braila, "Dunarea de Jos" University of Galati, Romania,* *7 Faculty of Music, Transilvania University of Brașov*
13.15-13.30	Promoting renewable energies as a tool for climate change mitigation; case studies – solar energy for the cities of Leeuwarden (Netherlands) and Suceava (Romania)	Alexandra Smalberger, Anca Măciucă *"Ștefan cel Mare" University of Suceava, Forestry Faculty, Romania*
13.30-13.45	Dimensional characteristics of wood chips and their moisture content for short-rotation crops of energy willow	Cezar Scriba, Elena Camelia Musat* *Transilvania University of Brasov - Faculty of Silviculture and Forest Engineering, Romania*
13.45-14.00	Determination of the potential social and biomass production impact of forestry works adjacent to the Via Transilvanica route	Cerasela Teodorescu *"Ștefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania*
14.00-14.15	Critical Analysis of Payments for Ecosystem Services: Case Studies in Kenya, Uganda and Tanzania	Ibrahim Osewe , Aureliu-Florin Hălălișan, Nicolae Talpă, Bogdan Popa *Transilvania University of Brasov - Faculty of Silviculture and Forest Engineering, Romania*
14.15-14.30	Analysis of the first-year students of the Forestry Faculty perceptions concerning the Romanian forests management	Catalina Oana Barbu. Liviu Nichiforel, Sergiu Andrei Horodnic *"Ștefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania*
14.30-14.45	The Romania Forest legislation seen as a Javon's Paradox	Marian Dragoi[1], Dragoș Costin[1], Veronica Toza[2], Vasile Iosifescu[1], Petru Drob[2] și Gabriel Dănilă[1] *1 "Ștefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania, 2 Legal consultant*

14.45-15.00	Forest laws analysis in selected European countries	Liviu Nichiforel[1], Valeriu-Norocel Nicolescu[2] *1"Ştefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania* *2 Transilvania University of Brasov - Faculty of Silviculture and Forest Engineering, Romania*
15.00-15.30	Coffee break	
15.30-15.45	PEFC - Standards for Sustainable Forest Management	Lucian Filigean *PEFC Romania*
15.45-16.00	Perceptions of stakeholders input for FSC forest management certification from Romania	Bogdan Buliga[1], Liviu Nichiforel[2] *1Preferred by Nature* *2 "Ştefan cel Mare" University of Suceava, Forestry Faculty, Romania*
16.00-16.15	A new metric to assess the deadwood presence in FSC certified forests	Ciprian Ceornea *"Ştefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania*
16.15-16.30	Understanding the EU Deforestation Regulation - Resources and tools for implementation	Tudor Serban, Bogdan Buliga *Preferred by Nature*
16.30-16.45	The role of cultural ecosystem services for sustainable forest management	Ramona Scriban, Marian Drăgoi, Carmen Badaluta *"Ştefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania*
16.45-17.00	Analizing the possibility to RfiD utilisation in forestry in Romania	Pălie Dorin, Laura Bouriaud *"Ştefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania*

Session: Forest Ecosystems and Climate   Room: E113

Moderator: Gabriel Duduman

13.00-13.15	Deadwood carbon dynamics over 10-years in a temperate virgin forest	Ion Cătălin Petrițan *Transilvania University of Brasov, Romania*
13.15-13.30	Mapping vegetation in the protection areas of the high voltage power lines for Ecological corridor Management	Ionut Barnoaiea[1], Ciprian Palaghianu[1], Ovidiu Iacobescu[1], Alina Dobresanciuc[2], Gabriel Duduman[1], Cezar Tomescu[1], Alexei Savin[1], Vasile-Cosmin Cosofret[1], Daniel Avacaritei[1], Iulian Danila[1], Georgel Mazare[1], Florin Clinovschi[1], Corneliu Pohontu[1], Gabriel Danila[1], Paul Iliescu[1] *1. "Ștefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania, 2. Delgaz Grid S.A.,Romania*
13.30-13.45	Results of vegetation and fauna mapping in Șipote Forest, Suceava municipality	Gabriel Duduman, Cezar Tomescu, Anca Măciucă, Ionuț Barnoaiea, Ovidiu Iacobescu, Mihai-Leonard Duduman *"Ștefan cel Mare" University of Suceava, Forestry Faculty, Romania*
13.45-14.00	Mapping historically disturbed forest structure using LiDAR and spy sattelites in Pecineagu watershed	Ioana Alexandra Nicolae, Mihai Daniel Niță *Transilvania University of Brasov, Romania*
14.00-14.15	Comparing the efficiency of forest mitigation strategies on carbon sequestration	Cosmin Cosofret, Olivier Bouriaud, Laura Bouriaud *"Ștefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania*
14.15-14.30	Use of terrestrial laser scanner (TLS) to optimize tree sampling for allometric model fitting in short-rotation woody crops (SRWCs)	Iulian Dănilă, Cosmin Coșofreț, Olivier Bouriaud *"Ștefan cel Mare" University of Suceava, Forestry Faculty, Romania*
14.30-14.45	Wood density in Norway Spruce (*Picea abies* (L.) H. Karst) stand installed using different planting schemes in the north of the Eastern Carpathians	Gheorghe Ștefan[1,2], Răzvan Vasile Câmpu[3], Radu Vlad[2], Alexandra Ispravnic (Ștefan)[1, 2] *1. Interdisciplinary Doctoral School, "Transylvania" University from Brasov, Romania* *2. National Institute for Research and Development in Forestry 'Marin Dracea', Campulung Moldovenesc, Romania* *3. Department of Forest Engineering, Forest Manangement Planning and Terrestrial Measurements, Faculty of Silviculture and Forest Engineering , Transilvania University of Brasov, Romania*

Time	Title	Authors
14.45-15.00	Growth and development indices at stand level in mixed Norway spruce (*Picea abies* (L.) H. Karst) silver fir (*Abies alba* Mill.) and beech (*Fagus sylvatica* L.) stands from the north of the Eastern Carpathians	Alexandra Ispravnic (Stefan)[1,2] Razvan Vasile Câmpu[3], Radu Vlad[2], Gheorghe Stefan[1,2] *1 Interdisciplinary Doctoral School, Transilvania University of Brașov,Romania* *2 National Institute for Research and Development in Forestry "Marin Drăcea" Câmpulung Moldovenesc Research Station, Romania* *3 Department of Forest Engineering, Forest Manangement Planning and Terrestrial Measurements,Faculty of Silviculture and Forest Engineering , Transilvania University of Brasov,Romania*

15.00-15.30   Coffee break

Time	Title	Authors
15.30-15.45	A systematic survey of conventional and new postural assessment methods	Gabriel Osei Forkuo *Department of Forest Engineering, Forest Management Planning and Terrestrial Measurements, Faculty of Silviculture and Forest Engineering, Transilvania University of Brașov, Romania*
15.45-16.00	Patterns of forest species association in sapling communities: a story of love and hate	Ciprian Palaghianu, Cosmin Coșofreț *"Ștefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania*
16.00-16.15	Weeding of seedlings in forest nurseries by chemical method - case study	Georgel Constantin Mazare *"Ștefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania*
16.15-16.30	The specifics of the growth of beech seedlings (*Fagus Sylvatica L.*) of different geographic provenience in the "Plaiul Fagului" scientific reserve	Victor Sfeclă, Alexandru Chetrean, Irina Sfeclă *Technical University of Moldova, Faculty of Agricultural, Forest and Environmental Sciences, Chisinău, Republic of Moldova*
16.30-16.45	Analysing the sound speed through the wood and stability of Norway spruce trees affected by trunk rot	Gheorghe Pei[1], Radu Vlad[2] *1.Transilvania University of Brașov, Faculty of Silviculture and Forest Engineering, Romania* *2.National Institute for Research and Development in Forestry (INCDS) "Marin Drăcea" - Câmpulung Moldovenesc, Romania*
16.45-17.00	The viability of beech seedlings of different geographic proveniences (*Fagus sylvatica* L.) in the conditions of the "Plaiul Fagului" scientific reserve	Victor Sfeclă[1], Irina Sfeclă[1], Nina Zdioruk[2], Nicolae Platovschii[2] *1Technical University of Moldova, Faculty of Agricultural, Forest and Environmental Sciences, Chişinău, Republic of Moldova* *2Institute of Genetics, Physiology and Plant Protection of SUM, Chisinau, Republic of Moldova*

Session: Forest Assessment, Modelling, Forest Management   Room: E109

Moderator: Cătălin Constantin Roibu

13.00-13.15	Exploring the effect of long-term natural disturbance dynamics on contemporary lichen communities	Rhiannon Gloor[1], Marek Svitok[2], Martin Mikoláš[1,3], Jeňýk Hofmeister[1], Ondřej Vostárek[1], Daniel Kozák[1], Lucie Zemanová[1], Miroslav Svoboda[1] *1Department of Forest Ecology, Faculty of Forestry and Wood Sciences, Czech University of Life Sciences Prague, Praha 6 – Suchdol, Czech Republic* *2Faculty of Ecology and Environmental Sciences, Technical University in Zvolen, Slovakia* *3PRALES, Odtrnovie 563, 013 22 Rosina, Slovakia*
13.15-13.30	Particularities in beech and oak responses to climate at the easternmost sites of their distribution in Europe.	Catalin-Constantin Roibu [1], Andrei Mursa [1], Ciprian Palaghianu [1], Marian-Ionut Stirbu[1], Mihai Gabriel Cotos[1], Cosmin Andriescu [1], Ana-Maria Cretan[2], Victor Sfecla[1,3] *(1) Forest Biometrics Laboratory- Faculty of Forestry, "Stefan cel Mare" University of Suceava, Romania (2) Transilvania University of Brasov, Romania (3) Technical University of Moldova, Republic of Moldova*
13.30-13.45	Outstanding structural attributes of primary spruce forests shape regional species distribution of various taxa	Matej Ferenčík *Czech University of Life Sciences Prague, Faculty of Forestry and Wood Sciences, Department of Forest Ecology, Czech Republic*
13.45-14.00	Optimal distribution of sample trees in developing allometric biomass models	Ioan Dutca *1.Transilvania University of Brasov, Romania;* *2.Buckinghamshire New University*
14.00-14.15	The vulnerability of some juvenile fir provenances (*Abies alba* Mill.) to damage caused by late frosts, evidenced by frost rings	Anca Botezatu, Anca-Ionela Semeniuc Fecioru, Maria Teodosiu *National Institute for Research and Development in Forestry" Marin Drăcea" Câmpulung Moldovenesc, Romania*
14.15-14.30	Maple resonance wood: structural and acoustic requirements	Florin Dinulică[1], Mariana Domnica Stanciu[1], Cătălin Constantin Roibu[2], Cristian Hiciu[1], Daniel Constantin Şandor[1], Marian Ştirbu[2], Andrei Mursa[2] *1Transilvania University of Brasov, Romania,* *2"Ştefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania*

Time	Title	Authors
14.30-14.45	Deadwood and saproxylic beetles in the Sinca Old-Growth Forest	Gabriela Isaia[1], Mihai-Leonard Duduman[2], Ionuț-Marian Dragomir[1], Ion Cătălin Petrițan[1] *1Transilvania University of Brasov, Faculty of Silviculture and Forest Engineering, Romania* *2"Ștefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania*
14.45-15.00	Bark and wood boring beetles in relation with the new episodes of oak decline in North-East of Romania	Daniela Lupaștean[1], Constantin Ciornei[2], Florin Botezatu[3], Mihai-Leonard Duduman[1] *1"Ștefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania, 2independent researcher, 3Ingka Investments Forest District, Romania*
15.00-15.30	Coffee break	
15.30-15.45	Leaf morphological traits distinguish between Cuban native species of mahagoni and the Hondurian mahagony.	Liuder Isidoro Rodríguez Coca, Elena Ciocirlan, Alexandru Lucian Curtu *Faculty of Silviculture and Forest Engineering, Transilvania University of Brasov, Romania*
15.45-16.00	Comparison between atmospheric depositions recorded at the Rarau experimental plot at different altitudes	Amelia Buculei [1], Carmen Iacoban [1], Ștefan Leca[2] *1. National Institute for Research and Development in Forestry" Marin Drăcea", Câmpulung Moldovenesc, 2. National Institute for Research and Development in Forestry" Marin Drăcea", Voluntari, România*
16.00-16.15	Effects of industrial activity and air pollution on European beech trees in Transylvania, Romania	Cosmin Ilie Cuciurean [1,2], Cristian Gheorghe Sidor[1], Ionel Popa [1,3] *(1) National Research and Development Institute in Forestry "Marin Drăcea", Romania, (2) Doctoral School of Engineering Sciences, "Ștefan cel Mare" University from Suceava, Romania, (3) Center of Mountain Economy -INCE - CE-MONT Vatra Dornei, Romania*
16.15-16.30	Co-exposure effects of polypropilene and ketoprofen treatments on zebrafish behavior	Ionuț-Alexandru Chelaru[1,2], Alexandra Savucă[1,2], Alin Stelian Ciobîcă[3,4,5], Dorel Ureche[6], Mircea Nicușor Nicoară[1,3] *1 Doctoral School of Geosciences, Faculty of Geography and Geology, "Alexandru Ioan Cuza" University of Iași,*

		2 Doctoral School of Biology, Faculty of Biology, "Alexandru Ioan Cuza" University of Iași, *3 Department of Biology, Faculty of Biology, "Alexandru Ioan Cuza" University of Iași,* *4 Academy of Romanian Scientists* *5 Center of Biomedical Research, Romanian Academy, Iași,* *6 Faculty of Sciences, Department of Biology, Ecology and Environmental Protection, University "Vasile Alecsandri", Bacau, Romania*
16.30-16.45	The study of the evolution of natural regeneration in the territories located outside the Adancata forest area	Savin Alexei, Voloşciuc Florentin-Nicolae, Cucu Cornel-Constantin *"Ştefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania*
16.45-17.00	The structure of the forest fund of the Străseni Silvocinegetic Enterprise depending on the natural conditions	Grati Vladislav[1,2], Bunduc Tatiana[3], Bejan Iurie[3] *1.Moldova State University, 2.Faculty of Forestry, "Stefan cel Mare" University of Suceava, 3. Moldova State University, Institute of Ecology and Geography*
17.00-17.15	Comparative analysis of altitude accuracy for forest roads, using methods based on total stations and lidar	Bogdan Popovici *"Ştefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania*

Poster Session 17.00-18.30   Lobby E – Building

Moderator: Mihai-Leonard Duduman

5 min	Freshwater Fish Communities As An Indicator Of Pesticide Pollution	Corneliu Mihaita Pohontu *Stefan cel Mare University of Suceava, Romania*
5 min	Results-based payments in the agricultural sector, with the possibility of application in the forestry sector	Teodorescu Cerasela *Ștefan cel Mare University of Suceava, Romania*
5 min	Ichthyofauna from the Casin river basin in 2023	Teodora-Ramona Popa, Camelia Ureche, Dorel Ureche *Universitatea "Vasile Alecsandri" din Bacău, Romania*
5 min	The study of the interaction between environmental policy and forestry policy with applicability to protected natural areas	Mariana Croitor *Ștefan cel Mare University of Suceava, Romania*
5 min	Forestry 4.0: How is the fourth technological advancement affecting the forestry sector?	Iulian Dănilă, Ciprian Palaghianu *Ștefan cel Mare University of Suceava, Romania*
5 min	The response of larch seedlings from different Romanian provenances to low temperatures	Alina M. Truța[1], Iulia Arion[1], Irina M. Morar[1*], Steluta M. Sîngeorzan1, Catalina Dan[2], Roxana D. Stoian-Dod[2], Liviu Holonec[1] *1 University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Forestry and Cadastre, Romania; 2 University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Horticulture and Business in Rural Development, Romania;*
5 min	Analysis of the main characteristics and germination capacity of fir seeds under various abiotic stress conditions	Irina M. Morar[1], Alina M. Truta [1*], Roxana D. Stoian-Dod[2], Catalina Dan[2] *1 University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Forestry and Cadastre, Romania; 2 University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Horticulture and Business in Rural Development, Romania*

5 min	The effect of rewilding of beech-dominated temperate forest ecosystems on carbon stocks and biodiversity indicators	Markuljaková K., Kozák D., Mikoláš M., Ferenčík M., Frankovič M., Dúhová D., Svoboda M. *Faculty of Forestry and Wood Sciences, Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Praha 6 – Suchdol, Czech Republic*
5 min	Evaluation and monitoring of comparative trials of half-sib provenances of beech (*Fagus sylvatica* L.) installed in two forest districts Demacusa and Vidra	Alina Todirică, Maria Teodosiu, Cristiana Ciuvăț, Ecaterina Apostol *National Institute for Research and Development in Forestry "Marin Drăcea", Romania*
5 min	Survey's and questionnaires for forestry research. Tools for the present.	Andrei Apăfăian [1], Cristian Mihai Enescu [2], Vlad Crișan[1] *1"Marin Drăcea" National Institute for Research and Development in Forestry, Brașov, Romania, 2 Department of Soil Sciences, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania*
5 min	Phytosanitary status of pedunculate oak crops in Voivodeni forest nursery, Reghin Forestry District, Mureș County Forest Administration, in the period 2021-2023	Mircea Ioan Varga[1], Ioan Tăut[1,2*], Florin Alexandru Rebrean[1], Mircea Moldovan[2], *1University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca Faculty of Forestry and Land Surveying, 2"Marin Drăcea" National Institute for Research and Development in Forestry Cluj, Romania*
5 min	Empirical Procedure For Estimating The Effect On The Peak Discharge Of Torrent Control Works	*Ioan Ciornei* *Ștefan cel Mare University of Suceava, Romania*
5 min	Floristic notes of the "Dobrușa" landscape reserve of the Republic of Moldova	*Victor Sfeclă[1], Pavel Pînzaru[2]* *1 State University of Moldova, Chișinău, Republic of Moldova, 2 "Alexandru Ciubotaru" National Botanical Garden (Institute), SUM, Chișinău, Republic of Moldova*
5 min	Aspects regarding the identification of forest genetic resources of cvercines in the North area of the Republic of Moldova	*Gheorghe Florență[2,1], Valeriu Caisîn[3,1], Aliona Miron[1], Veronica Florență[2,1]* *1 National Botanical Garden (Institute) "Alexandru Ciubotaru" of the State University of Moldova 2 Forest Research and Management Institute, Chisinau, Republic of Moldova 3 Agency "Moldsilva"*

5 min	Issues of assessing carbon stocks in the biomass and soil of grasslands in Orhei National Park	*Ion Talmaci[1,2], Aliona Miron[1], Alexandru Galupa[1,2], Erii Prosii[1,2], Ghenadie Cojocaru[1,2], Ala Mardari[1,2], Ludmila Talmaci[1]*
		1Grădina Botanică Națională (Institut) „Alexandru Ciubotaru" a Universității de Stat din Moldova
		2Institutul de Cercetări și Amenajări Silvice
5 min	Aspects regarding the estimation of carbon from the biomass of forest trees in the Southern Area of the Republic of Moldova	*Ion Talmaci[1,2], Erii Prosii[1,2], Alexandru Galupa[1,2], Ghenadie Cojocaru[1,2], Ala Mardari[1,2], Aliona Miron[1], Ludmila Talmaci[1], Alexandru Varzari[1,2]*
		1Grădina Botanică Națională (Institut) „Alexandru Ciubotaru" a Universității de Stat din Moldova
		2Institutul de Cercetări și Amenajări Silvice
5 min	Species *Orchis Purpurea* HUDS. in the grasslands of the Orhei National Park	*Aliona Miron[1], Alexandru Galupa[1,2], Ghenadie Cojocaru[1,2]*
		1"Alexandru Ciubotaru" National Botanical Garden (Institute) of the State University of Moldova, Chisinau, Republic of Moldova
		2Forest Research and Management Institute, Chisinau, Republic of Moldova

The response of the common oak (*Quercus robur*) and the grayish oak (*Quercus pedunculiflora*) to climate in the forest-steppe area of southeastern Romania

Popa Ionel[1,2], Popa Andrei[1,3], Balabasciuc Mihai[1]

[1]National Institute for Research and Development in Forestry Marin Dracea, Bucharest, Romania
[2]Center for Mountain Economy (CE–MONT), Vatra Dornei, Romania
[3]Faculty of Silviculture and Forest Engineering, Transilvania University of Brasov, Brasov, Romania
E-mail: popaicas@gmail.com

Global climate change impacts all regions of the world, including the forest-steppe zones in Romania. In the last decade, the effect of environmental changes in southeastern Romania has been manifested through increasing temperatures and more frequent and intense drought periods. These climate events have an impact on tree growth processes.

The objective of this study is to comparatively observe the response of trees to climatic factors in relation to their position within the forest stand. The research was conducted in the Bărăgan forest stand, managed by the BE Bărăgan. The analyzed species are the common oak (*Quercus robur*) and the grayish oak (*Quercus pedunculiflora*). Two research areas were selected for each species, one inside the forest and one at the forest edge. In each research plot, 21 trees were chosen for sampling. From each tree, one increment core was extracted at the height of 1.30 meters using a Pressler borer. The growth samples were processed and measured according to dendrochronological methods. A cubic smoothing spline function with a 50% frequency cutoff at 30 years was applied on individual tree ring width series to eliminate the age trend and any other disturbance signals. For each species, two mean chronologies were developed, one for inside forest stands and one for forest edge trees.

The climatic data (daily temperature and precipitation) used in this study were provided by Slobozia weather station for the period 1960-2022. The bootstrap Pearson correlation between cumulative temperature and precipitation on seasons of 21 to 120 days and tree-ring width index chronologies was computed.

Significant differences in radial growth were observed between the oak trees inside the forest and those at the forest edge. The oak tree inside the forest showed a positive and statistically significant correlation between growth indices and precipitation from August of the previous year to May of the current year. On the other hand, the oak tree at the forest edge does show statistically significant correlations with precipitation in this interval, except for spring. As for the common oak in the BE Bărăgan area, the radial growth indices show a positive and significant correlation with temperatures from spring only in the forest interior.

Key words: tree ring width, temperature, precipitation, Pearson correlation, dendroclimatic models, drought

Socioecological Dynamics and Forest Dependent Communities' Wellbeing: The Case of Yasuní National Park, Ecuador

Isabel Domingues[1], Coman Claudiu[2], Bogdan Popa[1]

[1]Faculty of Silviculture and Forest Engineering, "Transilvania" University of Braşov, Romania
[2]. Faculty of Sociology and Communication, "Transilvania" University of Braşov, Romania
E-mail: popab03@gmail.com

Socioecological approach has proved effective in better understanding the relationship between conservation efforts and human well-being tin the context of protected areas. This relationship can be seen through the case of the Kichwa indigenous communities in Yasuní National Park, Ecuador, as they have maintained a very close relationship with forest ecosystems. Using key informant interviews along with semi-structured interviews and focus groups, this research indicates that food, health and cultural identity are the most important benefits that communities obtain from forests. The research also describes the perceptions of the communities on the dynamics of socio-ecological systems, pointing to oil, infrastructure development and small-scale agriculture as the most important direct factors, while land governance and presence of settlers are the most important indirect factors of forest ecosystems change.

Aspects regarding the contribution of the National Forest Extension and Rehabilitation Program to the sustainable development of the Republic of Moldova

Dumitru Galupa, Ion Talmaci, Gheorghe Florență

Forest Research and Management Institute, Republic of Moldova
E-mail: dgalupa@yahoo.com

The Republic of Moldova (RM) is located in a region of increased vulnerability to climate change, which is increasingly experiencing heat waves, forest fires and drought. The policy documents adopted by the RM in the field of climate change include the forestry sector among the vulnerable sectors and the sectors that can significant contribute to mitigating the effects of climate change, including other sectors (agriculture, water resources, health, infrastructure, etc.). At the same time, Moldova faces a shortage of forest resources, as the coverage of different categories of forest vegetation is low (13.4%), with an even lower share of forests (about 11%). Experts estimate that at least 15% forest cover is needed to meet the challenges of adapting to climate change and ensuring community livelihoods. In this context, the Government by Decision No 55 of 17.02.2023 approved the National Forest Extension and Rehabilitation Programme for 2023-2032 (NFERP). The NFERP was conceptualised to address social-economic, environmental and climate challenges. It is in line with global commitments and trends related to forests and land use (Glasgow Leaders' Declaration on Forests and Land Use; UN Strategic Plan for Forests 2017-2030; European Green Pact, etc.). The NFERP is also in line with national policy documents and normative acts: the Forestry Code no. 887/1996, the Land Code no. 828/1991, Law no. 440/1995 on water protection zones and strips for rivers and water basins, Law no. 1041/2000 on the improvement of degraded land through afforestation, etc.

For the reference period, the NFERP foresees two strategic directions: (i) forest extension (afforestation), which includes the creation of new forest crops, with the primary objective of social (energy, economic) and ecological (forest habitats, biodiversity shelter) security, estimated at 110 thousand ha; (ii) forest rehabilitation (reforestation/rehabilitation), including the restoration or reconstruction of forest vegetation affected by various forms of degradation, with the primary objective of restoring natural forests and ensuring predominantly ecological functions, estimated at 35 thousand ha. Most of the land included in the NFERP will be in the public ownership of administrative-territorial units (79.2 thousand ha or 54.6% of the total), followed by land in public ownership of the state with 29.1% and private land with 16.2%. According to cadastral records and various specialised studies, the availability of land suitable for afforestation essentially exceeds the needs of the NFERP. Thus, at the moment there are available degraded lands (landslides, gullies, etc.) - 77.5 thousand ha, severely eroded agricultural lands - 123.4 thousand ha, riparian strips for water protection - 30.4 thousand ha. The total budget of NFERP for the period 2023-2032 is 15209.8 mln. MDL or about 750 mln. Euro. Direct costs for afforestation/reforestation works will be 12606,7 mln. MDL or 82,9% of

the overall costs. Based on the current situation in the forestry sector (shortage of highly qualified personnel, modern techniques and equipment; poor forestry infrastructure, etc.), the NFERP implementation process must start with extensive capacity building activities (institutional, personnel, technical equipment, creation of forestry infrastructure, etc.). The costs for capacity building will be about 1395.9 mln. MDL or 9.2% of the total, and most of them will have to be implemented during the first 4 years.

Afforestation within the NFERP will be carried out as a priority in areas of maximum impact on land and infrastructure. Afforestation technologies will be adapted to the primary conditions of the land concerned and the forest reproductive material (FRM) will consist of tree and shrub species that have confirmed suitability for harsh growing conditions and constraining pedological and climatic factors. According to the expert studies (including research and innovation project: 20.80009.7007.01) about 85 tree/shrub species, native and introduced (naturalized), will be used for the needs of NFERP, including from the related regions/countries of high interest for these purposes: Turkey oak (Quercus cerris L.), Hungarian oak (Quercus frainetto Ten.), etc. The edifying species of forests in the RM, such as European oak (Quercus robur L.), sessile oak (Q. petraea Matt.), the downy oak (Q. pubescens Wild.), the poplar (Populus alba L., P. nigra L.), ash (Fraxinus excelsior L.), are just some of the most important sylvophomorphic and priority elements for NFERP.

Potential benefits, present and future, from the implementation of NFERP will be prioritized: (i) reduction of soil degradation processes due to erosion, landslides, etc. (improvement of about 45 thousand ha of degraded land; direct protection of about 350 thousand ha of agricultural land); (ii) qualitative improvement of aquatic resources (afforestation of 15 thousand ha of riparian strips), forest vegetation contributing to efficient groundwater recharge, reduction of solid flow and pollutant concentration; (iii) reduction of air pollution by capturing carbon dioxide and various pollutants that endanger human health and the vitality of biological ecosystems (1272 kt CO_2/year); (iv) increasing the potential of products and services of newly created or rehabilitated forests (wood - 225 thousand m3/year; medicinal plants, berries, etc.); (v) modernisation of the FRM sub-sector (about 90% FRM grown under industrial conditions, including 20-30% with protected roots), growth of about 860 million seedlings; (vi) creation of new jobs, especially in rural areas related to a broad spectrum of activities (about 21,000 people); (vii) achievement of a large scale of transfer and dissemination of existing and new technologies in the forest sector (digital technologies; biotechnologies; carbon monitoring etc.). Key words: forest ecosystems; climate change; carbon sequestration; biotechnologies; improvement of degraded land; forest extension and rehabilitation; jobs; technology transfer

The music of wood - the connection between the forest ecosystem, the manufacturing technology and art

Mariana Domnica Stanciu[1], Florin Dinulica[2], Vasile Ghiorghe Gliga[1,3], Mihaela Campean[4], Adriana Savin[1,5], Silviu Marian Nastac[1,6], Alina Marian Nauncef[7]

[1]Department of Mechanical Engineering, Transilvania University of Brasov
[2]Department of Forest Engineering, Forest Management Planning and Terrestrial Measurements, Transilvania University of Brașov
[3]S.C. Gliga Musical Instruments S.A., Reghin, Romania
[4]Faculty of Furniture Design and Wood Engineering, Transilvania University of Brasov
[5]Institute of Research and Development for Technical Physics
[6]Faculty of Engineering and Agronomy, Braila, Dunarea de Jos University of Galati, Romania
[7]Faculty of Music, Transilvania University of Brașov
E-mail: mariana.stanciu@unitbv.ro

The aim of the paper is to present the traceability of resonance wood from harvesting to the finished product, emphasizing the superior utilization of wood under the conditions of the circular economy. The sound quality of a strings musical instruments is influenced by very many factors, such as: the quality of the wooden raw materials (resonance wood), the quality of the strings; the age of wood; the density and moisture content of the wood; the skill of the violin maker; the thickness profile of the plates; the type of coating used; the age of the instrument, etc. Violins are constructed of numerous elements having an acoustic, functional or aesthetic role. From an acoustic point of view, the violin consists of two subassemblies: the resonance box (violin body), having the role of an amplifier, and the sound generation system consisting of strings, neck with the tailpiece and the bridge. The violin body amplifies the musical sounds produced by the strings excited under the action of the bow. It consists of a top plate, a back plate, the ribs and the linings. The top plate is always made of resonance spruce wood (Picea abies L. Karst). The back plate is usually made of curly maple wood (Acer pseudoplatanus L.), but alternative species can be used as well. For instance, the violin is a very complex musical instrument, consisting of over 60 components. The manufacturing technology comprises more than 80 operations, which rely both on modern processing techniques, and on manual craftmenship gained over many years of experience, especially in the case of Maestro violins. The verification of the acoustic quality and ergonomics of the musical instrument is carried out by the instrumental artists through interpretation/testing activities of the instruments or through musical auditions of the acoustic recordings of new instruments, completed or in various stages of completion. Thus, their knowledge, skills and talent, musical ear, artistic feelings produced by the tested musical instruments are quantified in artistic terms and later correlated with the processing of recorded acoustic signals, based on a set of psycho-acoustic criteria that are part of a survey. In the end, it can be appreciated that the music of the wood begins in the forest, is perfected in the manufacturing process of the musical instruments and is amplified on the stage by the mastery of the performer, and time will lead to the crystallization of the wood and the musical sounds.

Promoting renewable energies as a tool for climate change mitigation; case studies – solar energy for the cities of Leeuwarden (Netherlands) and Suceava (Romania)

Alexandra Smalberger, Anca Măciucă

Ștefan cel Mare University of Suceava, Forestry Faculty, Romania
E-mail: anca.maciuca@usm.ro

In the European Union, the "European Green Deal" sets the objective of reducing greenhouse gas emissions and achieving climate neutrality by 2050. Following the Russia-Ukraine conflict, the European plan REPowerEU has emerged, aiming to accelerate the transition to a larger use of clean energy and unite European efforts to create a more resilient energy system. In this context, the paper presents two case studies, two projects aiming to promote renewable energy in Leeuwarden (the Netherlands) and Suceava (Romania). The purpose of these projects is to achieve carbon neutrality by promoting solar energy. In both cases, placing solar panels on building rooftops is planned, together with external fields of solar panels to cover the entire energy demands of these cities. Starting from the energy consumption of each city and from the available area for the placement of solar panels on the building rooftops, the dimensions that the solar panels fields (located in the vicinity of the studied urban agglomerations) should have, are calculated. Also, for both cities it is established starting from different criteria which are the optimal places of location of solar panel fields after the analysis of several options.

Through the case studies in Leeuwarden and the Suceava, the potential of solar energy has been investigated as a viable mean to achieve these objectives, even though efficient implementation requires in-depth analysis and significant initial investments. Furthermore, adapting technologies and carefully evaluation of local energy potential remains essential elements in ensuring an efficient and sustainable transition to renewable energy resources.

Dimensional characteristics of wood chips and their moisture content for short-rotation crops of energy willow

Cezar Scriba, Elena Camelia Musat

Transilvania University of Brasov - Faculty of Silviculture and Forest Engineering, Romania
E-mail: elena.musat@unitbv.ro

The current energetic context, the climate changes that have become more and more pronounced in the last period and the reduction of fossil fuel resources, have made that the concerns in this field to be directed towards renewable energy resources, emphasizing, more and more, on the valorization of wind energy, solar energy, that produced from thermal waters and even on a superior valorization of plant residues, respectively on the expansion of short-rotation crops, with fast-growing species, especially intended to obtain energy benefits.

In this sense, a series of experimental crops of willow, poplar and even Pawlonia, have been carried out in various countries, including Romania. Those fast-growing species produce considerable volumes of wood that can be used to obtain energy benefits. As an answer the present concern in the field, the article addresses the dimensions and the moisture content of the wood chips from short-rotation energy willow crops. Thus, samples of chopped wood were collected with the help of the Heizohack HM 8-400 chopper, coming from a 3-year-old willow crop, which was mechanically-manually harvested during the vegetative rest season (November - January 2022), but chopped in May 2023.

From a dimensional aspect, it was observed that the resulting chips are relatively uniform in size of the chips, but their moisture, in the given situation, decreased a lot as a result of the natural drying of the willow sticks from the moment of harvesting to the moment of their chopping. In addition, the characteristics of the willow wood and the high content of acetylsalicylic acid meant that no degradation phenomena occurred in the chips piles (stored for a relatively long term).

Determination of the potential social and biomass production impact of forestry works adjacent to the Via Transilvanica route

Cerasela Teodorescu

Ştefan cel Mare University of Suceava, Forestry Faculty, Suceava, Romania
E-mail: acatincai.cerasela21@gmail.com

Via Transilvanica is a route of about 1400 km, which starts in Putna, Suceava county and ends in Drobeta Turnu Severin, crossing ten counties, meeting all ethnicities and social categories and discovering all the natural floors that Transylvania has.

Nature has a very great impact on the Via Transilvanica project, particularly the forest, as the route it crosses passes largely through forest roads that are also technological transport routes, closed to public traffic, except for recreational, sporting and tourism activities, which can only be carried out with the consent of the owner, in the case of private forests, and the administrator, in the case of public state forests.

Forestry work is necessary for the proper management of the forest. From the point of view of social impact, the most sensitive are those requiring logging work. In the care phase, clearing and hygiene works have a lower social impact, but already in the thinning phase, treatments in particular have an important social impact through this exploitation activity.

The aim of the work is to identify the social impact of silvicultural activities for the stands bordering the Via Transilvanica route and to calculate the opportunity cost of functional zoning from the perspective of integrating these stands into forests with a social role.

Objectives:

1. To identify the characteristics of the stands bordering the Via Transilvanica route;
2. To identify the silvicultural works proposed for these stands;
3. Calculation of the opportunity cost.

Arcgis software was used for data analysis, with the following operations:

- Superimposing the Via Transilvanica route on each individual detour and creating an Excel database with the information obtained;
- The Via Transilvanica route in shp format was obtained by agreement between the university and the Tăşuleasa association on the basis of a collaboration protocol integrating the objectives of this work;
- The planning database for the farms located along the route.
- The data were analysed from the perspective of:
- analysis of the structural characteristics of the stands, using graphs in Excel;
- for the analysis of the proposed works, a map of their distribution along the route was produced using Arcgis software;
- - for the opportunity cost, a database was created based on the works carried out and the volumes to be extracted.

Critical Analysis of Payments for Ecosystem Services: Case Studies in Kenya, Uganda and Tanzania

Ibrahim Osewe, Aureliu-Florin Hălălișan, Nicolae Talpă, Bogdan Popa

Transilvania University of Brasov - Faculty of Silviculture and Forest Engineering, Romania
E-mail: osewe.ibrahim@unitbv.ro

The concept of payments for ecosystem services (PES) has been identified as a promising mechanism for use in Kenya, Uganda, and Tanzania, with several potential advantages and benefits, including raising new funding for landscape management, increasing the efficiency of conservation approaches, securing ecosystem services (ES), and benefiting poor rural communities. Starting from understanding the complex relationship between human dependence on natural resources and the environment, this paper aims to determine the degree to which the various criteria affect the success of PES that involve forests. Primary data were collected using a mixed questionnaire that was sent to institutions that implemented PES schemes in the region and 25 case studies of PES implemented in the region from various publications were used for the secondary data. The data were mainly analyzed using comparative analysis. The results indicated that PES success is higher when bundled ES are considered, financing is medium to long-term, implementation is at the regional level, combined transaction types (cash and in-kind) are used, private buyers and public sellers are involved. This paper provides a good benchmark for decision-makers on PES performance and serves as one of the tools for improving livelihood and ensuring the achievement of sustainable development goals.

Key words: forest ecosystem services; payments for ecosystem services; conservation efficiency; rural communities; livelihood improvement; decision-making; sustainable development goals; Kenya; Uganda; Tanzania

Analysis of the first-year students of the Forestry Faculty perceptions concerning the Romanian forests management

Catalina Oana Barbu, Liviu Nichiforel, Sergiu Andrei Horodnic

Ştefan cel Mare University of Suceava, Forestry Faculty, Suceava, Romania
E-mail: catalina.barbu@usm.ro

Ensuring a sustainable management of the forest fund is one of the fundamental principles of forest management. In Romania, after the nationalization in 1948, all forests belonged to the state. After 1990 the situation changed and, through a series of successive laws, the forest was restituted to the former owners or their descendants. Thus, at the current level, more than half of the area of the forest fund is private (3.37 million ha – 52%). Foresters are challenged to respond to the new demands of society, a society in continuous evolution. Thus, the skills offered by forestry higher education must be constantly adapted to keep up with the evolution of society. The aim of this paper is to identify and analyze the perceptions of Romanian forests and their management from the perspective of first-year students enrolled at the Forestry Faculty. To carry out this study, the survey method based on a questionnaire was used. The questionnaire was created online, being adapted to the Romanian forests. The survey population was constituted by 252 students enrolled in the first year in different periods (2016-2019) of which 197 are male and 55 females. 75% of the respondents consider that Romania's forests are not properly managed, that these forests are cut abusively and illegally (84%) and much more than in other European countries (75%). Regarding the forest cuts in the next 10 years, 56% consider that it should be completely stopped, while 23% believe that it would rather not. The perceptions of first-year students regarding the image of private forest management are equally divided. Thus, 34% believe that the image has deteriorated, 33% believe that the image has improved and 33% that it has remained the same. In the case of state forests management, the percentage of those who believe that the situation has deteriorated is similar of those who believe that the situation has remained the same (38%). Only 24% consider that the situation has improved.

The Romania Forest legislation seen as a Javon's Paradox

Marian Dragoi[1], Dragoș Costin[1], Veronica Toza[2], Vasile Iosifescu[1], Petru Drob[2], Gabriel Dănilă[1]

[1]Ştefan cel Mare University of Suceava, Forestry Faculty, Suceava, Romania
[2]Legal consultant
E-mail: marian.dragoi@usm.ro

The new draft bill of the Romanian Forest Code, apparently written down by a large team which gathered together experts and scholars representing the prevailing institutions involved in forest policy is being severely criticized by companies and forest administrator for being too restrictive and biased towards environmental protection. Noteworthy, this is the first time when Romanian prosecutors have been involved in drafting that bill. Therefore, to some extent, this is a real progress in designing a lawful and functional forest policy but, at the same time, changing the statute of many forest-related crimes from misdemeanors to felonies may have a perverse effect, in the sense that instead of applying appropriate and corrective fines, a lot of small-scale and difficult to investigate criminal cases will overwhelm the courts and the prosecutors' workloads. Even though the Javon's paradox initially had referred to energy production and consumption, it may well apply to any other resource (like time and money) whose consumption and effectiveness go up at different rates. More precisely, what really matters to emphasize is the rebound effect, which occurs when the consumption in a given period of time increases at a higher rate than the effectiveness of using that resource. This paradox has been studied in different domains, like water management, energy, environmental protection but never in forest-related legal system.

In order to demonstrate the recoil effect of Javons paradox, we made up three case studies: 1) SUMAL2 effectiveness since 2020, 2) a bunch of common forest crimes supposed to occur more often than others, penalized as misdemeanors in the past and as felonies now, and 3) the case of bear population, whose size increased strikingly after 2016, when bear hunting was completely banned.

Forest laws analysis in selected European countries

Liviu Nichiforel[1], Valeriu-Norocel Nicolescu[2]

[1]Ştefan cel Mare University of Suceava, Forestry Faculty, Universității 13, Suceava, Romania
[2]Transilvania University of Brasov - Faculty of Silviculture and Forest Engineering, Romania
E-mail: liviu.nichiforel@usm.ro

The analysis of the forestry legislation focused on the main regulatory act of the forestry sector (Forest Code or Forestry Act) in 17 European countries that have a recognized tradition in the forestry sector, countries considered to be representative at the level of European distribution. The objective of the study (according to the specifications) is to identify and describe best practices in the regulation of the forestry sector in forestry legislation in other countries. The database for the analysis it was mainly constituted by FAOLEX but also from relevant scientific articles for the comparative analysis of the way of regulation of the forestry sector. The results of the analysis point to the different approaches used to regulate the forestry sector on five domains: governance and forest administration, ownership and property rights, sustainable forest management, biodiversity conservation and bioeconomy and financial support. The recommendations regarding good regulatory practices in the analysed European countries are presented from the perspective of the necessary adjustments at the national level.

PEFC - Standards for Sustainable Forest Management

Lucian Filigean

PEFC Romania
E-mail: lucian.filigean@pefc.ro

PEFC is the biggest standardization system for Sustainable Forest Management in the world with over 280milion hectares of forest certified against PEFC national standards.

Perceptions of stakeholders input for FSC forest management certification from Romania

Bogdan Buliga[1], Liviu Nichiforel[2]

[1]Prefered by Nature
[2]Ştefan cel Mare University of Suceava, Forestry Faculty, Universităţii 13, Suceava, Romania
E-mail: bogdan@buliga.info

Stakeholder input plays a pivotal role in the process of the FSC certification system. From the standard development up to the implementation of the standard in the field, all essential steps are done together with input received from stakeholders. The central core of the FSC system is the Forest Management certification, which allows globally recognized responsible and sustainable forest management, encompassing ecological, social, and economic dimensions. During this step, stakeholders could give feedback in two ways: during the audit to the auditing team, ongoing through internal procedures. The auditing team summarizes perceptions from the stakeholders into a report which is made publicly available. In this research, we have evaluated perceptions received from stakeholders during the auditing process from 2002 up to the end of 2020. One of the main results shows that there is no standard way of presenting stakeholder feedback during the certification process in the assessed period. Each Certification Body (CB) has a different way of presenting that information. For example, one of the main CBs conducting audits in Romania has a chapter dedicated to complaints for annual audits, but this chapter is not available for main audits. All the feedback received is introduced in a database and classified against their questions: type of respondent, tone of feedback and type of finding. As feedback could include multiple findings, the database was restructured based on findings. To understand the difference between feedback and findings, here is an example: Feedback: "Good collaboration with Forest Directorate Vaslui. They have often common meetings where community needs and requirements are discussed in order to find common solutions to any issue and to provide help, when possible, in solving some problems. DS responds promptly to all calls to dialogue made by mayoralty. Also participation to joint actions E.g.: "Celebration of Flowers" in May of each year. DS help to ensure the fuel wood to the population especially for social cases.", Findings of this feedback: B101: General remarks under category Collaboration & communication, domain Social issues & communication; B102: Joint activities, same category and domain; B107: Solving the gaps/issues, same category and domain and B402: Access to the wood under category of community, same domain. Assessment of the findings shows that 85% of them are with a positive tone, while just 8,5% are negative for the assessed period. While we can see that the certification process shows a significant positive attitude of stakeholders, the press release and media communication for this period show a more negative tone related to forest activities. In conclusion, certification is a great tool. It has all the features that could create the environment of communicating with stakeholders and receiving all kinds of feedback from them. In contrast, the stakeholders need to use the system's full potential. As the FSC is a tool based on stakeholder feedback, missing input from an important category could influence the credibility and the level of enforcement of the FSC system in the field.

A new metric to assess the deadwood presence in FSC certified forests

Ciprian Ceornea

Ștefan cel Mare University of Suceava, Forestry Faculty, Universității 13, Suceava, Romania
E-mail: ciprian.ceornea@gmail.com

This short research note presents a possible use of stochastic dominance in assessing the degree to which a stand of mature and overmature trees meets the FSC requirements related to the presence of deadwood into certified forests. The two statistic populations subject to testing stochastic dominance are high-quality trees and low-quality trees of only one forest tree species, assuming the latter category may host, sooner or later, a great deal of species whose ecological niche is deadwood. The stochastic dominance is measured by the ratio between the total area of the polygons delignated upwards by the cumulative distribution function of high-quality trees and downwards by low-quality trees. The input data were collected from a forest district where extensive forest inventories have been carried out in order to foresee not only the allowable cut but the degree to which that forest can provide high quality wood, on the one hand, but also design a feasible plan for preserving biodiversity hosted by deadwood, laid down or on the stump. The field data were collected from a private forest of broadleaves where the most important species are oaks and beech, trees recommended to be kept as deadwood. The owner of the forest intends to get a FSC certificate and we calculated the stochastic dominance index against diameter at breast height and volume respectively. If both indices were greater than one that stand can be spared one more decade, while if both indices are smaller than there are two options: to record all low-quality trees of beech and oaks as deadwood, or to include the whole stand in an island of aging forest, thus observing the FSC requirements.

Understanding the EU Deforestation Regulation - Resources and tools for implementation

Tudor Serban, Bogdan Buliga

Prefered by Nature
E-mail: tserban@preferredbynature.org

This presentation provides an examination of the European Union's Deforestation Regulation (EUDR) and its implementation strategy, detailing its impact, challenges, and potential solutions. It begins with an introduction to "Preferred by Nature", an organization deeply committed to sustainable land management and supply chain certification. With over a decade of experience in working with EU Timber Regulation (EUTR), the presentation sheds light on both the successes and obstacles encountered, including the complexity of verifying information robustness, subjective interpretations of 'negligible risk', and the inconsistency in national enforcement levels across the EU. An exploration of the EUDR's broader scope is presented, focusing on its inclusion of an extensive range of commodities and derived products. The presentation touches on the necessity for companies to show a comprehensive product traceability and to implement a more robust due diligence system, including for exports from the EU market. Additionally, the presentation offers a detailed timeline for the implementation of these measures and the role of the European Commission in establishing a centralized database for risk assessments, including the development of a three-tier system for country risk assessment. To illustrate the practical implications and real-world challenges of regulatory compliance, a case study on the "All Eyes on Wagner" project by OpenFacto is introduced. This study highlights the intersection of human rights abuses, economic predation, and export indicators, demonstrating how EU regulations serve as essential tools in identifying and mitigating illegal activities that detrimentally impact global communities and the environment. The presentation shows the collaborative efforts between Preferred by Nature and the Food and Agriculture Organization (FAO) protocol, established for developing resources for managing geolocation data within global supply chains, ensuring alignment with the EUDR and other pertinent regulations. In the final part of the presentation touches on tools, resources and services offered by Preferred by Nature to support the transition and implementation of the EUDR, including Sustainability Framework, Tailored Services, online free toolkits and resources for updated information. Overall, this presentation offers crucial insights into the complexities involved in the effective implementation of the EUDR. It serves as a valuable resource for companies aiming to comply with its stringent requirements and emphasizes the pivotal role of due diligence and traceability in stopping deforestation and fostering sustainable trading practices within the European Union.

The role of cultural ecosystem services for sustainable forest management

Ramona Scriban, Marian Drăgoi, Carmen Badaluta

Ștefan cel Mare University of Suceava, Forestry Faculty, Universității 13, Suceava, Romania
E-mail: ramona.scriban@usm.ro

Increasingly more studies are extending the forest ecosystem services to the importance of immaterial benefits with human-nature interactions. As is evident, forest ecosystem services are a major part for improving decision-making. At European level, cultural ecosystem services is a pillar for environmental policies and the challenge to identify the cultural forests raise the awareness to features of rural landscapes and at the same time are difficult to identify because they need to be analysed from social, ecological and behavioural perspective. In Romania, cultural forests are not a demand from community, except the landscapes with recreational values. The Romanian forestry system integrates many of the ecosystem services in the forest management planning process by assigning to each stand a specific functional category due to silvicultural measures. In Romania, forests have protective and productive functions. The forests with protection functions include mostly the regulating ecosystem services (soil protection, water protection, climatic protection) while the only cultural services addressed refer to forests providing recreation services. For identifying and mapping forests with cultural values, several tools are used for its assessment through forest certification process, mainly with public consultations and GIS-based techniques. The focus of the research was to link the FSC system's with forest ecosystem services, especially cultural values and afterwards to adapt them to the particular requirements of certification process. The Forest Stewardship Council (FSC®) certification scheme specifically considers the identification of a larger set of cultural services as part of the identification of High Conservation Value Forests (HCVFs). Nevertheless, there is no clear definition of what these cultural services refer to and no clear methodology for their identification. In this context, the analysis aims to identify: 1) what bundles of cultural services can emerge from the forest certification process; 2) what tools and methods exist for the identification of forests with cultural services; 3) how are the forests with cultural services addressed in the forest management planning. The methods used for the analysis rely on data provided by the public reports existing in the FSC® database combined with available information regarding the identification of HCVF. The reports refer to a total number of 30 certificates for forest management (FM) in place covering a total area of 2.68 million hectares of forest (40% of the area occupied by forests in Romania). The results of the analysis show that the cultural services identified as part of the certification process generally refer to forests near cultural and heritage establishments (such as churches and monasteries) or to the forests providing important aesthetic and recreational values. Apparently, the FSC® certification bring additional valuable inputs in the identification of cultural services that forest management planning does not prioritizing them.

Analizing the possibility to RfiD utilisation in forestry in Romania

Pălie Dorin, Laura Bouriaud

Ștefan cel Mare University of Suceava, Forestry Faculty, Universității 13, Suceava, Romania
E-mail: dorin.palie@yahoo.com

In recent years research findings on the use of RFID (Radio frequency identification) on forest sector has been accumulating. Since technological progress is very rapid a synthesis of the research results is needed as to know to what extent the use of this technology is appropriate in the forestry sector in Romania. This study is important because the forestry sector cannot be competitive if it is cut off from technological progress, in particular if considered that automation and robotization will be increasingly present in forestry due to the lack of manpower.

In the immediate future, the forestry entities and operators will need to import technologies compatible with their own business-model as to provide a clear endorsement that the raw material is supplied from sustainably managed forests. The main barrier to this technology transfer is the difficulty of integrating the use of RFID tool into forestry operations related to placing timber on the market.

Hence, we use the available research results to understand which organizational, or behavioral and technical characteristics are determining the technological progress up-taking for a better traceability of raw material coming from Romanian forests.

Deadwood carbon dynamics over 10-years in a temperate virgin forest

Ion Cătălin Petrișan

Transilvania University of Brasov - Faculty of Silviculture and Forest Engineering, Romania
E-mail: petritan@unitbv.ro

Deadwood plays an important role on nutrient cycling and on other forest ecosystem functions: provides shelter and food for animals, bacteria and fungi, serve as a seedbed for natural regeneration, significant role in the carbon cycling of the forests, accounting for 30-40% of the total timber volume in natural mixed beech-coniferous temperate mountain forests and for up to 10-20 % of the aboveground stand biomass. Its importance is more emphasized particularly in virgin forests which showed significantly higher deadwood amounts than managed forests. The large amount of deadwood harbored by natural forests are mainly caused by natural tree mortality processes, canopy damages, but also by occasional occurrence of major natural (wind, snow, insect attacks) disturbances. These forests are considered carbon neutral according to Odum's theory (1969), although other more recent studies demonstrated that old-growth forests can act as significant carbon sinks. Hence, more accurate estimates of C stored in deadwood, but particularly the dynamics of deadwood carbon over time will help us to understand better its contribution to the total C stocks and more clearly assess the C sink capacity of old-growth forest. In this regard, we carried out a long-term monitoring experiment in Sinca virgin forest, Carpathians Mountains, Romania where 21 plots (35x35 m) were installed in 2013 and re-inventoried in 2023. Dewood was recorded during both census, as lying and standing deadwood, per species (European beech and Silver fir), but also considering the decay classes (five decay classes system). Using the deadwood density and Carbon content found in an accompagnion investigation, we were able to compare the carbon content stored in deadwood at every monitoring time (2013 and 2023), but also the transformation rate into soil (deadwood losses) or new incoming deadwood percentage (new trees dead over monitored window).

Mapping vegetation in the protection areas of the high voltage power lines for Ecological corridor Management

Ionut Barnoaiea[1], Ciprian Palaghianu[1], Ovidiu Iacobescu[1], Alina Dobresanciuc[2], Gabriel Duduman[1], Cezar Tomescu[1], Alexei Savin[1], Vasile-Cosmin Cosofret[1], Daniel Avacaritei[1], Iulian Danila[1], Georgel Mazare[1], Florin Clinovschi[1], Corneliu Pohontu[1], Gabriel Danila[1], Paul Iliescu[1]

[1]Ştefan cel Mare University of Suceava, Forestry Faculty, Suceava, Romania,
[2]Delgaz Grid S.A.
E-mail: ionut.barnoaiea@usm.ro

The maintenance of the high voltage power lines requires very short rotation interventions on the forest/shrub vegetation that could endanger the security of the power supply through these lines. Even though such interventions have a strong impact on the vegetation and constitute a disturbance on the actual ecosystem, the regeneration of the vegetation in these conditions constitutes an opportunity for creating high biodiversity areas and landscape-level diversity of habitats. This opportunity was taken by the energy provider e-on to develop a standard for power lines corridor management that changes the types of operations implemented: to switch from clearcutting whole areas of vegetation to a step-by-step procedure to map and monitor vegetation, to plan specific measures for each type of habitat present and to promote slow-growing tree species and shrubs that would require a less-impact disturbance of the habitats. The ECM measures are applied in Germany, Slovakia and Sweden and have started to be implemented in Romania also. The power supplier DELGAZ GRID SA, in cooperation with Stefan cel Mare University in Suceava, has started to map and implement these measures on 60 km of powerlines corridors in six counties in Moldova, with interesting results in terms of species and habitat diversity. The mapping methodology involves preliminary remote sensing for delineating elementary (homogenous) units (min 400 sq m), that are further biometrically described in the field. The planned measures take into account the biodiversity of habitats, classification of species, presence of marginal/priority habitats and parameters regarding the security of the powerlines. The database obtained through the mapping procedures is a basis for the study of forest vegetation succession in different site conditions and types of management, as well as a good start point for repeated vegetation monitoring biodiversity assessment, for both flora and fauna species.

Results of vegetation and fauna mapping in Șipote Forest, Suceava municipality

Gabriel Duduman, Cezar Tomescu, Anca Măciucă, Ionuț Barnoaiea, Ovidiu Iacobescu, Mihai-Leonard Duduman

Ștefan cel Mare University of Suceava, Forestry Faculty, Romania
E-mail: gduduman@usv.ro

The Șipote Forest is located in the southeast of the Suceava municipality, in the vicinity of Suceava Fortress, the first afforestations dating in the first decades of last century, mainly with the role of consolidating the slopes against erosion and landslides. Until 1975, the entire right side of the Cetății stream was completely forested, and in the period 1975-1977, a dendrological park was established on the left side, on an area of about 7 ha, with 6700 saplings from 160 species. In 1998, only 67.5% of the total number of species originally planted were found in the dendrological park. The Șipote Forest belongs to Suceava Municipality and is managed by the National Forest Administration through the Pătrăuți Forestry District. The studied area is almost entirely covered with forest. Through this study, a new inventory of flora and fauna species was made, dysfunctions related to species, condition, age, disturbing and limiting factors were analysed, and management measures for the existing habitats were proposed. Data collection was carried out between April and June 2022, based on a specific methodology, being identified 51 species of trees, 20 species of shrubs, 3 species of lianas and 146 species of herbaceous plants. Also, 104 species of fauna were observed, of which 7 species from the Mollusca class, 3 species from the Arachnida class, 32 species of insects, 2 species from the Amphibia class, 2 species of reptiles, 47 species of birds and 11 species of mammals. Dysfunctionalities related to the component species of the ecosystem are insignificant, and their impact on the Șipote Forest as a whole is reduced. Some areas affected by water and soil pollution have been identified, and discarded waste is present almost everywhere. The need for wood can lead to illegal logging, but this aspect is carefully controlled by the current manager. In terms of disturbing factors, the greatest attention will have to be paid in the future to persistent droughts. The Șipote forest is a rich area in terms of fauna, but some species suffer a lot due to the presence of stray dogs and roaming cats. The management measures in the future must mainly aim at the revitalization of the area for the effective valorisation of the social-recreational role of this forest, the increase of species diversity by including new local species in the areas where regeneration is required, the establishment of undisturbed areas for the species of fauna, and limiting the anthropic impact on the ecosystem. However, in the areas accessible to visitors, it is necessary to carry out tree grooming, maintenance operations that will aim to ensure the safety of visitors, to improve the current general landscape, to diversify the composition and structure of the vegetation, to increase the stability and resilience of forest ecosystems to the action of disturbing factors.

Mapping historically disturbed forest structure using LiDAR and spy sattelites in Pecineagu watershed

Ioana Alexandra Nicolae, Mihai Daniel Niță

Transilvania University of Brasov
E-mail: ioana.nica@unitbv.ro

INTRODUCTION. Particularly long-term changes in forests have major consequences for ecosystem functioning, carbon storage, climate regulation and biodiversity (DeFries et al., 2004; Newbold et al., 2015). The main human intervention that over time has shaped the forest in order to maintain a balance between forest change and other ecosystem services, such as provisioning, supporting, regulating and cultural is the forest management activity. Our goal was to quantify changes in forest structure in Valea Dambovitei using modern three-dimensional analysis techniques. METHODOLOGY. In order to identify forest disturbances, we digitized based on standard visual interpretation all areas with noticeable canopy changes that were visible in the panchromatic satellite imagery from the 1970's Corona program taken from the U.S. Geological Survey based on differences in image texture, gray level, and patch size. On the other hand to perform a stand level analysis, assessing tree morphology and forest structure, 7 plots were scanned using the GeoSlam Horizon Scanner. To quantify changes in forest structure, several parameters were extracted from point clouds using a code (R). Species structural diversity, species richness, heterogeneity and homogeneity, horizontal and vertical structure and differentiation, and a simplified index of total diversity were determined for each market. RESULTS. The distribution of tree diameters in most plots is asymmetric, indicating the presence of both young and mature trees. This suggests a diversity in stand age and potential for continued growth. The tree location map shows that tree distribution is not uniform and is influenced by anthropogenic interventions. In terms of the evenness of the distribution of species diversity within the plot, the Shannon entropy indicates increased diversity in plot 9. Also, the uniformity given by the Simpson index indicates a more equal distribution of individuals among species in plot 9, providing a positive perspective on the ecological balance in the ecosystem in plot 9. Thus, heterogeneity is increased in plot 9. In the case of species richness it can be seen that there are no big differences, but plots 5 and 9 indicate a higher local biological diversity, given by the Margalef Richness Index, while plots 3, 4 and 6 have a lower biological diversity. On the other hand, in terms of the intensity of competition within each plot, given by the Bella index, it was found that in plot 4 there are more competitive conditions, while in plot 9, where a succession of accidental, thinning and hygienic cuttings were carried out, there is less competition, providing potentially more favourable growing conditions for the trees within the plot. CONCLUSIONS. Our research provides that although the regenerated forests have been logged in the past, they have retained a similar structure. In order to manage these forest areas sustainably, it is necessary to consider the effects of disturbance and develop appropriate conservation and restoration strategies.

Comparing the efficiency of forest mitigation strategies on carbon sequestration

Cosmin Coșofreț, Olivier Bouriaud, Laura Bouriaud

Ştefan cel Mare University of Suceava, Forestry Faculty, Suceava, Romania
E-mail: cosmin.cosofret@usm.ro

Carbon sequestration represents the amount of carbon removed from the atmosphere and stored in a forest ecosystem. The carbon sequestration and stock of forest biomass may vary greatly in a forest ecosystem over time due to the initial stand characteristics, the type and intensity of management and the length of the rotation period or other period being considered. Increased regionality in the global change effects requires a more local investigation, which also renders more details on the dominant drivers and forces. Therefore, we used a dynamic forest landscape model (LandClim model) to compare the three opposed mitigation strategies of forests, and quantify their potential for sequestration of carbon, in Frasin case study, in the context of global changes.

In the mild climate, in SA 100 managed stands were stored the highest quantity of carbon, showing a capping of growth at the end of the 200 simulated years. From 2040, in the SA 30 and SA 0 managed stands, the carbon stock was lower with 28%, respectively 37% compared to SA 100 management (Fig. 4a).

Looking more into detail, in 2210, in mild climate scenario (RCP 26), in SA 100 managed stands were stored 17.9 *105 tC. Analyzing the influence of SA 30 and SA 0 management strategies on carbon stock was observed that in SA 30 managed stands was a lower stock with 2.1*105 tC and in SA 0 managed stands with 7.5*105 tC.

The literature suggests no management strategies for carbon storage but on extreme climate cannot be a solution. Therefore, sequestration is a safe solution only for forests with a very high stability.

Use of terrestrial laser scanner (TLS) to optimize tree sampling for allometric model fitting in short-rotation woody crops (SRWCs)

Iulian-Constantin Dănilă[1], Cosmin Vasile Coșofreț[1], Olivier Bouriaud[1,2]

[1]Ştefan cel Mare University of Suceava, Forestry Faculty, Romania
[2]LIF, ENSG, IGN, 14 rue Girardet, 54000 Nancy, France
E-mail: obouriaud@usm.ro

Allometric equations remain today the most common estimation method of trees aerial volume and biomass. However, allometries have a high degree of variability and fit better as locally models (Bouriaud et al. 2019). The process of tree selection to construct allometric models has been surprisingly overlooked, and destructive methods of estimating biomass require a great deal of work and expense. Among estimate techniques, terrestrial laser scanning (TLS) is an improvement that enables volume estimation with high accuracy (Calders et al. 2020).

This works attempts to test to what extent TLS can help identify the most suited trees to be destructively measured and produce samples that produce the best biomass fits. Consequently, three distinct tree sample techniques: random (SRS), systematic (SYS), and stratified (STR) were contrasted. In addition, our purpose was to respond to the following questions: (i) whether TLS-based estimates are useful for constructing optimal tree samples for destructive measurement, specifically to minimize bias and prediction errors; (ii) which method of subsampling is the most efficient, and what are the important features, such as the range of tree dimensions of the subsample leading to high performance fit or, on the contrary, high bias; and (iii) how does sample size influence tree selection?

The research was carried out on SRWCs planted with two hybrid poplar clones (AF8 and Pannonia) in northeast Romania. In total, 184 trees were scanned and harvested for destructive aerial volume and biomass estimation.

TLS-based volume was shown to have a strong correlation with destructive methods. TLS provides a sampling optimization solution. As a result, samples with substantial prediction bias can be discovered and avoided using TLS. When the sample size was increased, R2 dispersion, RMSE, and bias were all reduced evenly in SRS and STR. Simple random sampling was found to be the most efficient and easiest way to use.

Wood density in Norway Spruce (*Picea abies* (L.) H. Karst) stand installed using different planting schemes in the north of the Eastern Carpathians

Gheorghe Ștefan[1,2], Răzvan Vasile Câmpu[3], Radu Vlad[2], Alexandra Ispravnic (Ștefan)[1, 2]

[1]Interdisciplinary Doctoral School, Transylvania University from Brasov, 500123 Brasov, Romania
[2]National Institute for Research and Development in Forestry 'Marin Dracea', Calea Bucovinei, 73 bis, 725100, Campulung Moldovenesc, Suceava, Romania
[3]Department of Forest Engineering, Forest Manangement Planning and Terrestrial Measurements, Faculty of Silviculture and Forest Engineering, Transilvania University of Brasov, Romania
E-mail: stefani.ghe@gmail.com

In this study, the density of Norway spruce wood from an experimental block where four planting schemes were used (2500, 3330, 5000, and 7510 trees*ha^{-1}), aged 45 years, in which thinnings were not carried out in time, located in the north of the Eastern Carpathians. The density of the wood was determined by the volumetric method, on wood cores extracted with the Pressler drill at a height of 1.3 m. The results obtained showed that there is an obvious relationship between DBH and the wood density for planting variants with a low number of trees (2500, 3330 trees * ha^{-1}), compared to planting variants with a large number of trees (7510 trees*ha^{-1}). The density of the wood was influenced by the reduced growth capacity of the dense stands, compared to the stands which had a small thickness and more development space. Depending on DBH, the variation in wood density was smaller in dense plantations compared to the variants with a small number of trees ha^{-1}. As a general conclusion, the density of wood is influenced by the number of trees in planting scheme, and when the forestry works are not applied on time it reduces the differences between the analyzed stands.

Key words: Norway spruce; wood density

Growth and development indices at stand level in mixed Norway spruce (*Picea abies* (L.) H. Karst) silver fir (*Abies alba* Mill.) and beech (*Fagus sylvatica* L.) stands from the north of the Eastern Carpathians

Alexandra Ispravnic (Stefan)[1,2] Razvan Vasile Câmpu[3], Radu Vlad[2], Gheorghe Stefan[1,2]

[1]Interdiciplinary Doctoral School, Transylvania University from Brasov, 500123 Brasov, Romania
[2]National Institute for Research and Development in Forestry 'Marin Dracea', Calea Bucovinei, 73 bis, 725100, Campulung Moldovenesc, Suceava, Romania
[3]Department of Forest Engineering, Forest Manangement Planning and Terrestrial Measurements, Faculty of Silviculture and Forest Engineering, Transilvania University of Brasov, Romania
E-mail: ispravnic.alexandra@gmail.com

Mixed forests are of interest and are preferable both in terms of size and quality of production but also in terms of esuring high levels of biodiversity. Mixed stands have their own development laws, the productivity of pure stands is maintained for a shorter period than in the mixing stands and the exploitability of the mixt stands is achieved 10-20 years later compared to pure stands. The experimental plots were located in Management unit I Demacușa, the Tomnatic Experimental Base. The research stands are between 80 and 120 years old. Field measurements took place in 2022, when permanent experimental plots of 10,000 m2 (100 m x 100 m) were located, in homogeneous areas that are representative of the general conditions of the stand. The degree of structural homogeneity expressed by the Gini index, is define as the deviation of the Lorentz curve to the diagonal and has specific aspects for the Norway spruce, Silver fir and European beech spruce mixture. If the values of the Gini homogeneity index are analysed, the Norway spruce is the species with the highest homogeneity. According to Eichhorn's law, the volume of a tree species at a certain height must be identical for all production classes. Regarding the relationship between height (x) and the corresponding volume by species (respectively the total volume) of the mixtures of spruce, fir and beech analyzed (y), it was found that it is given by an exponential equation of the form y = aexb. Among the methods for estimating the growth and development of forest ecosystems, the most used in forestry is based on three foundations referring to the classification of the tree taking into account its height, Eichhorn's legitimacy and the effect of the improvement cutting carried out.

Key words: mixed forest, productivity, experimental plots, Gini index, Eichorn Law.

A systematic survey of conventional and new postural assessment methods

Gabriel Osei Forkuo

Department of Forest Engineering, Forest Management Planning and Terrestrial Measurements, Faculty of Silviculture and Forest Engineering, Transilvania University of Braşov
E-mail: gabriel.forkuo@unitbv.ro

Postural assessment is a crucial aspect of evaluating the ergonomic condition of work systems, particularly in demanding occupations such as forestry. In recent times, traditional methods such as self-reports, observational methods, motion detection systems, and electromyography have been used to assess postures. Technological development has recently led to new methods based on machine learning and computer vision. These methods offer the possibility of analyzing data collected with sensors and/or in the form of images or video files, allowing noninvasive, low-cost postural assessment. This paper uses the PRISMA methodology to collect and synthesize information on the accuracy and reliability of different methods used in ergonomic-postural assessment, including machine learning and computer vision-based methods, in order to identify the benefits and limitations of these methods. In addition, the study assesses the importance of dataset size, ethical issues, and the interpretability of machine learning models as key aspects of ergonomic-postural assessment. Specific machine learning and computer vision algorithms identify jobs that can cause musculoskeletal problems and are useful in developing preventive actions through specialized education, ergonomic assessment and planning. The size and diversity of the data sets are of great importance for the performance of the models used. The study highlights the benefits of machine learning and computer vision-based methods in identifying postural trends and abnormalities that are more difficult to detect using traditional methods. Modern methods are also low-cost, non-invasive, and can work with large data sets. However, the accuracy and reliability of these relatively new methods are still debatable, and ethical considerations surrounding data protection are a priority. Operating with such methods requires transparency and accountability in the model development stages. This study characterizes the potential of these methods to improve the accuracy and reliability of postural assessments. The main issues to be considered when using these methods are data protection, ethics, and the interpretability of the machine learning and computer vision models.

Key words: postural assessment, traditional methods, machine learning, computer vision, algorithms.

Patterns of forest species association in sapling communities: a story of love and hate

Ciprian Palaghianu, Cosmin Coșofreț

Ștefan cel Mare University of Suceava, Forestry Faculty, Suceava, Romania
E-mail: cosmincosofret@gmail.com

Ecological patterns of species distribution can reveal essential information on the spatial and functional relationship between species or species and their environment. Various methods can assess species associations: the co-occurrence indices for binary presence-absence data, principal component analysis (PCA) on species abundance or point process analysis. Our goal was to understand the co-occurrence patterns better by identifying forest species association trends in sapling communities using different methods and scales. The analysis of the binary Jaccard index shows significant positive associations of several species pairs on almost all spatial scales and negative associations at smaller spatial scales. The PCA confirmed a positive association between ash and linden, but the results are less consistent for the other species. The point processes analysis allowed us to detect more refined patterns of associations depending on the interaction distance between the species. The positive association between ash and linden and other mostly positive associations were again confirmed. However, several repulsive associations were also detected. Our observational study displayed distinct co-occurrence patterns of forest species in sapling communities, finding consistent positive and negative associations between species. The results suggest that the scale significantly influences spatial patterns of associations, with more frequent repulsion interactions at small scales and attraction interactions at larger scales.

Weeding of seedlings in forest nurseries by chemical method - case study

Georgel Constantin Mazare

Ștefan cel Mare University of Suceava, Forestry Faculty, Suceava, Romania
E-mail: george.mazare@gmail.com

Crop maintenance work in forestry nurseries involves, among other things, the weeding of weeds that tend to suffocate young seedlings, aged up to one year and over. For this purpose, regardless of the degree of weeding and the type of seedlings, manual weeding and weeding with a is proposed in the works estimate. This operation is, however, a painstaking operation, which requires, among other things, a high attention from the workers as well as a rather high labor force requirement, especially if the favorable weather leads to a strong weeding.

In the conditions where the labor force represents an increasing problem on the labor market in our country, implicitly in forestry, it is necessary to look for solutions that have the same efficiency on the crops but that reduce the labor force requirement.

Regarding the mentioned, the present work wants to propose an alternative to manual work, including the weeding of crops, by combating weeds by chemical means. For this purpose, we will present a case study, in which the experiments were carried out on small areas, on test areas, using approved substances in forestry.

Following the treatments with chemical substances, it was observed that they have a fairly good efficiency, leading both to the reduction of the number of weeds appearing in the crops and to the delay in their appearance. It is also worth mentioning that a possible use of chemicals to combat weeds in crops would lead to a significant reduction in production costs. Both different substances and their different doses or different frequency of application were tested. Being only a case study, it is necessary to carry out some well-organized experiments in order to draw universally valid conclusions.

The specifics of the growth of beech seedlings (*Fagus Sylvatica* L.) of different geographic proveniences in the "Plaiul Fagului" Scientific Reserve

Victor Sfeclă, Alexandru Chetrean, Irina Sfeclă

Technical University of Moldova, Faculty of Agricultural, Forest and Environmental Sciences, Chisinău, Republic of Moldova
E-mail: victor.sfecla@spp.utm.md

The aim of the conducted researches is to assess the particularities of growing in height and diameter of the beech (*Fagus sylvatica* L.) seedlings in the habitat of the "Plaiul Fagului" scientific reserve, obtained from seeds that were harvested from populations of different geographical origins. The researched provenances originate from: the "Plaiul Fagului" scientific reservation, compartment 26C (Republic of Moldova); Strâmbu Băiuț forest district, UP II, compartment 76C (România) and Ivano-Frankivsk – State Enterprise "Nadvirnyanske Lisove Gospodarstvo", Nadvirna district, compartment 6(1) (Ukraine). The seeds were sown in the fall of 2020. According to the height and diameter growth particularities of the seedlings, in the cultures where they originate from, the beech can be considered as a variable species. Seedlings from Plaiul Fagului, compared to those from Băiuț and Ivano-Frankivsk, are distinguished by a current growth energy in height and diameter, which suggests that the population of local origin has a higher genetic load, being better buffered for these seasonal conditions. At this stage of development, the ecological factors of forest crop area do not significantly influence the speed of growth of the studied seedlings. The dispersion analysis of the heights (cm) according to origin are totally different (PL - 46.59 ± 2.55; Băiuț - 44.55±2.98; Ivano-Frankivsk - 37.35±3.98). The degree of influence between provenances is reduced, constituting 16%, and the degree of influence within provenances is 84%. The dispersion analysis of the diameters (mm) by origin are totally different (PL – 7.15±0.38; Băiuț-6.14±0.45; Ivano-Frankivsk - 5.06±0.61). The degree of influence between provenances is reduced, constituting 28%, and the degree of influence within provenances is 72%.

Key words: *Fagus sylvatica* L.; "Plaiul Fagului" scientific reserve; Republic of Moldova; beech seedlings

Analysing the sound speed through the wood and stability of Norway spruce trees affected by trunk rot

Gheorghe Pei[1], Radu Vlad[2]

[1]Transilvania University of Brașov, Faculty of Silviculture and Forest Engineering, Romania
[2]National Institute for Research and Development in Forestry (INCDS) "Marin Drăcea" - Câmpulung Moldovenesc, Romania
E-mail: pey_gheorghe@yahoo.com

Norway spruce (*Picea abies* L. Karst) is one of the most important forest species in Romania, from an ecological and economic point of view, the quality of trees and stands having a direct influence on their ecological effects, stability and multifunctionality. The aim of this study was to bring new scientific information related to the knowledge of qualitative elements specific to this category of stands from the area at risk of rot, the use of the modern tools that allow non-destructive qualitative assessments of trees wood, the need to use modern methodologies for estimating stability and risk areas. The research was conducted in spruce stands in the north of the Eastern Carpathians. The primary data regarding the speed of sound, the tomography of the analyzed section and their stability were collected using the ARBOTOM® - Tree Impulse Tomograph device and Mechanic ARBOTOM® graphic module. The expression of the spatial distribution in relation to the percentage of decrease in the individual stability of the trees was carried out using the thematic maps interpolated by the geostatistical Kriging method. The results showed that the sound propagation speed in the tree trunks affected by rot has minimum values between 269 m·s^{-1} and 552 m·s^{-1} and maximum values between 602 m·s^{-1} and 826 m·s^{-1}. The wind resistance of Norway spruce trees, indicated by the ARBOTOM device, was find to decrease with increasing rate of decay in tree cross section. This relationship is described by a polynomial regression equation of the type $y = ax^2 + bx + cx$ (y represents the proportion by which the wind resistance indicated by ARBOTOM® is reduced, x – the proportion occupied by decay in the cross-section). Variograms of individual stability indicate a direct correlation between the frequency of affected trees and the decrease of group stability, through the reduced presence or absence of centers of maximum stability, which are characteristic of healthy trees. Based on the obtained results, it can be stated that non-destructive techniques, such as those based on the concept of 'tree tomography' (acoustic scanners), can be successfully used to determine changes from inside the tree trunk, at the analyzed level. These methods can also be used to estimate the risk areas that can be affected by windfalls, in addition to the existing models, considering rot as a favoring factor.

Key words: Norway spruce, trunk rot, sound speed, quality, stability

The viability of beech seedlings of different geographic proveniences (*Fagus sylvatica* L.) in the conditions of the "Plaiul Fagului" scientific reserve

Victor Sfeclă[1] , Irina Sfeclă[1] , Nina Zdioruk[2] , Nicolae Platovschii[2]

[1]Technical University of Moldova, Faculty of Agricultural, Forest and Environmental Sciences, Chişinău, Republic of Moldova
[2]Institute of Genetics, Physiology and Plant Protection of SUM, Chisinau, Republic of Moldova
E-mail: victor.sfecla@spp.utm.md

This study aimed to investigate the response of the three years old beech seedlings leaves to the action of heat shock (HS), as considered an abiotic stress for plant growth. Under the influence of high temperatures in plants reactive oxygen species and damage to cellular structures are induced. The effectiveness of these processes depends on the genetic specificity, the physiological state of the plants, and the dose of the stress factor. Given the complexity of the processes involved in the response and adaptation of plants to thermal stress, this poses a serious threat to plants, especially in the light of the threat from global climate change. In order to determine the response of forest species to the action of high temperatures and to monitor the state of forest health, it is important to use methods quick and precise analysis. In this sense, the electrolyte leakage, PAM – fluorimetry and chlorophyll index methods are promising, because it allows the assessment of the change in the physiological state of some tissues and organs of the plant grown in different climatic conditions. In our research, we used three years old leaves of beech collected from plants growing in the experimental plantation created in the "Plaiul Fagului" scientific reserve, Republic of Moldova. These plants represent two different geographical origins as follows: "Plaiul Fagului" scientific reserve, compartment 26C (Republic of Moldova), Strâmbu Băiuț Forest District, UP II, compartment 76C (România). The leaf samples were treated at a temperature of 60°C for 20 minutes. Overall, the data demonstrate that the thermal tolerance of beech leaves from the local provenance Plaiul Fagului is higher compared to that from Băiuț. The obtained results indicate that exposure to HS at a temperature of 51°C during 5 minutes on the leaves of beech seedlings leads to an immediate reaction of the photosynthetic apparatus (PA) of the leaf. Relative value of PS-2 activity after heat stress at 51°C during 5 minutes, indicate that the depth of induced damage to photosystem 2 (PS-2) depends on the HS temperature. At 24 hours after the action of HS, the difference between the reactions of leaves of different origins becomes noticeable. Before exposure to heat shock, beech leaves from different growing zones had the same yield value. After exposure to HS, the yield values fall sharply, reaching a minimum after 24 hours, and then gradually restored. The chlorophyll index made it possible to identify variant with the best integrity of the leaf apparatus the Plaiul Fagului has a chlorophyll index of 11,52 CCI and Băiuț has 10,51 CCI.

Keywords: beech seedlings, heat shock, photosystem II, PAM – fluorimetry, chlorophyll index.

Exploring the effect of long-term natural disturbance dynamics on contemporary lichen communities

Rhiannon Gloor[1], Marek Svitok[2], Martin Mikoláš[1,3], Jeňýk Hofmeister[1], Ondřej Vostárek[1], Daniel Kozák[1], Lucie Zemanová[1], Miroslav Svoboda[1]

[1]Department of Forest Ecology, Faculty of Forestry and Wood Sciences, Czech University of Life Sciences Prague, Kamýcká 129, Praha 6 – Suchdol 165 00, Czech Republic
[2]Faculty of Ecology and Environmental Sciences, Technical University in Zvolen, T.G. Masaryka 24, 960 01 Zvolen, Slovakia
[3]PRALES, Odtrnovie 563, 013 22 Rosina, Slovakia
E-mail: gloor@fld.czu.cz

In this era of biodiversity loss and climate change, quantifying the impacts of natural disturbance on forest communities is imperative to improve biological conservation efforts and foster ecological resilience. Lichens are valuable indicators of habitat quality and continuity, and can provide insights into ecosystem dynamics, however, there is an absence of knowledge regarding their long-term drivers in some of Europe's most ecologically valuable yet threatened ecosystems; primary mixed-beech forests. These forests are likely to be amongst the most resilient to future climatic changes. Using a dendrochronological approach, this study investigates how natural disturbance dynamics indirectly influence various lichen community metrics. We surveyed eight stands in the Western Carpathians - a hotspot of primary forests in Central Europe. General linear modelling revealed that natural historical disturbance processes have long-term effects on forest structure which persist for 150 years. Richness and composition of contemporary lichen communities were indirectly affected by variable historical processes through the alteration of forest habitat structures. The relationships between various disturbance variables, structural attributes, and diversity metrics are complex, exhibiting both congruent and divergent patterns. Total species richness benefited from higher-severity disturbances via increased canopy openness and basal area of standing dead trees. Red-listed species richness showed a more complex relationship, increasing with disturbance-related structures (standing dead trees) whilst simultaneously benefiting from periods without severe disturbance events (old trees and reduced deadwood volume). While natural disturbances can elevate overall species diversity, our study reveals the vulnerability of threatened species to high severity disturbance events, a concern as they are predicted to intensify with climate change. Additionally, the high number of threatened species found reinforce the critical role of primary forest structural attributes for species-rich lichen community maintenance. Hence, we recommend a landscape scale approach that encompasses a variety of forest patches in different successional stages to support high lichen diversity. These results emphasise the necessity of considering long-term disturbance dynamics in forest conservation efforts, as they provide critical insights for safeguarding biodiversity in our changing world.

Forest Assessment, Modelling, Forest Management

Particularities in beech and oak responses to climate at the easternmost sites of their distribution in Europe

Catalin-Constantin Roibu [1], Andrei Mursa [1], Ciprian Palaghianu [1], Marian-Ionut Stirbu[1], Mihai Gabriel Cotos[1], Cosmin Andriescu [1], Ana-Maria Cretan[2], Victor Sfecla[1,3]

[1]Forest Biometrics Laboratory- Faculty of Forestry, "Stefan cel Mare" University of Suceava
[2]Transilvania University of Brasov
[3]Technical University of Moldova
E-mail: catalinroibu@usm.ro

Beech and oak are the most representative forests for Romania and for the Republic of Moldova. In the context of forecasted climate change scenarios, the growth of these tree species at their distribution margin is crucial to adapt current forest management strategies. Analyses of beech (*Fagus sylvatica* L.) and oak (*Quercus* sp.) growth have shown high plasticity, but easternmost beech populations have been rarely studied. To describe the response of the marginal beech and oak population to the climate in the far east sites of its distribution, we first compiled new tree ring width chronologies. Then we analysed climate-growth relationships for two dendrochronological networks for the both species in Eastern Romania and the Republic of Moldova. We observed a relatively high growth rate in the marginal populations compared to core distribution sites. Our analyses further revealed a distinct and significant response of beech and oak growth to all climatic variables, assessing for the first time the relationship between growth and vapour pressure deficit (VPD) which described how plant growth responds to drought.

Outstanding structural attributes of primary spruce forests shape regional species distribution of various taxa

Matej Ferenčík

Czech University of Life Sciences Prague, Faculty of Forestry and Wood Sciences, Department of Forest Ecology
E-mail: ferencik.mato@gmail.com

Deforestation and degradation of European temperate natural forests are the primary drivers of forest biodiversity loss, especially affecting threatened species. However, comprehensive regional studies in well-preserved primary forests are rare. To develop effective conservation strategies, we need to understand how the structure of these forests influences the diversity of different species groups and their spatial turnover at the landscape scale. Here, we surveyed 58 plots distributed across ten best-preserved primary forest stands in the Western Carpathians, at five mountain ranges, focusing on four taxonomic groups considered effective indicators in conservation biology: birds, epiphytic and epixylic lichens, saproxylic beetles, and deadwood-inhabiting fungi. With only one exception regarding birds, the stands hosted less than half of the regional species pool of the respective taxa. This indicates great importance of each stand (and subsequently plot) regardless of local species richness. We did not document congruent patterns for spatial turnover or nestedness components of beta diversity, except for congruent spatial turnover of fungi and lichens. Using GLS models, we documented that several structural attributes of primary forests supported local species richness of beetles and lichens, as well as the number of red-listed species of fungi. Increased canopy openness and volume of slightly decaying deadwood (decay stage 1) positively influenced species richness of beetles, while mean age of the five oldest trees and the volume of standing deadwood supported the species richness of lichens. The mean age of the five oldest trees, together with highly decomposed deadwood (decay stages 4 and 5) positively influenced the number of red-listed species of fungi and lichens. The substantial presence of rare and endangered species underscores the pivotal role of primary forests in biodiversity conservation. Our multi-taxonomic study offers comprehensive insights into biodiversity patterning at a regional scale and brings evidence that each fragment of primary forest contributes to the regional species pool. Hence it becomes evident that protection of all preserved fragments of primary forests are necessary. In addition, landscape-scale conservation of each primary forest stand contributes unique species compositions, it becomes evident that protecting only small, isolated fragments of primary forests may prove inadequate. Therefore, landscape-scale conservation efforts aimed at enhancing connectivity within European biodiversity hotspots are critically important to support the distinctive biodiversity of primary forests.

Forest Assessment, Modelling, Forest Management

Optimal distribution of sample trees in developing allometric biomass models

Ioan Dutca[1,2]

[1]Transilvania University of Brasov
[2]Buckinghamshire New University
E-mail: idutca@unitbv.ro

Allometric biomass models are fundamental for estimations of forest biomass and carbon, whether based on ground measurements such as those in national forest inventories, remote sensing techniques or combinations of both. These are nonlinear regression models that predict tree volume or biomass based on predictors such as diameter at breast height (D) and/or tree height (H). Selecting the trees to develop allometric biomass models is a challenging task because it not only the sample size that is important, but also the distribution of sample trees across the D-range. Finding the optimal distribution of the sample trees to develop allometric biomass models would ensure a maximum prediction power for any given sample size. Therefore, the effort for collecting biomass observations is optimized. Here, I compare six types of distribution of the sample trees over the D-range to find which one would produce models that would most accurately predict the biomass in the population: (i) D-distribution of the sample trees that matches D-distribution in the population, (ii) uniform distribution over D-range, (iii) D-distribution of sample trees that matches the distribution of standard deviation of biomass residuals within the D-classes, (iv) D-distribution of sample trees that matches the distribution of basal area within the D-classes, (v) D-distribution of sample trees that matches the distribution of the sum of predicted biomass within the D-classes and (vi) Uniform distribution of the sample trees over ln(D)-range (i.e., in logarithmic scale). A Monte-Carlo procedure was used to determine the effect of the sample trees distribution (in developing allometric models) on the standard error of population mean. The results showed that a distribution of the sample trees matches the distribution of basal area within the D-classes was optimal, producing in similar conditions (i.e., under similar sample sizes) a minimum standard error of the population mean. Therefore, I recommend using a distribution of sample trees that matches the distribution of basal area within the D-classes when developing allometric biomass models, in order to produce models that are accurate predictors of population biomass.

Forest Assessment, Modelling, Forest Management

The vulnerability of some juvenile fir provenances (*Abies alba* Mill.) to damage caused by late frosts, evidenced by frost rings

Anca Botezatu, Anca-Ionela Semeniuc Fecioru, Maria Teodosiu

National Institute for Research and Development in Forestry" Marin Drăcea" Câmpulung Moldovenesc
E-mail: ancabtzt@gmail.com

Fir (*Abies alba* Mill.) is a valuable forest species in Romania both ecologically and forestry, being considered the most productive conifer species from the country.

The main objectives of this study were:

i) The detection and description of frost rings from seedling fir trees in the north-eastern part of Romania;

ii) The link between the presence of frost rings and the thermal regime of the test location;

iii) The sensitivity of different fir provenances in the conditions of a colder climate as indicator for adaptation to climate change and assisted migration.

For this experiment, 5 samples of fir seedlings from 9 different surfaces were analyzed, representing a total of 45. For each provenance, five fir samples were collected, with the purpose making of laboratory analyses, following how the annual rings were affected as well as dating the years in which negative temperatures were recorded.

After identifying the annual rings in which the frost occurred, as well as dating the years,

a classification was made depending on the extension and localization of affected early cells inside the annual ring. The degree of percentage damage was established in the circumference of the annual ring (less than 30%, between 30-50%, over 50% and 100%. Depending on the place where the frost occurred, it was established (class a) in the first five rows of formed cells, (class b) deformed cells that appear after five rows).

After analyzing of the annual rings, it was observed that the low temperatures that affected the cell formation were during May 10-11, May 19-20. In 2017, temperatures were lower for May 9-11. They recorded values of 0.82°C, -2.07°C and -3.89°C. The average daily value was 2-4 °C. The highest number of frost rings was found for provenances 5 (Avrig), 12 (Dobra) and 16 (Comandău) and the least for provenances 11 (Sinaia) and 18 (Gârda).

In the present study were clearly noted structural anomalies of the xylem specific to frost rings, results depending on the origin of the fir saplings.

Key words: frost ring, deformed cells, fir seedlings, species

Maple resonance wood: structural and acoustic requirements

Florin Dinulică[1], Mariana Domnica Stanciu[1], Cătălin Constantin Roibu[2], Cristian Hiciu[1], Daniel Constantin Șandor[1], Marian Știrbu[2], Andrei Mursa[2]

[1]Transilvania University of Brasov
[2]Ştefan cel Mare University of Suceava, Forestry Faculty, Suceava, Romania
E-mail: dinulica@unitbv.ro

We hypothesized that, as in spruce, the structure of maple wood (*Acer pseudoplatanus* L.) is a determinant of the wood's acoustic quality. We checked this connection on the air-dried maple wood for back plate manufacturing of violins of different acoustic performances. For this purpose, tree rings and anatomical features (porosity, cell wall thickness) were measured on the cross-section, as well as wavy grain in the radial section. The measured wood properties were the density, by stereometric and densitometric methods, the ultrasound velocity along and across the fiber and the color of the wood in radial plane. The impedance, modulus of elasticity and acoustic radiation were derived.

We found a lot of relationships between measured properties and wood structure. Thus, the lighter-colored maple wood drives ultrasound faster, but is stiffer and has medium density values. The more redness in the color of the wood, the lower the modulus of elasticity and along-fiber impedance. Likewise, the more yellowness, the lower ultrasonic speed, impedance and modulus of elasticity. The wood with the highest ultrasonic speed values has medium density. Maple wood with narrow rings drives the sound faster radially, is heavier, but has less longitudinal radiation. Maple wood with high regularity of ring width drive ultrasound faster along the fiber, has low impedance, higher longitudinal radiation, is lighter, is more elastic tangentially and has medium values of the chromatic metrics.

Maple wood with well-defined curly-wave and narrow rings shows vessels with a smaller lumen and narrower walls. The wide-ringed maple wood, poorly defined curly-wave as well, has thicker rays and also vessels with an obvious tendency to join.

Deadwood and saproxylic beetles in the Sinca Old-Growth Forest

Gabriela Isaia[1], Mihai-Leonard Duduman[2], Ionuț-Marian Dragomir[1], Ion Cătălin Petrițan[1]

[1]Transilvania University of Brasov, Faculty of Silviculture and Forest Engineering
[2]Ştefan cel Mare University of Suceava, Forestry Faculty, Suceava, Romania
E-mail: gabriela.isaia@unitbv.ro

Saproxylic insects play an essential role in the natural recycling of dead wood. The relationship between the decay rate of deadwood from different tree species and the diversity of saproxylic insects has been very little studied so far. In this context, our research studied the connection between the presence and richness of saproxylic insect species and the quality and quantity of dead wood of different species (fir and beech) in the Şinca Old-Growth Forest. In the spring of 2022, a number of 30 sample areas were chosen and materialized in the field, 15 inside the unmanaged forest and 15 in the managed forest, each having a circular shape and an area of 500 m2. WitaPrall Ecco traps with transparent walls were used, placed in the middle of each sample area so that the collecting container was at 1 m above ground level and anchored to the surrounding trees using raffia strings. To preserve the captured material, an equal proportion of ethylene glycol and water in a volume of 200 ml was introduced into each collection container. Insects were collected at 14-day intervals, from 21.04.2022 to 28.09.2022. The dead wood was inventoried by species (silver fir and European beech), by the type of dead wood (log or stump) and by decay classes.

A total number of 2048 individuals belonging to 104 species included in 37 families were identified, namely: 950 individuals belonging to 62 species and 28 families in the unmanaged forest, and 1098 individuals belonging to 87 species and 35 families in the managed forest. The species *Orchestes fagi* L*., Dalopius marginatus* L*., Trypodendron domesticum* L. and *Trypodendron lineatum* Ol. were the most abundant species in both forests - 1411 individuals, representing 68.90% of the total number of individuals. Both in the case of all identified species, and in the case of xylophagous species, there were no statistically differences between the average number of individuals captured in the 2 types of forests. However, the average number of individuals was higher in the unmanaged forest compared to the managed forest. Although no significant differences were identified between the average number of individuals captured according to the amount of dead wood in the sample area, the average number of individuals was still higher in areas where the volume of dead wood exceeded 10 m^3.

Keywords**:** saproxylic beetles, deadwood, diversity, naturalness, species richness

Bark and wood boring beetles in relation with the new episodes of oak decline in North-East of Romania

Daniela Lupaștean[1], Constantin Ciornei[2], Florin Botezatu[3], Mihai-Leonard Duduman[1]

[1]Ștefan cel Mare" University of Suceava, Forestry Faculty, Suceava, Romania
[2]Independent researcher
[3]Ingka Investments Forest District
E-mail: daniela.lupastean@usm.ro

Pedunculate (*Quercus robur*) and sessile (*Q. petraea*) oak are long living trees, of great ecological and economical importance, consisting in significant components of natural hardwood forests in Romanian lowlands. Even oak forests are resilient, over the last decades they have been affected several times by episodes of decline, followed by significant levels of mortality. These episodes are more frequent lately and have very rich facets. The surveys were conducted in several oak forests in North – East Romania, region Botoșani, severely affected by the decline syndrome, in order to differentiate and discuss a number of causes of oak decline and death and place them in the context of Romanian forest condition. Insect species play an important role in oak decline, starting with the defoliating species, especially spring defoliators, and continuing with the bark and wood boring insects which participate in the final phase of the causative chain that leads to mortality of oaks. Among the bark and wood boring beetle species associated with oak decline, the most important are buprestid and ambrosia beetle species. *Agrilus sulcicollis* was the most abundant buprestid beetle and *Anisandrus dispar* and *Xyleborinus saxesenii*, the most abundant ambrosia beetle species detected in this study. The role of the mentioned species in oak dieback is discussed, and the symptoms of the infested trees are described based on observation at sampling. Considering the lack of data on these insect species distribution and population level in Romanian forests, quantitative survey means are analyzed. Are brought into discussion the complex nature of the oak decline and the numerous knowledge gaps that make more difficult the identification of the possible management options.

Leaf morphological traits distinguish between Cuban native species of mahagoni and the Hondurian mahagony

Liuder Isidoro Rodríguez Coca, Elena Ciocirlan, Alexandru Lucian Curtu

Faculty of Silviculture and Forest Engineering, Transilvania University of Brasov, Romania
E-mail: liuder.coca@unitbv.ro

Introduction: The genus Swietenia includes three mahogany species *Swietenia Humilis* (Zucc), *Swietenia macrophylla* (King.) and *Swietenia mahagoni* (L.) Jacq. There are reports of hybrids between S. mahagoni and S. macrophylla that has been localized in some Caribbean islands. These species are used in the manufacture of various high-quality products, such as musical instruments, handicrafts, wooden floors, paneling.

Materials and method: Phenotypic data from a total of 356 mahogany trees were collected in the province of Sancti Spíritus, Cuba. Using the leaf phenotypic data collected Principal Components Analysis (PCA) and Discriminant Function Analysis (DC) were performed.

Results and discussions: In the DC, Wilks' partial lambda indicates that the variable "leaflet length" with 0,97 contributed the most to the overall discrimination. In the PCA analysis carried out only with the data collected in the populations of the two species S. mahaoni and S. macrophylla, Factor 1 explains 78,28% of the variation of the variables and is represented by leaflet length and rachis length; while Factor 2 explains 10,32% of the variation and is associated with petiole length. When analyzing the populations of S. mahagoni, S. macrophylla and the mixed stands together, Factor 1 explains 69,56% of the variation in the variables and is mainly represented by rachis length and leaflet length, while Factor 2 explains 15,69% of the variation in the data and is more closely associated with petiole length.

Conclusions: Using the leaf mofological variables by Discriminant and Principal Components Analysis of S. mahagoni and S. macrophylla species it was possible to distinguish the differences between the two species and the differences between the putative hybrids and the two species, leaflet length being the variable with the highest discriminant power.

Key words: Cuban mahogany, Honduran mahogany, hybrid mahogany, morphometric

Comparison between atmospheric depositions recorded at the Rarau experimental plot at different altitudes

Amelia Buculei [1], Carmen Iacoban [1], Ştefan Leca[2]

[1]National Institute for Research and Development in Forestry Marin Drăcea - Câmpulung Moldovenesc
[2]National Institute for Research and Development in Forestry Marin Drăcea - Voluntari, Românĭa
E-mail: buculeiamelia@gmail.com

The quality of the environment is influenced by precipitation as the main factor. The precipitation composition substance is a result of several processes and chemical reactions involving natural phenomena and the emission of pollutants. If there are sufficient amounts of cations in the air, sulphide and nitrate anions are neutralized by salts. However, in the case of the excess of anions, the strong acids (sulphuric and nitric) are formed. Those acids, as precipitation fall down, may cause acidification of ecosystems. Atmospheric deposition's chemical content can cause significant environmental damage by storing acidifying and eutrophizing compounds, resulting in nutrient imbalances and changes in biodiversity. Monitoring the flux of atmospheric depositions in forest ecosystems by measuring the amount of precipitation and the phisico-chemical parameters in the laboratory of samples periodically collected is an internationally used method in estimating the inputs of pollutants and nutrients from the atmosphere. The analysis of pollutant ion fluxes can also serve to estimate the forest's contribution to transforming pollutants and limiting their transfer to surface and groundwater. On this basis, it may be decided on the solutions necessary to be adopted in sensitive areas or at risk of contamination. Annual depositions, expressed in $kg\ ha^{-1}an^{-1}$, $meq\ ha^{-1}an^{-1}$, $mmol\ m^{-2}an^{-1}$ or $g\ m^{-2}an^{-1}$, provides useful information through the values themselves or by comparison with the values recorded in other areas. The purpose of this study was to compare the deposition monitored at two experimental plots installed in Rarau at different altitudes, in order to establish the trends and correlation with other factors that can affect the forest health. One of the plots was located at the 1100 meters altitude (long 25.32.11; lat 47.28.34), wich is the ICP Forests plot from 1998. The other plot was installed close to the lodge of Rarau and Pietrele Doamnei at 1395 meters altitude (long. 25.33.50; lat.47.26.93). This study follows the dynamics of quantitative and qualitative atmospheric deposits of the two surfaces, during the vegetation season in 2007 and 2008. The pH and conductivity were determined using WTW instruments. For the measurements of Cl^-, $S-SO_4^{2-}$, $N-NO_3^-$, Na^+, $N-NH_4^+$, K^+, Mg^{2+} and Ca^{2+} ion concentrations from precipitations a ion cromotograph Dionex ICS-3000 with simultaneous analysis of anions and cations from INCDS "Marin Drăcea" Câmpulung Moldovenesc was used.

Following the data obtained for the studied area, we can conclude that understanding regional variations and demonstrating the effectiveness of policies to reduce emissions requires both qualitative and quantitative assessments of atmospheric deposition. Clean air policies can only be created and implemented with the help of deposition monitoring.

Key words: monitoring, forest ecosystems, poluant compounds, ion concentration

Effects of industrial activity and air pollution on European beech trees in Transylvania, Romania

Cosmin Ilie Cuciurean[1,2], Cristian Gheorghe Sidor[1], Ionel Popa[1,3]

[1]National Research and Development Institute in Forestry "Marin Drăcea", Romania
[2]Doctoral School of Engineering Sciences, "Ștefan cel Mare" University from Suceava, Romania
[3]Center of Mountain Economy -INCE - CE-MONT Vatra Dornei, Romania
E-mail: cuciureancosmin@gmail.com

The development of urban areas, industrialisation and increasing road traffic intensity is a global problem of air, soil and water pollution, with negative effects on forest ecosystems and wildlife. Trees play an important role in pollution control by filtering the air and reducing the negative effects of pollution. The use of plants and trees as bioindicators of air pollution has for many years been a simple and effective way of highlighting the effects of pollution on forest ecosystems. This study provides a detailed analysis of the negative effects of air pollution on beech trees (*Fagus Silvatica* L.) in the region of Copșa Mică, Romania. In this region, industrial activity such as non-ferrous metal processing and carbon black manufacturing started in 1936 and developed continuously until 1990. After 1990, the industrial activity was significantly reduced and stopped in 1993. Three areas with different degrees of damage were investigated: intensively polluted area, moderately polluted area and unpolluted area. By analysing the beech trees increment series, growth losses were highlighted during the period with intensive industrial activity, especially in the intensively polluted area. Resilience indices showed the period when intensively affected trees were able to recover growth lost during the period of very hight industrial activity. Regarding the dendroclimatic response of trees, it is shown that monthly rainfall in the April-August period positively influenced tree growth, while monthly mean temperatures in the April-September period are negatively correlated with tree growth. The dendroclimatic models differed according to pollution intensity. Correlations with climate variables over different periods revealed a change in the response of trees affected by local pollution to the climate, compared to unaffected trees at times when air pollution was very high. Chemical analysis of tree rings over a period of 60 years showed that trees are able to accumulate heavy metals. Five heavy metals (Cu, Zn, Mn, Fe and Ni) were identified in the composition of the tree rings, the concentrations of which showed statistically significant differences at a 95% confidence interval in relation to the level of pollution.

Co-exposure effects of polypropilene and ketoprofen treatments on zebrafish behavior

Ionuț-Alexandru Chelaru[1,2], Alexandra Savucă[1,2], Alin Stelian Ciobîcă[3,4,5], Dorel Ureche[6], Mircea Nicușor Nicoară[1,3]

[1]Doctoral School of Geosciences, Faculty of Geography and Geology, "Alexandru Ioan Cuza" University of Iași
[2]Doctoral School of Biology, Faculty of Biology, "Alexandru Ioan Cuza" University of Iași
[3]Department of Biology, Faculty of Biology, "Alexandru Ioan Cuza" University of Iași
[4]Academy of Romanian Scientists
[5]Center of Biomedical Research, Romanian Academy, Iași
[6]Faculty of Sciences, Department of Biology, Ecology and Environmental Protection, University "Vasile Alecsandri", Bacau, Romania
E-mail: chelaru.alexandru@yahoo.com

This research describes the multifaceted impact of plastic waste and pharmaceutical residues on the environment. Single-use plastic items are a pervasive threat, resulting in widespread pollution that adversely affects ecosystems, wildlife and natural habitats. At the same time, the introduction of pharmaceutical residues into the environment through various routes, such as improper disposal and wastewater, poses a significant challenge to water quality and aquatic ecosystems. This summary highlights the complicated and far-reaching environmental implications of these pollutants. Urgent attention is needed to address the growing concerns associated with plastic waste and pharmaceutical contamination. Comprehensive waste management strategies and increased public awareness are essential to preserve ecosystems and mitigate environmental degradation. Insufficient scientific investigations have been conducted on the co-occurrence of pharmaceuticals and plastics, despite their presence in the ecosystem. The aim of the study was to evaluate under laboratory conditions the effects of a drug and a polymer in both single and mixed administrations. Relevant environmental concentrations were used to investigate the effects on different parameters such as swimming performance and behavior using the model animal Danio rerio. Swimming performance parameters for example total distance travelled, swimming speed, activity, inactivity, and markers of anxiety and sociability were affected by the concentrations tested. In the natural environment, notable alterations in swimming patterns linked to significant anxiety or sociability effects might pose challenges for the species survival. Following the experimental results, further research will continue to deepen our understanding of the toxicological effects of these pollutants.

Key words: ecotoxicity; behavior; pharmaceuticals, plastics

The study of the evolution of natural regeneration in the territories located outside the Adancata forest area

Savin Alexei, Voloșciuc Florentin-Nicolae, Cucu Cornel-Constantin

[1]Ştefan cel Mare University of Suceava, Forestry Faculty, Suceava, Romania
E-mail: alexei.savin@usm.ro

The natural regeneration in areas adjacent to the forests is active, signaling a clear phenomenon of the return of the forest to its former territories in the Dragomirna Plateau. Moreover, all the soils with agricultural or practical use around the forest massif of the Dragomirna Hills are of forest origin (Luvisoils) and do not show potential and particular interest from an agricultural point of view.

As a result of the research, we found a greater share in the regeneration composition of the adjacent abandoned hayfields and orchards of the species, such as, hornbeam, poplar and other species, compared to oak and beech. This fact confirms the theory of the precursor species, of the first afforestation.

Regarding the hornbeam, the most widespread species in the regeneration composition, it can be said that in some areas the number of specimens does not follow a decreasing course, as is natural, and this is due to the anthropization of some habitats.

As expected, in the species with easy and multiple deseeding (acerinee, hornbeam, poplar, willow) from zoochore to anemochore, the number of individuals per surface unit decreases with the distance from the mother stand, and the effect is the multiplication of the weight in the composition of regeneration compared to the composition of the neighboring stands.

No correlation was found between the number of specimens of shrubs (hawthorn, hazel, bloodstain, elder) and the distance from the forest, a sign that their regeneration follows other laws of emerging forest ecosystems.

With regard to the speed of taking over new territories by the forest, expressed by the time required for the establishment of the settlement from close to close, it was found that for an advance of 25 m outside the forest fund, approximately 8-10 years are needed.

The structure of the forest fund of the Străseni Silvocinegetic Enterprise depending on the natural conditions

Grati Vladislav[1,2], Bunduc Tatiana[3], Bejan Iurie[3]

[1]Moldova State University
[2]Faculty of Forestry, "Stefan cel Mare" University of Suceava
[3]Moldova State University, Institute of Ecology and Geography
E-mail: grativlad@gmail.com

Natural conditions influence differently the structure of the forest fund in the Codrilor Străsenilor forest. Cultivated forestry contributes to obtaining structures close to the vegetation conditions offered by a certain territory. Over time, regardless of the nature of the factors that influenced the forest, differences in the weight of species were identified.

The sustainable management of forests is closely related to the natural factors of pedological, hydrological and climatic order, and each component of the natural conditions can contribute to the differentiation of the growth conditions of woody vegetation. The basic species in Codrii Străsenilor are the sessile oak, the pedunculated oak and, to a lesser extent, the beech.

Changing the structure of forests, without taking into account aspects related to vegetation conditions, is the consequence of the "aggressive" application of silvotechnical works through uncontrolled extractions and the introduction of exotic species into culture. The introduction of exotic species into forestry without a prior study of the impact and their resistance to the new conditions generated significant losses of stands after the first generation. A significant percentage of natural forests have derived into partially derived, fully derived and underproductive.

In order to identify the location of the natural conditions, the mapping of the forest structure is carried out according to the natural conditions (geomorphology, geology, hydrology, soil, etc.) of the location of the Strășeni Silvocinegetic Enterprise.

Comparative analysis of altitude accuracy for forest roads, using methods based on total stations and lidar

Bogdan Popovici

Faculty of Forestry, "Stefan cel Mare" University of Suceava
E-mail: axxbogdan@yahoo.com

Topographic measurements are in a continuous development and adaptation of all needs in the field of large-scale construction and research.

The current research trend is to analyse all pro/contra aspects of the use of the LIDAR sensor in order to determine as accurately as possible the data collected from all areas of activity.

The forest spectrum for the determination and study of the stand and all elements of the forest infrastructure remains under debate due to the precision influenced by external factors, as well as the structure of the surface analyzed.

Accuracy obtained is in accordance with norm C 56-85

The objective proposed in this study is to analyze by comparative method the altimetric odds (Z) collected with different devices (total station, terrestrial scanner and lidar sensor located on UAV)

The working assumptions were as follows:

• Measurement with lidar sensor mounted on UAV

• Terrestrial measurements TLS (Leica C10)

• Classic measurements (using the integrated system - total station measurements and GNSS)

LIDAR has the undeniable advantage of recovering a large amount of information (number of points) in a short interval, what helps to form the DTM (Digital Land Model) and DSM (Digital Land Model) of the study surface and together with the orthophotoplane can determine the structure and composition of a larger area.

For the analysis of the differences in the quota between the measurement results, 7 cross profiles applied on the longitudinal road profile were processed.

Interpretation of altimetric (Z) data following measurements was performed using the 3D model (DTM) and cross profiles (P3, P5, P10, P12, P14, P16, P18).

The final result following the comparison of altimetric odds between traditional measurements taken with the total station and the other two measurements using LIDAR technology, the, this indicates that terrestrial measurements using the traditional principle of topographic measurements are much more accurate in terms of collecting planimetric and altimetric data.

For technical solutions necessary for forest infrastructure projects (roads, bridges, bridges, dams, construction) data collection with LIDAR sensor UAV for forest infrastructure projects, it will be completed and verified with terrestrial LIDAR equipment and traditional methods using total station and GPS.

Freshwater Fish Communities As An Indicator Of Pesticide Pollution

Corneliu Mihaita Pohonțu

Stefan cel Mare University of Suceava
E-mail: corneliu.pohontu@usm.ro

Agriculture has been an important practice to sustain the life-support systems of human civilizations since ancient times. Nowadays, using different pesticides to the environment from chemical synthesis have led to the pollution of most ecosystems and consequent deterioration in environmental water quality. All ecosystems will eventually take over high concentrations of pesticides. But, freshwater fish communities are the first affected with severe impact on biodiversity. The aim of this study is to assess toxic effects of two pesticides widely spread: Glyphosate and Deltametrin on fish species *Puntius titteya*. The first one is used to combat herbs and the second is an insecticide, the both are known with high toxic effects on environment. The species is part of the taxonomic family *Ciprinidae*, very common in fresh waters of the temperate zone. At laboratory level, the specimens were exposed at different non-lethal concentrations to evaluate chronic toxicity. The experiments took place over a period of 21 days and several indicators were monitored such as: morphologic malformations, behavior and anxiety. The harmful effects have been recorded on swimming performance in interaction with Glyphosate herbicide. At higher concentrations of Deltametrin insecticide was observed the aggressive behavior significantly increasing.

Results-based payments in the agricultural sector, with the possibility of application in the forestry sector

Teodorescu Cerasela

Ştefan cel Mare University of Suceava
E-mail: acatincai.cerasela21@gmail.com

Result-based payment schemes are so-called agri-environment schemes in which farmers and land managers are paid for allowing or enhancing the presence of bird, butterfly or flower species of particular biodiversity importance on their land, with the farmer receiving a payment corresponding to the outcome desired by the environmental authority. The article analyses how such schemes are implemented at European and national level. For the description of schemes at European level, an analysis of existing result-based payment contracts in international databases was carried out. In Romania, Fundatia ADEPT implemented a pilot scheme of result-based biodiversity payments aimed at rewarding practical land management.

The field stage consisted in carrying out semi-structured questionnaires in localities bordering the city of Miercurea-Ciuc, respectively in the locality of Ghimeș-Făget in the Pogany-Havas region, between 18-21 July 2022. Questionnaires with farmers were conducted in the Târnava-Mare region on 5-6 March 2023. At the same time, in 2021 questionnaires were applied to farmers in Vicovul de Jos, who received agri-environmental payments based on actions from the Agency for Payments and Interventions for Agriculture (APIA). Farmers were asked questions capturing information on: i) socio-demographic characteristics (year of birth, gender, last school graduated); ii) agricultural land, machinery and costs; iii) views on PBR; iv) previous participation in agri-environment schemes and v) satisfaction with the pilot agri-environment scheme vi) role of agri-environment schemes in biodiversity conservation. Following the analysis of the result-based payment contracts at European and national level, the common objective of these contracts was the protection of biodiversity. Romanian farmers mentioned that unclean grassland leads to biodiversity loss. They consider that this type of scheme requires less effort, time and cost of production but the income is lower than the traditional schemes. As a result, an important performance indicator of this scheme is the freedom of decision of the owner on the measures to be applied to achieve the desired result. In order to implement payments for ecosystem services and biodiversity on a large scale, it is necessary to overcome two main obstacles: lack of indicator species and opposition from the authorities. The basic condition for the implementation of result-based payment schemes is that the legislative system allows for the voluntary commitment of owners to conservation objectives.

Ichthyofauna from the Casin river basin in 2023

Teodora-Ramona Popa, Camelia Ureche[1], Dorel Ureche[1]*

1 "Vasile Alecsandri" University of Bacau, 157 Marasesti Street, 600115 Bacau, Romania,
bio06ramona@yahoo.com
2 "Mihail Sadoveanu" National College, Pascani, Romania
E-mail: bio06ramona@yahoo.com

The study was carried out in 2023 in the basin of the Casin River, on the main course of Casin River and on two of its tributaries. The main objective was to investigate the diversity of fish fauna. The need for this study arises from changes in environmental conditions resulting from the influence of anthropogenic activities.

Seven sampling sites have been scientifically investigated. Sampling was carried out by legal methods, respecting the principles of rare species protection.

Taxonomic analysis revealed the presence of 10 fish species, belonging to 3 orders and 8 families. Three of these are of community importance: Rhodeus amarus, Barbus meridionalis, and Sabanejewia balcanica.

Indices of species richness, heterogeneity and equitability were calculated.

As the study area overlaps the trout zone, the most common and frequent fish species are Barbatula barbatula, Phoxinus phoxinus, and Barbus meridionalis.

The study reveals some changes in the fish fauna structure compared to the situation found in 2016.

Key words: fish fauna, biodiversity, Casin River basin.

The study of the interaction between environmental policy and forestry policy with applicability to protected natural areas

Mariana Croitor

Ştefan cel Mare University of Suceava
E-mail: marianacenusa27@yahoo.com

Sustainable forest management contributes simultaneously to economic, environmental and social objectives. The main objectives of the new EU forest strategy will be to effectively afforest, conserve and restore forests in Europe, to contribute to increased CO_2 absorption, to reduce the incidence and extent of forest fires and to promote the bio-economy, in full respect of biodiversity-friendly environmental principles.

Evidence from most studies that have attempted to assess the effectiveness of forest conservation policies and programmes, particularly in tropical areas, suggests that despite the proliferation of policies and programmes, many have failed to achieve their objectives.

When forest conservation policy narratives and programme documents are at odds with the values held by stakeholders, conservation efforts can be weakened, leading to policy failure.

This disconnect between how nature is valued in policy and the values that stakeholders may hold is likely to result in policies that are not in line with local realities and views.

The aim of the paper is to analyse the interaction between environmental policies and forest policies with applicability to protected natural areas in Romania. Identifying conflicts and overlaps at the level of legal rules: to what extent are the provisions and regulations at European and national level in establishing management measures on natural areas contradictory?

Identify and substantiate a methodology for analysing the interaction between environmental policy and forestry policy from the perspective of the main stakeholders. One way to achieve this is for conservation policies and programmes to capture the multiple human values and contrasting interests of different stakeholders.

The fivefold helix model defines five social systems related to education, economy, politics (self-governance), civil society and environment. Central to the achievement of further progress is knowledge, its content and nature, the process of its formulation and the dynamics of knowledge exchange based on the type of social interactions.

Q methodology to examine the views of different stakeholders on the values underlying forest conservation. Four-step process involves: research design, data collection, data analysis, interpretation of factors.

Forestry 4.0: How is the fourth technological advancement affecting the forestry sector?

Iulian-Constantin Dănilă, Ciprian Palaghianu

Ștefan cel Mare University of Suceava
E-mail: iuliandanila@usm.ro

The forest sector plays an essential role in the global economy, and sustainable management of forest ecosystems increasingly relies on detailed forecasting and effective operational control. The development of digital technologies has led to the use of the internet on a mass scale, marking the beginning of the fourth industrial revolution (Industry 4.0). There is a comparable trend noticeable in the forestry industry. Forestry 4.0 is transforming the way forestry data is monitored, collected, and analyzed, making the most of the data collected by implementing innovations based on artificial intelligence (AI) and the Internet of Things (IoT). Thus, Forestry 4.0 has recently been proposed as a research initiative, and most publications have focused on digital technologies. This material aims to highlight the characteristics of digitization in forestry and the advantages of connecting this sector to the digital world. Keywords: Forestry 4.0; Industry 4.0; Smart Forestry; Internet of Things (IoT).

The response of larch seedlings from different Romanian provenances to low temperatures

Alina M. Truța[1], Iulia Arion[1], Irina M. Morar[1], Steluta M. Sîngeorzan[1], Catalina Dan[2], Roxana D. Stoian-Dod[2], Liviu Holonec[1]

[1]University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Forestry and Cadastre, Romania
[2]University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Horticulture and Business in Rural Development, Romania
E-mail: alina.truta@usamvcluj.ro

Currently, the results of anthropogenic impact on the forest ecosystem can be seen as one of the main factors of global climate change. One aspect of the climate change, which has been a major issue in recent years for both the environment and humanity, is temperature change, with extreme values. Moreover, cold and heat stress is a significant limitation for seedlings' growth, especially in the early stages of development for forestry species. The fundamental goal of the current study was to identify possible genetic resources of *Larix decidua* with an adequate response to the action of abiotic stress factors, such as low temperatures. The biological material was represented by one year old seedlings obtained from seeds collected from mature trees, selected as representatives for seven larch clone populations established at Baciu Orchard, OS Cluj, Romania. Seedlings were exposed to various low temperatures (-20 °C, -30 °C and -40 °C) for 30 days and compared with the control ones, not exposed to cold. Several phenotypic traits of interest for larch afforestation and reforestation programs were analysed: plant height, diameter, number of needles. The data were further correlated with root weight and total seedlings' weight. The results showed significant differences between seedlings' growth, considering the impact that the origin provenance might have. For height, Gura Humorului and Anina provenances presented the highest values. Based on the data determined, non-significant difference was identified between the saplings in the control and those subjected to -20 °C and -30 °C, a fact justified by the fact that such temperatures are normally registered in larch growing area in Romania, thus it can be assumed that the origin trees were already adapted and influenced the development of the respective progenies. The lowest results were recorded within the seedlings exposed to -40 °C, where decay of larch seedlings was observed for all clones. The study can highlight correlation criteria regarding the effects of cold on the growth of larch saplings, while specific Romanian provenances can be valuable for future improvement strategies in forestry.

Key words: *Larix decidua*; clones; abiotic stress; plant growth; cold

Analysis of the main characteristics and germination capacity of fir seeds under various abiotic stress conditions

Irina M. Morar[1], Alina M. Truta [1], Roxana D. Stoian-Dod[2], Catalina Dan[2]*

[1]University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Forestry and Cadastre, Romania
[2]University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Horticulture and Business in Rural Development, Romania
E-mail: irina.todea@usamvcluj.ro

During their development, trees are exposed to a wide range of abiotic factors, and their adaptation to stressors such as temperature extremes, drought, salinity, and inadequate soil conditions is crucial. Assessment of forest diversity and tree reproductive traits is of great importance for genetic resource conservation and forest management. In this study, the peculiarities of cones, seeds, and their germination were investigated in seven Romanian populations of silver fir (*Abies alba* Mill.): Valea Bistrei, Someșul Rece, Avrig, Budescu, Sohodol, Valea Morii and Gârda Seacă. The main germination indices were calculated depending on the geographical origin and the treatments to which the seeds were exposed. The seeds were subjected to the following treatments to stimulate germination, respectively stressed by abiotic factors, like salt and water stress: 1. Control - without special treatment to stimulate germination, it only involved soaking the silver fir seeds for 24 hours in water at 18 °C; 2. Thermal treatment - the seeds were kept at -40 °C for 24 h before being put to germination; 3. Salt treatment, seeds were soaked in salt water (200 mM NaCl) for 24 h before germinating; 4. Water stress - germination was analyzed under water shortage conditions. Seeds from treatments 1-3 were watered regularly every two days with tap water and maintained in the laboratory under similar conditions at a temperature of 20 °C, while seeds from treatment 4 were subjected to water stress. Significant differences between populations were identified for all reproductive traits and considerable differences between applied germination treatments. All types of stress decreased the germination capacity, the highest values in all provenances being obtained in the control treatment, with values between 24% (Valea Bistrei) and 38% (Garda Seaca). Garda Seaca consistently showed the highest germination in all applied stress treatments. The results provide useful information regarding the germination of silver fir seeds under different test conditions, respectively abiotic stressors. Determining the reproductive characteristics related to seeds and their germination is important for the conservation of A. alba genetic resources and for local forestry strategies.

Key words: *Abies alba*; abiotic stress, germination capacity; provenances; seed treatments

The effect of rewilding of beech-dominated temperate forest ecosystems on carbon stocks and biodiversity indicators

Markuljaková K., Kozák D., Mikoláš M., Ferenčík M., Frankovič M., Dúhová D., Svoboda M.

Faculty of Forestry and Wood Sciences, Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Praha 6 – Suchdol, Czech Republic
E-mail: markuljakovak@gmail.com

Maximising carbon storage and habitat availability in forests is of great importance. Primary forests are critical in this regard, offering significant carbon storage potential and serving as vital biodiversity habitats. Given the limited size and fragmentation of primary forests in Europe, there is a growing interest in understanding how rewilding for formerly managed forests impacts carbon storage, sequestration, and habitat provisioning. However, scientific literature lacks comparative studies between primary and secondary old-growth forests. Consequently, little is known about the timeframes and conditions required for secondary old-growth forests to achieve the carbon volumes and habitat provisioning comparable to primary forests. To address this knowledge gap and better understand the impact of rewilding (long-term management cessation) on carbon storage, fixation rate and biodiversity indicators, we compared these parameters in some of the best-preserved temperate mixed beech-dominated primary forests in the Carpathians with adjacent uneven-aged forests allowed to undergo self-development for an extended period of six decades.

We applied the Generalized Least Squares (GLS) method to assess and compare the stored carbon content in various components, including living biomass, lying deadwood, and standing dead trees. Additionally, we determined the aboveground biomass (carbon) increment in living trees, evaluated and compared the deadwood decay stages, and quantified and compared the abundance of large trees and tree-related microhabitats.

The results indicated similar structural characteristics of primary and secondary old-growth forests. Statistical analysis demonstrated no significant differences between the two forest categories in carbon storage, aboveground biomass carbon increment, and biodiversity indicators. Specifically, the mean total carbon storage was 238 T/ha in primary and 228 T/ha in secondary old-growth forests, with a sequestration rate of 4,5 T/ha/year in primary and 4 T/ha/year in secondary old-growth forests. Deadwood carbon constituted approximately seven per cent of the total carbon stock in both forest types. Notably, the deadwood volume exhibited the most substantial variation among the forest types, with primary forests having 158 m³/ha and secondary old-growth forests having 111 m³/ha. Although primary forests exhibited a higher abundance of large trees, secondary old-growth forests showed a slightly greater richness in tree microhabitats.

Furthermore, we emphasise that forest heterogeneity, encompassing factors such as age, DBH, canopy layer, species composition, and growth patterns, is crucial for enabling managed forests to reach the peak capacity for carbon storage observed in their old-growth counterparts. Our findings underscore the vital role of preserving old-growth forest ecosystems for effective carbon storage and biodiversity conservation. Although 70 years may not be sufficient for secondary old-growth forests to replicate the features of primary forests entirely, our study demonstrates significant resemblances, advocating for strict protection and rewilding as a highly effective nature-based solution.

Evaluation and monitoring of comparative trials of half-sib provenances of beech (*Fagus sylvatica* L.) installed in two forest districts Demacusa and Vidra

Alina Todirică, Maria Teodosiu, Cristiana Ciuvăţ, Ecaterina Apostol

National Institute for Research and Development in Forestry Marin Drăcea
E-mail: alinatody@yahoo.com

European beech (*Fagus Sylvatica* L.) is the most widespread species in Romania, having a great importance both from the economic and biodiversity point of view. Since natural regeneration of beech forests has been used almost exclusive in our country, there are currently no programs for improving or testing the genetic values of seed sources. Nevertheless, the selection of adequate reproductive material it is the guarantee for the success and adaptation of regenerated tree stands. To ensure the resilience of beech forests, in 2013, two comparative trials were installed in Romania to obtain quantitative information on the effect of climatic changes on the growth and vitality of the species. In this context 60 beech populations from the entire country were evaluated as part of the study to select the genetic material for the installation of two comparative trials (one provenances/progeny trail (Tomnatic) and one provenances trial (Vidra). Within the Tomnatic Experimental Base, 65 families and 15 provenances are tested and for the Vidra Experimental Base there are 12 provenances. The main goal of this study was to find patterns of genetic variation in survival, height, diameter stem form, forking and current phytosanitary status. The mixed linear model was applied to process the quantitative data obtained. Pearson correlation coefficients were calculated to determine the connection between the diameter, the height and shape of the trunk and it showed that in both trials the best provenances were Solca and Varatec provenances. To better observe and understand how different provenances respond to climate changes, these results ca be used to establish appropriate seed sources.

Key words: comparative trials, beech, half-sib provenances, phenotypic traits, experimental base

Survey's and questionnaires for forestry research. Tools for the present

Apăfăian Andrei[1], Enescu Cristian Mihai[2], Crișan Vlad[1]

[1]Marin Drăcea National Institute for Research and Development in Forestry, Brașov, Romania
[2]Department of Soil Sciences, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
E-mail: apafaian.andrei@gmail.com

Even though at first sight we may think that in the forestry domain everything is measured in number of trees and harvested volumes, in the last years, either it is related to the field activities or in research, survey's and questionnaires are used by specialists to unveil the stringent needs of data collection. Also dedicated software programs are available on the market that can ease the process made by specialists due to the fact that survey's and questionnaire elaboration can be expensive and it needs time and specialized resources to conduct in a proper manner.

It is of great importance that the design is right from the start, this will allow at the end of the S/Q a good compilation of the data, data analysis and results that are in accordance with the desired goal. The succession of steps that have to be respected in order to have a good survey is to define the research goals, target the entities involved, design the template of the questionnaire, face to face or on-line gathering of data, simulation with a test survey (if needed), perform the main assessment and at the end the analysis of the data must be performed.

It is highly significant that the persons who are responsible for the creation of the questionnaire are composing such questions that are appropriate for their research aim and that the end user they want to reach understands the intended purpose.

Also an important step is the statistical analysis of the data, as after it is summed up, it shall be suitable for the analysis that is desired. Survey's and questionnaires are of great importance at present time due to the fact that it enables the researchers to have a better overview of a phenomenon that is happening in their field of activity.

Phytosanitary status of pedunculate oak crops in Voivodeni forest nursery, Reghin Forestry District, Mureș County Forest Administration, in the period 2021-2023

Mircea Ioan Varga[1], Ioan Tăut[1,2], Florin Alexandru Rebrean[1], Mircea Moldovan[2]

[1]University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca Faculty of Forestry and Land Surveying
[2]Marin Drăcea National Institute for Research and Development in Forestry Cluj
E-mail: mircea.varga@usamvcluj.ro

In order for forest ecosystems to fulfil their established functions, it is necessary to protect them from disruptive factors, especially diseases and insect pests. Therefore, to maintain a good phytosanitary condition, it is necessary to ensure that the whole complex of diseases and pests is monitored and that effective control measures are taken as soon as outbreaks are reported. The main objective of the present work is to establish the spectrum of biotic factors in correlation with the main abiotic factors that cause damages in forest crops and to implement appropriate measures to achieve an optimal phytosanitary status. So, it is necessary to analyze the climatic elements that can influence the phytosanitary status of nursery crops by: determining the main insect pests present in the nursery, identifying the main pathogens affecting the crop and implementing measures to increase the quality and quantity of seedlings obtained. In order to achieve the proposed objectives, the work was carried out in the Voivodeni Forest Nursery of the Reghin Forestry district belonging to Mureș County Forest Administration, located near the village of Filpișul Mic, with an area of 26 ha. In the nursery, in the pedunculate oak crop sown in autumn 2021, an experimental block consisting of three replications and 7 variants was installed in early 2022. In order to obtain the data on diurnal temperatures and relative humidity, a Data Logger model BL-30 was installed. Also, soil surveys (1 m x 1 m x 1 m) were carried out in the nursery and biological samples were collected, i.e. May/June beetle larvae (*Melolontha melolontha*/*Amphimallon solstitialis*), determining the degree of infestation, which was very weak for the year 2022 and the flight intensity, also very weak for the year 2023. Infections caused by *Erysiphe alphitoides* (Griffon & Maubl.), (syn *Oidium alphitoides*, *Microsphaera alphitoides*), assessed after the last treatment, in the year 1 pedunculate oak crop, are low, with the percentages of medium and heavily attacked seedlings below 19%, compared to the control variants, where the percentage is above 50%. By correlating the results obtained from the analysis of the field samples, with the data from previous years, it can be concluded that the condition of the Voivodeni nursery from the Reghin Forestry District is relatively good.

Empirical Procedure For Estimating The Effect On The Peak Discharge Of Torrent Control Works

Ioan Ciornei

Ștefan cel Mare University of Suceava
E-mail: ioanciornei@usm.ro

For the control and mitigation of torrents, the development of the hydrographic network is considered necessary and entails multiple technical (hydrological and anti-erosion), ecological, economic, and social effects that are challenging to evaluate due to the difficulties encountered in quantifying the benefits and damages. The extensive surface area of the studied basins and the diversity of causal factors within them recommend the use of geographic information systems (GIS) and software for the storage and processing of databases.

To express the hydrological effect of the works on the hydrographic network means/methods must be employed that can highlight the effect of the works on the flood wave propagation in the channel on which they are located. The hydrological effects of the works are reflected in the flood hydrograph, and to evaluate these effects, maximum discharges before and after the works must be compared.

The hydrologic effect of the works can be determined by relating the differences in flow ΔQ (calculated before and after the execution of the works) to the maximum flow Q before the intervention in the basin; in this way, the coefficient of effectiveness or efficiency of the correction works for torrents is obtained.

The proposed procedure allows for the identification of the effect of the works on the maximum liquid flood discharge starting from the rational formula, which can estimate the rate of discharge reduction after the channel has been modified by the works, depending on the reduction of velocity in the modified section.

Floristic notes of the "Dobruşa" landscape reserve of the Republic of Moldova

Victor Sfeclă[1] , Pavel Pînzaru[2]

[1]State University of Moldova, Chişinău, Republic of Moldova
[2]"Alexandru Ciubotaru" National Botanical Garden (Institute), SUM, Chişinău, Republic of Moldova
E-mail: victor.sfecla@spp.utm.md

This floristic study was carried out during the vegetation growing season of 2023, within the limits of the "Dobruşa" landscape reserve (2,634 ha), located between the village of Olişcani and the Ciorna river, Şoldăneşti district. This protected area is managed by Şoldăneşti State Forest Enterprise, Olişcani Forest District. The main purpose of the study was to identify new data about the distribution of some rare plant species of the Republic of Moldova into this protected area. The carried out floristic research resulted in the highlighting of new places of growth for 16 rare species like: Adonis vernalis L.; Anthyllis macrocephala Wender.; Asparagus officinalis L.; Caltha palustris L.; Genista elata (Moench) Wender. [Genista tinctoria non L. auct. mold.]; Iris aphylla L.; Luzula multiflora (Ehrh.) Lej.; Potentilla alba L.; Rosa villosa L.; Scleranthus uncinatus Schur; Scrophularia umbrosa Dumort.; Scrophularia vernalis L.; Selinum carvifolium (L.) L.; Sonchus palustris L.; Veratrum nigrum L.; Vinca minor L. Two of the total identified species, are included in the Red Book of the Republic of Moldova (3rd edition, 2015) – Caltha palustris L. (EN) and Luzula multiflora (Ehrh.) Lej. (VU). At national level, seven species are protected by Law No. 1538-XIII on fund of protected areas (1998), such as: Adonis vernalis L.; Asparagus officinalis L.; Caltha palustris L.; Genista elata (Moench) Wender. [Genista tinctoria non L. auct. mold.]; Scrophularia umbrosa Dumort.; Veratrum nigrum L.; Vinca minor L. The distribution network of these species within this protected area were located by GPS, the growth points which will allow us to monitor the state of the evolution of the populations. The habitat, due to its micro-relief forms and eco-coenotic factors and provides optimal conditions for the development of these species. At the same time, in order to preserve the biodiversity of the natural ecosystems of the "Dobruşa" landscape reserve, it is necessary to develop and implement a set of measures for recording, regulating and minimizing the negative anthropogen impact.
 Key words: Dobruşa landscape reserve; Republic of Moldova; rare species of plants.

Aspects regarding the identification of forest genetic resources of cvercines in the North area of the Republic of Moldova

Gheorghe Florență[2,1], Valeriu Caisîn[3,1], Aliona Miron[1] , Veronica Florență[2,1]

[1]National Botanical Garden (Institute) "Alexandru Ciubotaru" of the State University of Moldova
[2]Forest Research and Management Institute, Chisinau Republic of Moldova
[3]Agency "Moldsilva"
E-mail: florentagheorghe@mail.ru

Currently, we are witnessing a rapid process of climate change, which represents one of the biggest threats to the environment, the social and economic environment. This process also happened in the past by alternating warm periods with cold ones, but at a much lower speed compared to what is happening now. Therefore, the existence of a plant species depends on its ability to adapt in a short time to the new conditions of the environment in which it grows. In order to ensure the continuity of species of community interest, one of the many solutions is the identification and establishment of forest genetic resources, and based on them, the creation of forests adapted to the new conditions. The identification of forest genetic resources in the Republic of Moldova is carried out according to the EUFORGEN Program, of which our country also joined in 1994. The present work refers to the forest genetic resources of cvercines identified in the northern area of the Republic of Moldova in the year 2023.

The surface of the forests in the northern area of the Republic of Moldova managed by the subordinated to the "Moldsilva" Agency (RN Pădurea Domnească, ÎS Edineț, ÎS Glodeni, ÎS Soroca, ÎS Bălti, ÎS Șoldănești) is 85735.53 ha. The natural-fundamental trees occupy an area of 28,651.97 ha or about 33% of the total. These are dominated by sessile oak, pedunculate oak, downy oak, white poplar, black poplar, willow. The largest areas of natural-fundamental stands compared to the total area of the forestry entity are in ÎS Edineț (10532.5 ha or 44%), followed by ÎS Șoldănești (6502 ha or 43%), RN Pădurea Domnească (2002, 9 ha or 38%), ÎS Soroca (5422.3 ha or 37%), ÎS Glodeni (3896.2 ha or 26%). The smallest share of fundamental natural stands are registered within the forestry entity ÎS Balti, which amounts to 296.07 ha or 3%. It is worth noting that the majority of the area of forests managed by ÎS Balti is found in the Balti steppe.

The natural-fundamental stands of sessile oak, pedunculate oak, downy oak for which FGR identification researches were carried out total the area of 26825.57 ha or about 94% of the total natural-fundamental stands in the northern area. The identification of genetic resources was achieved through the following stages: exploration, sampling, description, evidence, classification and establishment of management measures.

As a result of the research carried out in 2023, were identified 4 downy oak forest genetic resources (44 ha), 13 sessile oak forest genetic resources (386 ha) and 18 pedunculated oak forest genetic resources (383 ha). Based on the results obtained, were proposed conservation measures of the available genetic pool.

Issues of assessing carbon stocks in the biomass and soil of grasslands in Orhei National Park

Ion Talmaci[1,2], Aliona Miron[1] , Alexandru Galupa[1,2], Erii Prosii[1,2], Ghenadie Cojocaru[1,2], Ala Mardari[1,2], Ludmila Talmaci[1]

[1]Grădina Botanică Națională (Institut) „Alexandru Ciubotaru" a Universității de Stat din Moldova
[2]Institutul de Cercetări și Amenajări Silvice
E-mail: iontalmaci@mail.ru

The paper presents results of research carried out in 2013-2022 within the EU CLIMA EAST Moldova Project and the Research and Innovation Project: 20.80009.7007.01 on the estimation of carbon stock in biomass and soil of grasslands in Orhei National Park (ONP). Grasslands in the Republic of Moldova (RM) are an important source of greenhouse gas (GHG) absorption, as they account for about 27% of the total GHG fluxes in the country. The importance of grasslands is also determined by their share in the land use structure of the RM, where according to the land cadastre they account for 10.7% or 361.1 thousand ha.

Current research results from the ONP are used in the process of updating data on carbon stocks in grassland ecosystems in the RM. In this context, by applying the AR-AM0002 methodology on the grassland land within the ONP (about 5.9 thousand ha) a sample of 61 sample plots (SP) was located, of which 27 SP for biomass carbon and 34 SP for soil carbon. According to the research it was established that the grasslands within the ONP grow on 33 taxonomic soil units, of which cernozones predominate with about 33%. Based on the results of the laboratory analyses it was determined that the total amount of carbon stored in the soil pool of the grassland in the ONP is 342.6 ktC or an average of 58.7 tC/ha. At the same time, the min/max values are 33.9 tC/ha and 78.6 tC/ha respectively. Overall, these indicators are characteristic of degraded soils and are relatively similar to the results obtained in the monitoring exercises of Moldova Soil Conservation Project and Moldova Community Forestry Development Project.

The biomass of the grasslands within the ONP was estimated by gravimetric or weighing method. Thus, it was determined that the productivity of the grassland sites within the study sample ranged from 1.19-3.97 t/ha aboveground dry mass, with a mean of 2.78 t/ha. The average productivity of the grasslands within the NWP is 2.16 t/ha above-ground dry mass which corresponds to the "medium productivity" classification (1.3-2.5 t/ha dry mass). The cumulative mean value of the biomass of the grasslands (above and below ground) in the ONP is 4.32 t/ha dry mass. Final calculations indicate that the average volume of carbon in biomass in the study sample is 2.16 tC/ha, and the cumulative volume per sample - 12.4 ktC. The results obtained show the urgent need for improvement works on degraded grasslands by applying different methods (fertilization, over-seeding, etc.) and their reasonable management.

Aspects regarding the estimation of carbon from the biomass of forest trees in the Southern Area of the Republic of Moldova

Ion Talmaci[1,2], Erii Prosii[1,2], Alexandru Galupa[1,2], Ghenadie Cojocaru[1,2], Ala Mardari[1,2], Aliona Miron[1], Ludmila Talmaci[1], Alexandru Varzari[1,2]

[1]Grădina Botanică Națională (Institut) „Alexandru Ciubotaru" a Universității de Stat din Moldova
[2]Institutul de Cercetări și Amenajări Silvice
E-mail: iontalmaci@mail.ru

The paper presents the results of the research carried out in the framework of the Research and Innovation Project: 20.80009.7007.01 on the estimation of the contribution of forests in the Republic of Moldova (RM) to the absorption of greenhouse gases (GHG). Thus, it is found that forests in the RM are the main source of GHG absorption, with a share of about 63%, which corresponds to the international trend. The qualitative estimation of the contribution of forests to the GHG balance is a key factor in the reporting by the RM of the Nationally Determined Intended Contribution (NDC) under the United Nations Framework Convention on Climate Change (UNFCCC). In this context, the paper describes one of the current steps in the process of updating the data on carbon stocks in forests in the southern part of the RM, as well as some conclusions on the process of strengthening national GHG sequestration capacities.

According to the land cadastre (01.01.2023), the area of forest land is 451.7 thousand ha or 13.3% of the territory of the RM. The land covered by forests constitutes 370.0 thousand ha or 11.3% of the land area of the country. Forests in the RM are scattered in 3626 forest bodies with an area ranging from 5 ha to 5550 ha, located in the area of activity of 920 administrative-territorial units. From a territorial point of view, about 57.7% of the forest area is located in the central part of the RM. The northern area accounts for 26.6% of the forest area and the southern area only 15.7%. Administratively, the forest ecosystems in the southern part of the RM are divided into 6 forestry entities with a total area of 85.9 thousand ha, including the area covered by forests - 70.1 thousand ha. According to the data from the forestry management plans, the largest share in the horizontal structure of forests in the southern part of the RM is accounted for by acacia trees with 40372.8 ha or 53.8%, cvercines - 17.6%, other species - 28.6%. The situation regarding the stock of wood is partially different - cvercines hold 41.1% (2021280 m3), followed by acacia (22.1%), ash (14.6%) and poplar (5.6%).

By applying the AR-AM0002 methodology, it was determined that the total amount of carbon stored in tree biomass in the southern area is 2565.1 ktC. Of this volume, about 48% (1240.5 ktC) belongs to cvercine stands, followed by acacia (21.7%) and ash (13.2%) stands. Roughly the same situation is recorded for the average carbon stock indicator, where the most carbon is held by hornbeam (99 tC/ha), cvercines (94 tC/ha) and lime (71 tC/ha), and at the opposite pole is acacia - 14 tC/ha or 7.1 times less than hornbeam and 6.7 times less than cvercines. This situation is a relevant argument for the need to gradually reduce the share of acacia in the forests of the RM in favour of natural/autochthonous species. Comparative analysis of the current average changes in carbon pools in tree biomass shows that the values recorded in the southern area are lower compared to the data in the central area, but also compared to the preliminary data in the RM.

Species Orchis Purpurea HUDS. in the grasslands of the Orhei National Park

Aliona Miron[1], Alexandru Galupa[1,2], Ghenadie Cojocaru[1,2]

[1]Alexandru Ciubotaru National Botanical Garden (Institute) of the State University of Moldova, Chisinau, Republic of Moldova
[2]Forest Research and Management Institute, Chisinau, Republic of Moldova
E-mail: florentagheorghe@mail.ru

Orchis purpurea Huds. is a critically endangered species, spread from Europe to the Caucasus, Turkey and North Africa. In the Republic of Moldova it is found in clearings and forest edges, mainly in the central districts (Calarasi, Straseni, Ungheni, Nisporeni, Ialoveni, Falesti, Orhei), and in the herbarium of the "Al. Ciubotaru" National Botanical Garden (Institute) Institute, there are also specimens collected in some more southern districts of the country - Hincesti, Cimislia, Cantemir. The species is protected at the international level by the CITES Convention, and at the national level by Law No. 1538/1998 being included in the Red Book of the Republic of Moldova (2001, 2015 editions). The species is conserved in situ in the "Codru" Scientific Reserve, the "Molești-Răzeni" Forest Nature Reserve, the "Căbăiești-Pîrjolteni" and "Cărbuna" landscape reserves, and the Orhei National Park (ONP). According to literature data in ONP the species has been identified in Vatici Forest District (Vatici and Curchi villages) and on the "Seliște-Camencea" forest tourist trail.

The presence of Orchis purpurea species on the grasslands of the ONP is recorded for the first time in the period 2021-2023 as part of a more comprehensive study of the grasslands covering their flora, vegetation, the conditions of the natural environment, productive and nutritive potential. On the basis of the research, new growing sites of the species have been identified both for the territory of ONP and for the territory of Moldova. Thus, the species was identified in the following localities and grasslands:

1. Morozeni, Orhei district: • Grassland body 25B - "La Ponoare" - grassland with scrubs on a north-eastern slope affected by historical landslides; slope degree - 90; altitude - 145-158 m; soils - dark grey and typical grey, weakly to moderately eroded; land use in the past (1981-1995) - agricultural; functional group according to planning - PS (soil protection). • Grassland body 26A - "Fundul Văii" - grassland with scrubs on a north-eastern slope affected by historical landslides; slope degree - 90; altitude - 170-235 m; soils - soil complexes damaged by landslide processes; land use in the past - grassland; functional group according to planning - PS (soil protection).

2. Donici, Orhei district: • Grassland body 5B - "La Țîmbula" - grassland with scrubs on a western slope; slope degree - 70; altitude - 110-120 m; soils - carbonate chernozem, moderately to strongly eroded; land use in the past: 1981 - grassland, 1995 - agricultural; functional group according to planning - FP (production function). • Grassland body 10A - "La Sfînt în Deal" - grassland with scrubs on a south-west slope; slope degree - 110; altitude - 200-215 m; soils - dark gray soil, poorly to moderately eroded, land use in the past: 1981 - agricultural, 1995 - grassland; functional group according to planning - FP (production function).

3. Codreanca, Straseni district: • Grassland body 5C - "Cociarna" - grassland with scrubs on a western slope; slope degree - 120; altitude - 150-250 m; soils - typical grey, strongly eroded, land use in the past: 1981 - forest plantation, 1995 - land with forest vegetation (shrubs); functional group according to planning - FP (production function).

The most representative population of Orchis purpurea among those identified is the population in grassland 10A "La Sfînt în Deal". The population size has been estimated at about 50 individuals, most of

which are in the generative phase. The plants grow well, reaching about 45 cm in height, flower and fruit abundantly. The population is spread over the whole grassland area (2.12 ha).

Comparative analysis of Orchis purpurea populations and the natural conditions under which they grow shows that the species prefers scrubby grasslands on sunny slopes with grey soils (neutral in the topsoil and weakly alkaline at depth). The presence of the species on grasslands affected by landslides or on trains excluded from the agricultural circuit, later included in the category of grasslands, emphasizes the role of these apparently unimportant lands in the conservation of biodiversity, including some rare plant species with protection status at the level national and international.