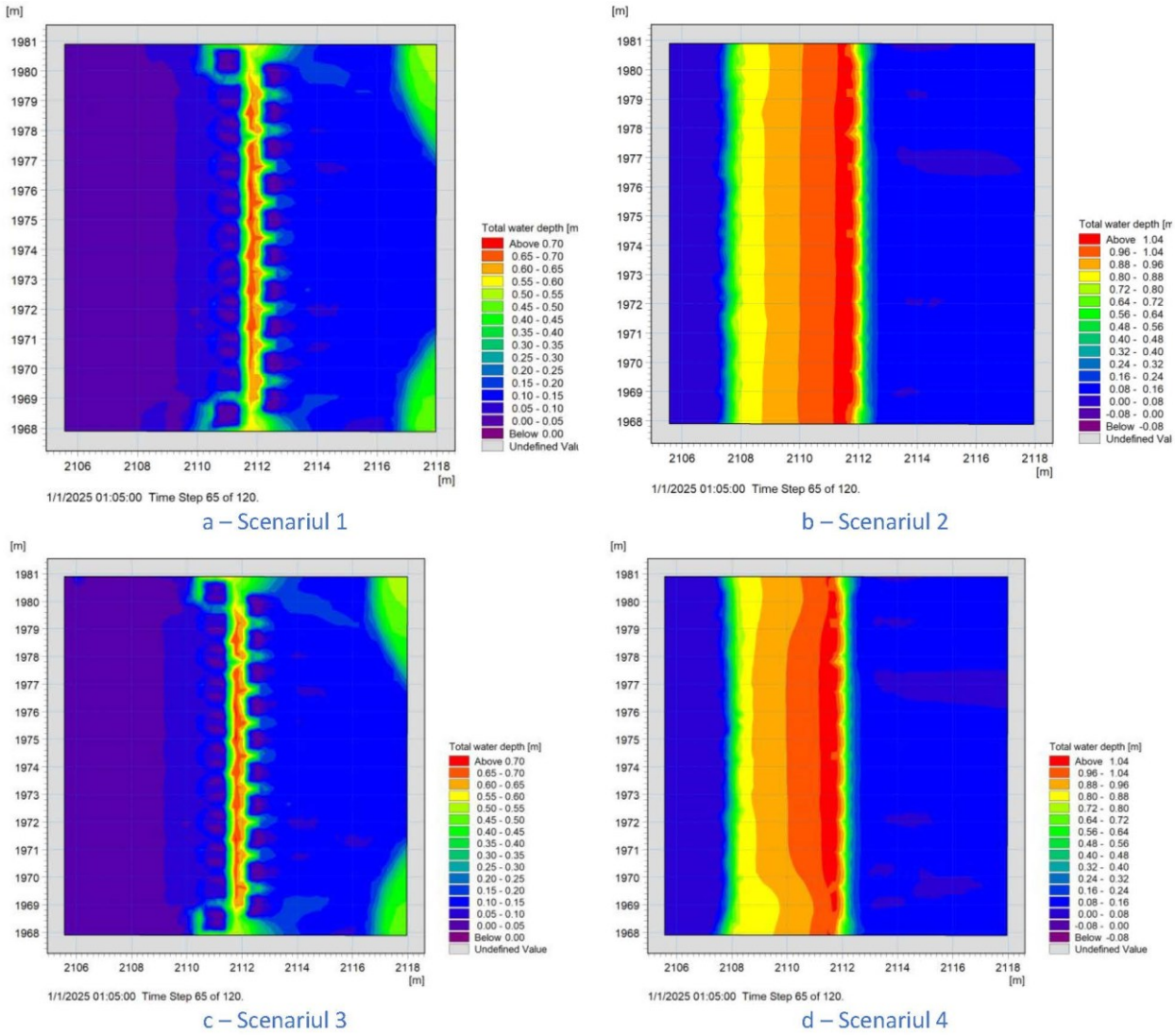
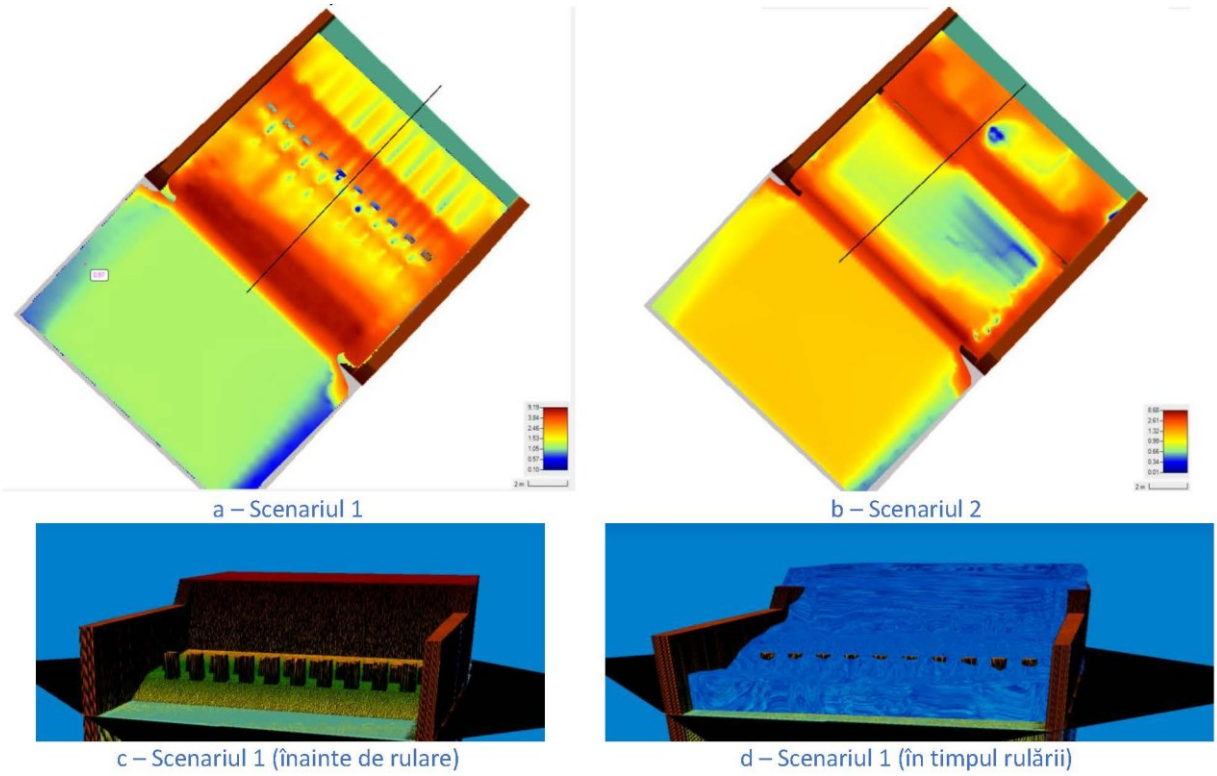
REZULTATE 2025

Proiectul PN 23090203: *Contribuții științifice noi pentru un management sustenabil al bazinelor hidrografice torențiale, terenurilor degradate, perdelelor forestiere și al altor sisteme agrosilvice în contextul schimbărilor climatice*

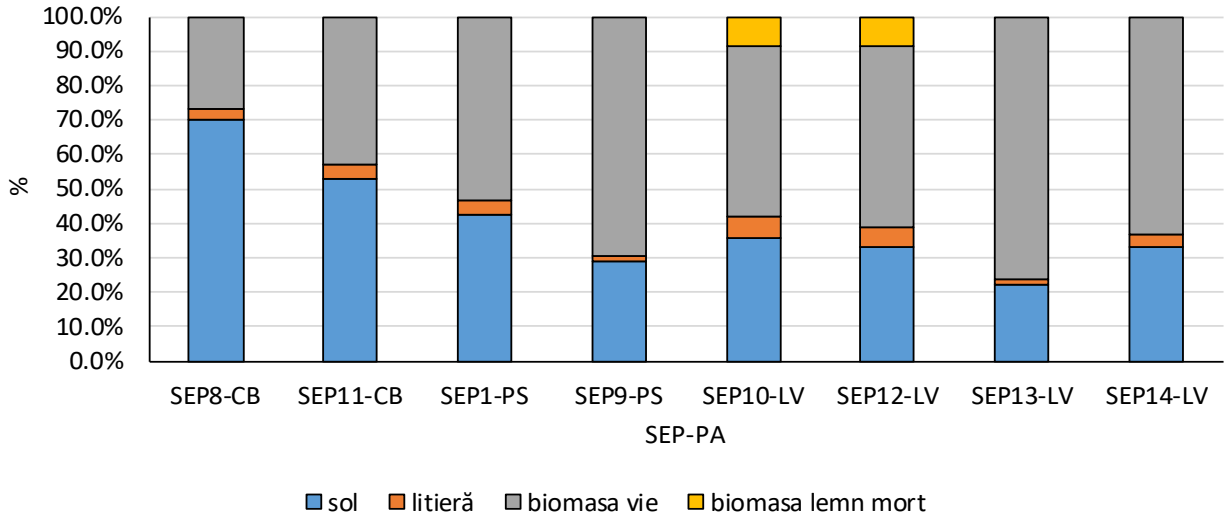
FAZA 6



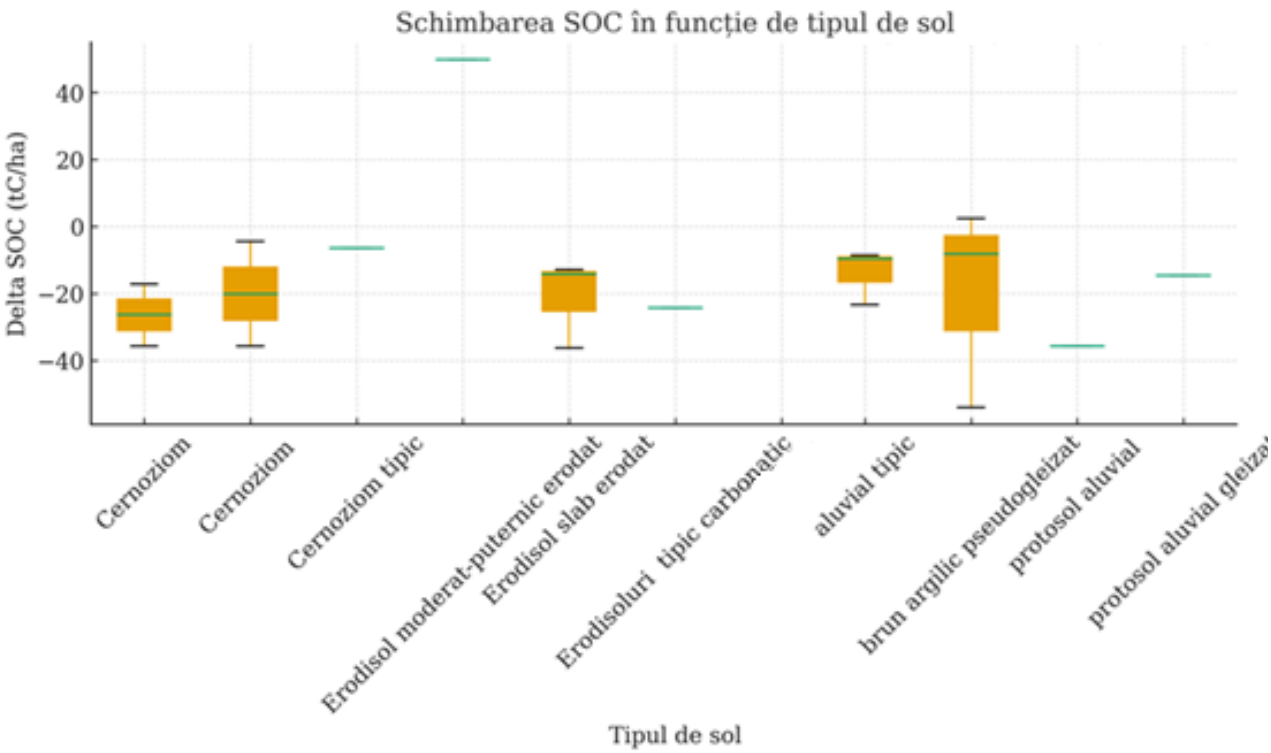
Distribuția valorilor de adâncime a curentului simulată cu modelul Mike-She în cazul dinților disipatori

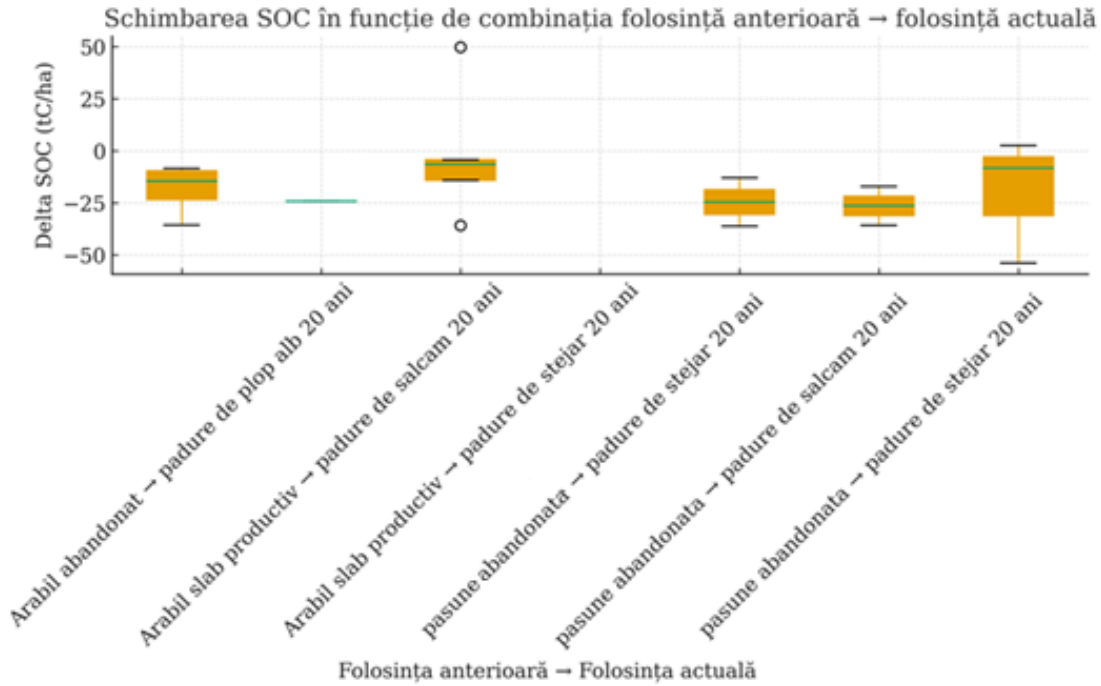


Distribuția vitezelor de scurgere simulate cu modelul HEC – RAS în cazul dinților disipatori

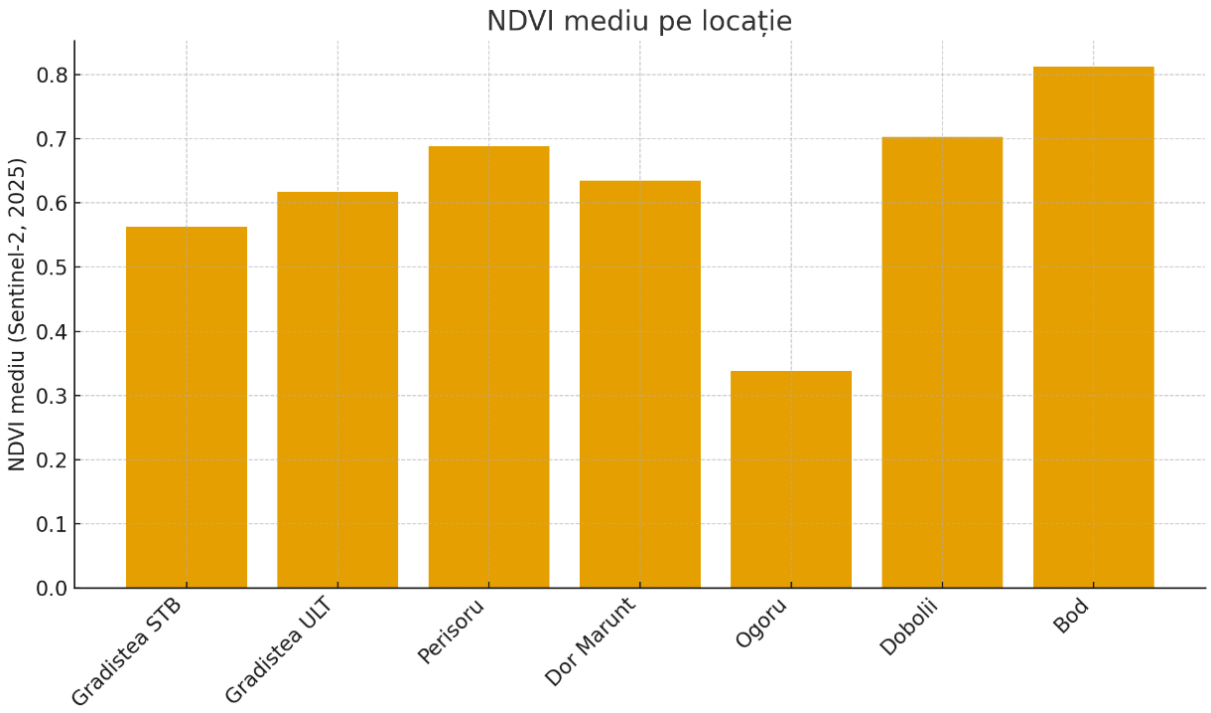


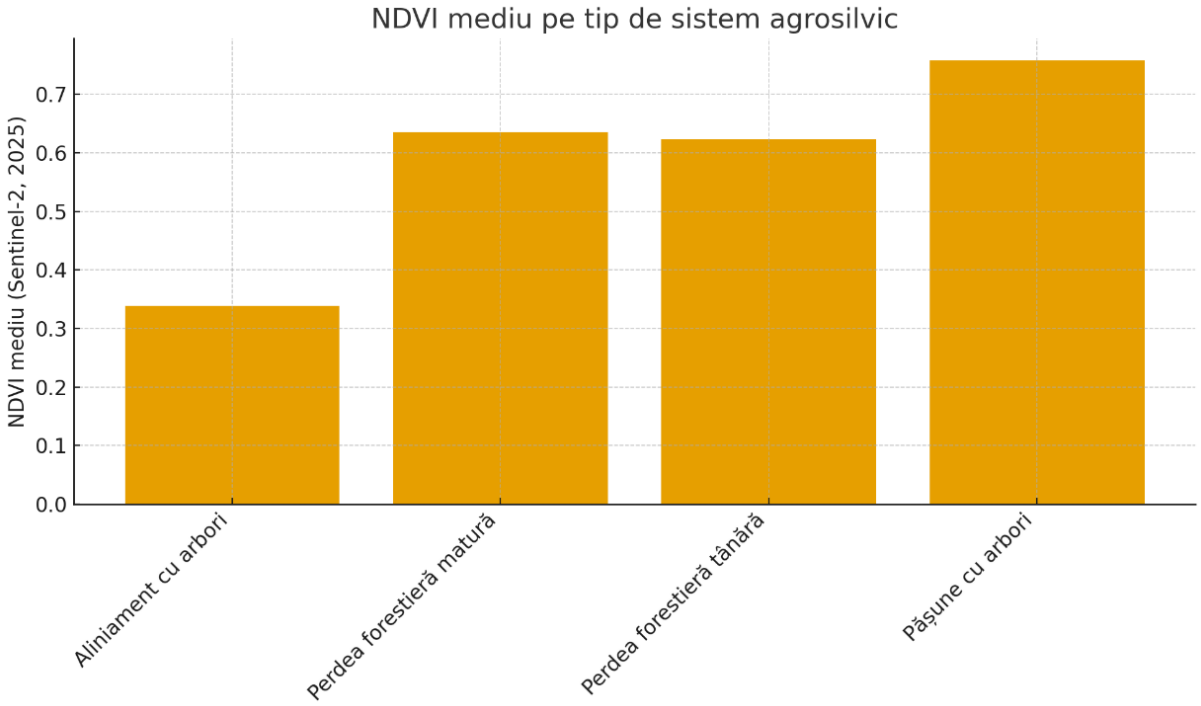
Structura stocului de carbon (%) la nivelul biocenozei forestiere, pe componente din: sol, litieră, biomasă, lemn mort la nivelul suprafețelor experimentale permanente. (Legendă: SEP- suprafața experimentală permanentă; PA- Perimetrul de ameliorare; CO- carbon organic; CB- Caciu-Bârsești; PS- Pârâul Sărat-Valea Sării; LV- Livada-Râmnicu Sărat)



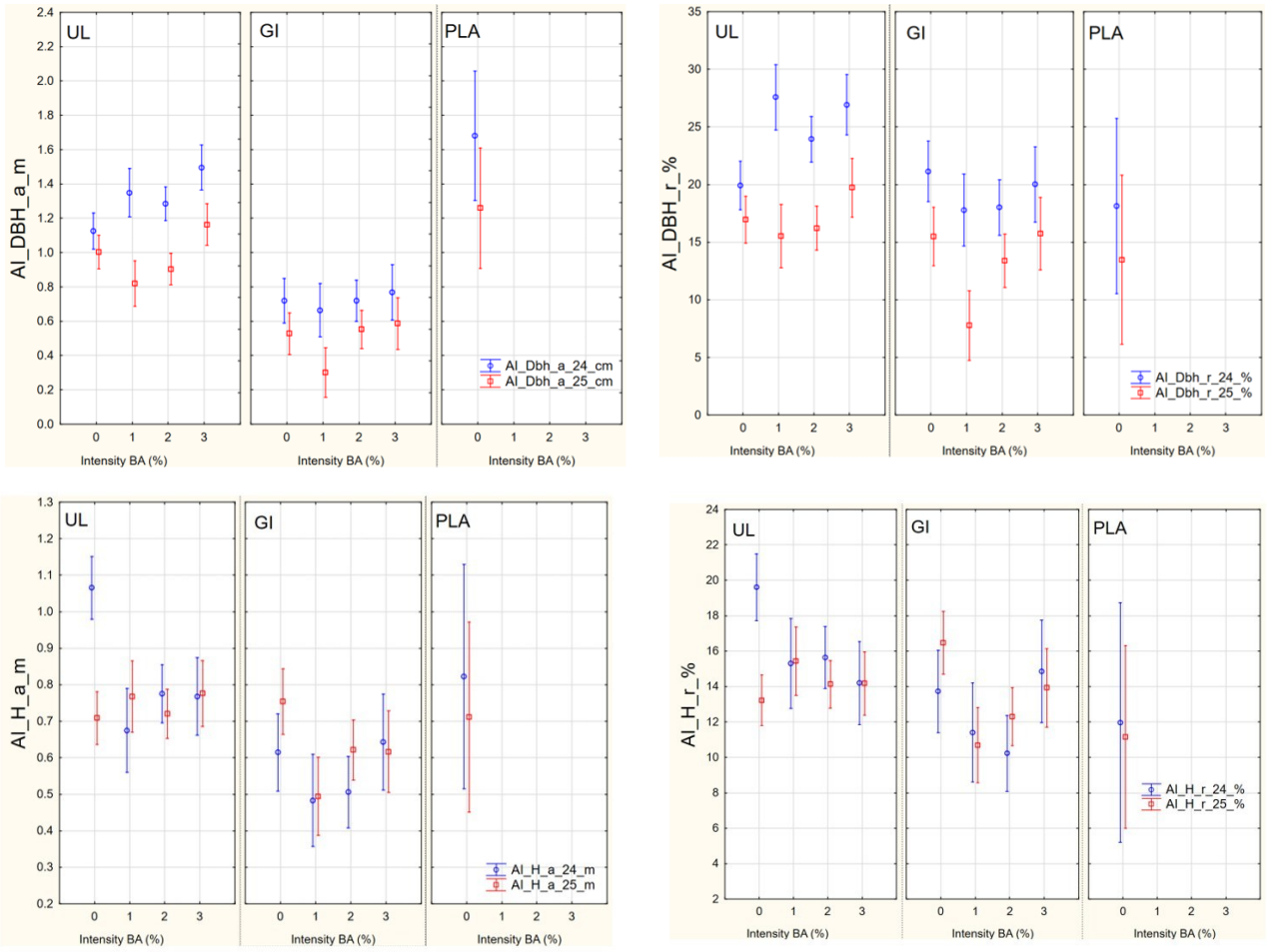


Schimbarea SOC în funcție de funcție de tipul de sol și de schimbarea categoriei de folosință

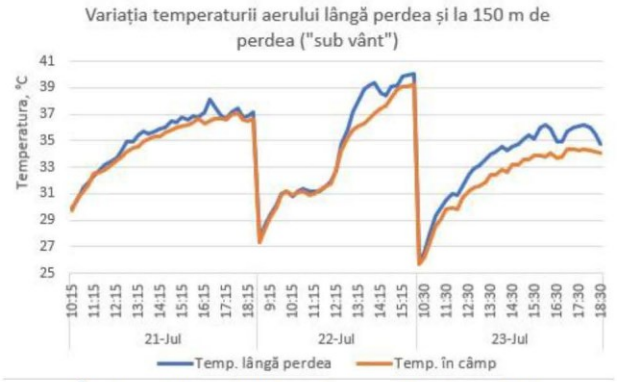




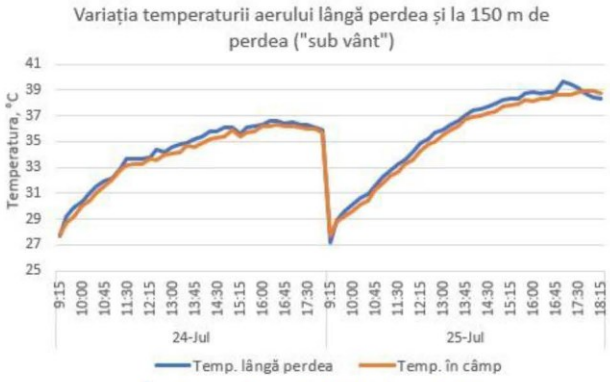
Valorile medii ale indicatorului NDVI pentru sistemele agrosilvice analizate (sus) și în raport cu tipul de sistem agrosilvic analizat (jos)



Variația creșterii absolute (Al_Dbh_a_cm) și relative (Al_Dbh_r_%) în diametru (sus) și în înălțime (jos) în 2024 și 2025, între variantele de rărire stabilite după suprafața de bază, la speciile din perdeaua forestieră Perișoru (Intensity BA_% 0, 1, 2, 3 corespunde variantelor martor – 0, slabă – 1, moderată – 2, forte – 3).



În dreptul perdelei unde s-au făcut curățiri



În dreptul perdelei fără curățiri

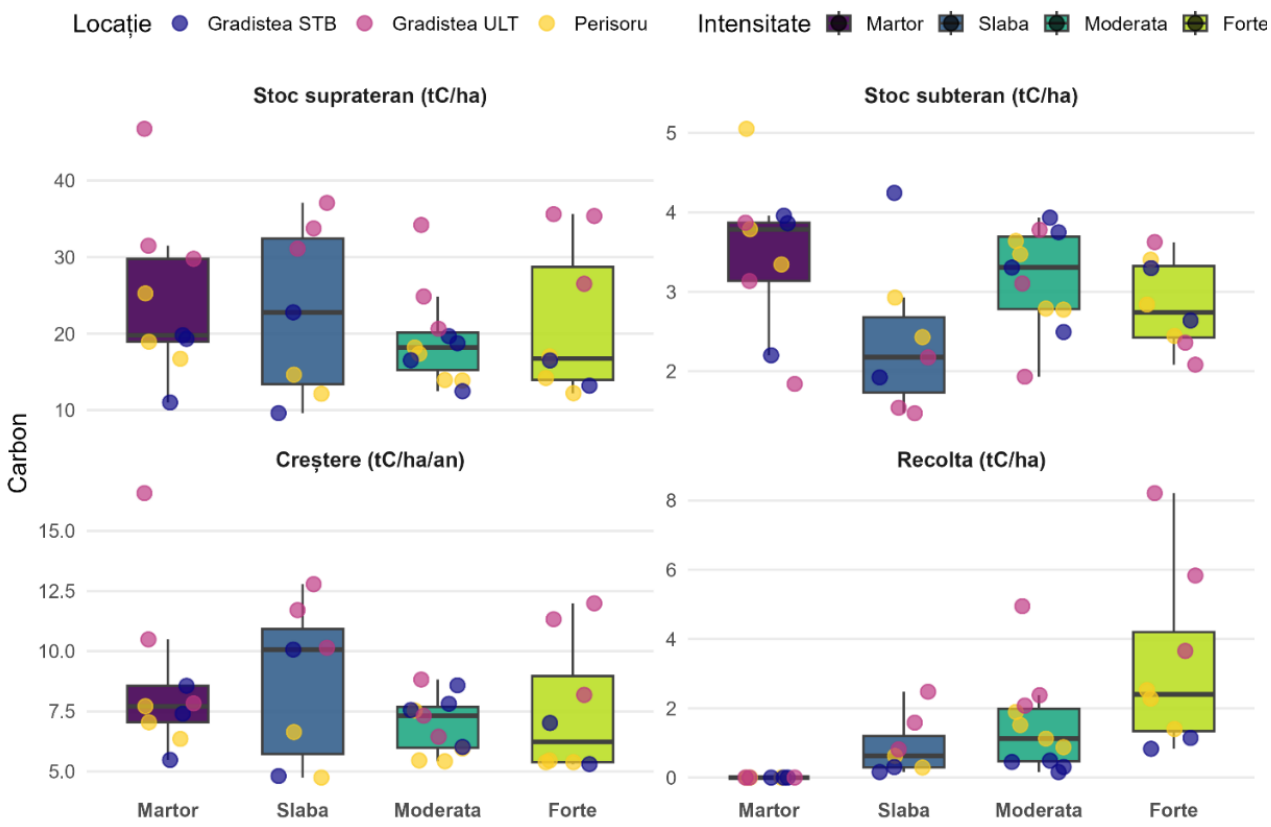
În dreptul perdelei unde s-au făcut curățiri

În dreptul perdelei fără curățiri

În dreptul perdelei unde s-au făcut curățiri

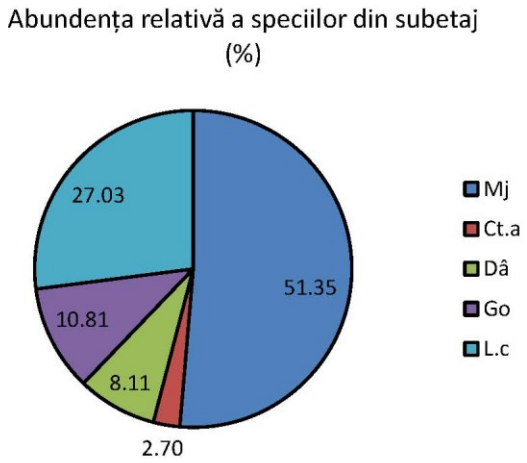
În dreptul perdelei fără curățiri

Variația temperaturii (sus), a umidității (centru) și a vitezei vântului (jos) lângă perdea și la 150 m în câmp – Perdeaua forestieră Perișoru.

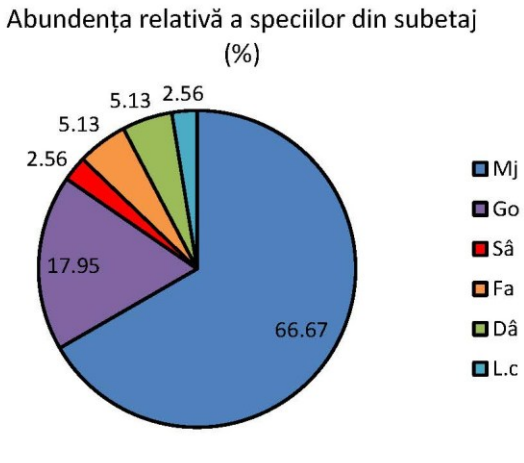


Stocul curent, creșterea si recolta de carbon pentru perdelele forestiere supuse intervenției silvotehnice.

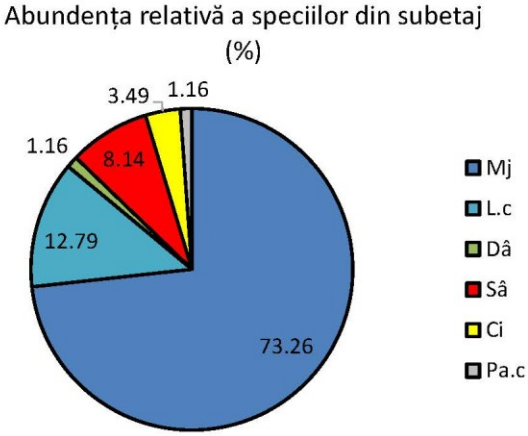
A. Sondaj S1, SEP8, CB



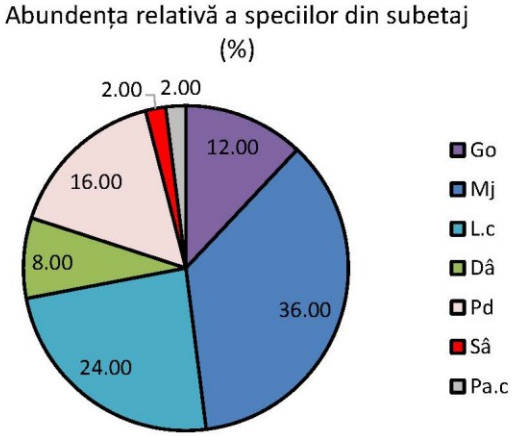
B. Sondaj S2, SEP11, CB



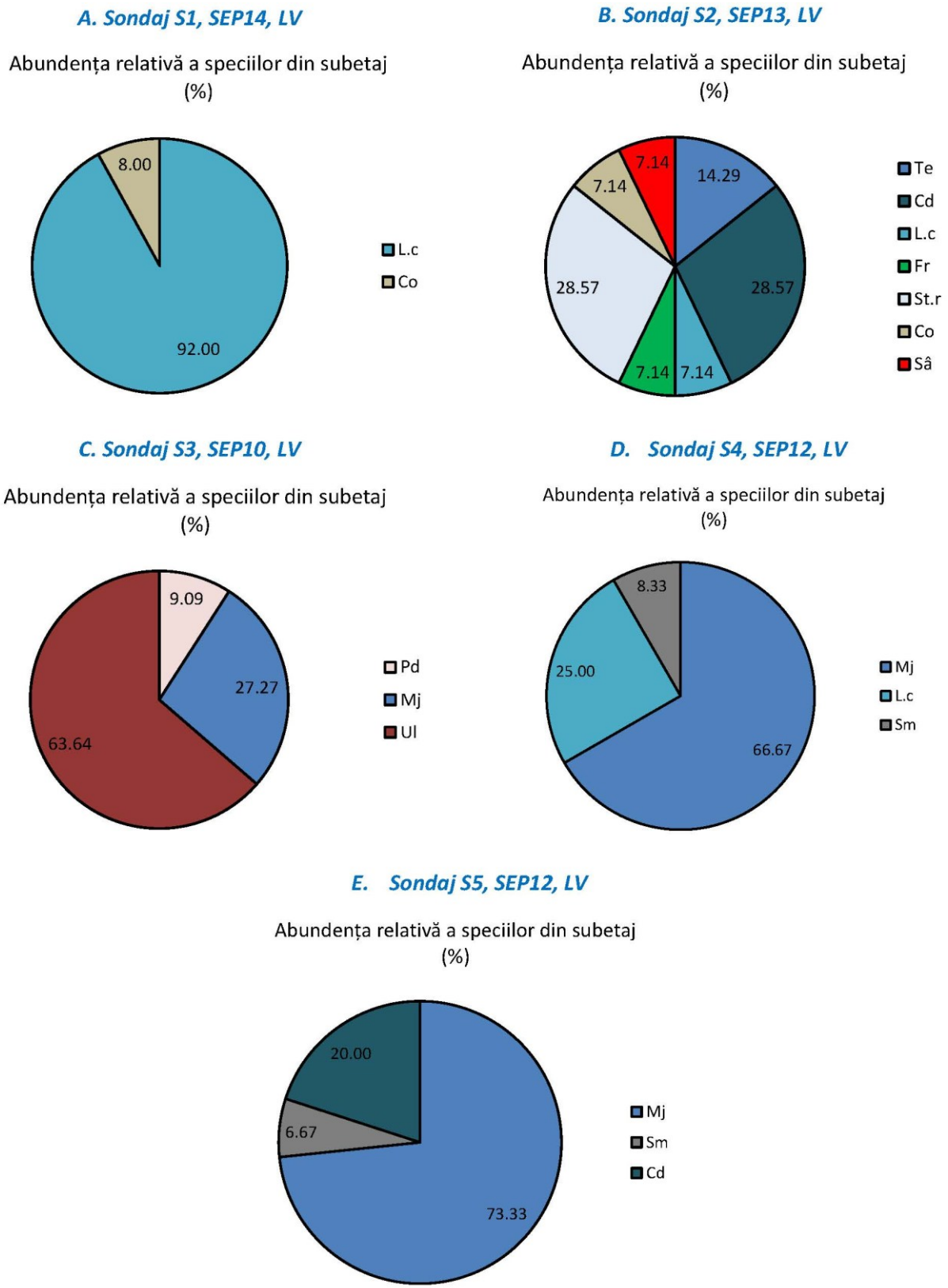
C. Sondaj S3, SEP1, PS



D. Sondaj S4, SEP9, PS



Variabilitatea abundențelor relative procentuale (%) a speciilor din subetaj la nivelul celor cinci subsondaje amplasate în dispozitive de formă circulară (500 m²) *Legendă: Mj- mojdrean; Ct.a- cătină albă; Dâ- dârmox; Go- gorun; L.c- lemn câinesc; Sâ- sânger; Fa- fag; Ci- cireș; Pa.c- paltin de câmp; Pd- păducel)*



Distribuția indicilor de diversitate în cadrul suprafețelor experimentale din zona de silvostepă internă de deal (Ssd) (Legendă: L.c- lemn câinesc; Co- corn; Te- tei; Cd- corcoduș; Fr- frasin; St.r- stejar roșu; Mj- mojdrean; Sâ- sânger; Ul- ulm; Sm- sâmbovină)

Figure 1

forests

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Article

Relation between Topography and Gap Characteristics in a Mixed Sessile Oak–Beech Old-Growth Forest

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Abstract: The interest to assess the relationship between forest gap characteristics and topography features has been growing in the last decades. However, such an approach has not been studied in undisturbed mixed sessile oak–beech old-growth forests. Therefore, the present study carried out in one of the best-preserved sessile oak–beech old-growth forests in Europe, aims to assess the influence of topographic features (slope, altitude and aspect) on *(i) some characteristics* of canopies and expanded gaps (surface, diameter and perimeter) and *(ii) the proportion of beech and sessile oak as bordering trees, gap fillers and gap makers*. Through a complete gap survey on an area of 32 ha, 321 gaps were identified and mapped. The largest gaps and also the highest gap frequency (140) was found in the slope class (15.1–20°), while the gap frequency increased with altitude, with 99 gaps being recorded at 601–650 m a.s.l. The size and perimeter of the canopy and expanded gaps, as well as the number of gap makers, were negatively related to the slope and altitude. The expanded gap to canopy gap size ratio decreased with the slope and was positively related to the altitude, while a significant negative decrease in gap filler density with altitude was encountered. The sessile oak participation ratio as bordering trees forming the gap increased not only with the altitude but also with the slope. The topography plays an important role in the formation of gaps as well as in the characteristics of the future stand. This study provides valuable insights into the relationship between canopy gap characteristics and topography, which is useful information for forest owners that pursue the design of forest management toward nature-based solutions.

Keywords: natural reserve; mixed sessile oak–beech forest; old-growth forest; topography features; gap characteristics

Citation: Tudose, N.C.; Petritan, I.C.; Toiu, F.I.; Petritan, A.-M.; Marin, M. Relation between Topography and Gap Characteristics in a Mixed Sessile Oak–Beech Old-Growth Forest. *Forests* **2023**, *14*, 188. https://doi.org/10.3390/f14020188

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1. Introduction

Old-growth forests represent ecosystems where human interventions are missing or slight [1]. Even if old-growth forests cover only 3% of total European forests, these are rich in biodiversity, thereby contributing to climate change mitigation and delivering fundamental ecosystem services [1]. However, forest characteristics change over time, and these changes are foreseeable only a few years after they occur or when old-growth forests are replaced by secondary forests [2,3].

Scarce old-growth forests composed of mixed beech (*Fagus sylvatica* L.) and sessile oak (*Quercus petraea* (MATT.) Liebl.)—two very important European species from an ecological and economic point of view—are of special interest to explore the main processes occurring naturally in such forest ecosystems. Investigating the changes in forest characteristics provides valuable information on forest behavior under different stress factors [4–6]. Topographic elements such as altitude, aspect and slope influence the availability of soil moisture, nutrients and daily insolation, which are determining factors for species suitability and composition [7]. Moreover, under a changing climate, those effects can be

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Article

Carbon Sequestration Dynamics in Peri-Urban Forests: Comparing Secondary Succession and Mature Stands under Varied Forest Management Practices

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Abstract: This study examines the impact of silvicultural and land-use management practices on carbon sequestration in peri-urban forest ecosystems, with a particular focus on human-induced carbon dynamics. The study area's complex profile spans from a compact native forest to varying degrees of fragmentation. This included areas undergoing secondary succession forest without silvicultural interventions (No-SI) alongside sites subjected to high-intensity (High-SI) and low-intensity silvicultural interventions (Low-SI). The research assessed carbon stocks and sequestration in different carbon pools (living biomass, dead organic matter and soil) using field data, allometric equations and laboratory analysis. Findings reveal a significant correlation between the intensity of anthropogenic interventions and variations in carbon stocks. The CASMOFOR model facilitated the reconstruction of carbon stock and carbon-stock change dynamics over four decades (1980–2022), showing disparities in carbon storage capabilities linked to the structural characteristics of the sites. The Low-SI site had the highest carbon stock in all carbon pools (378 tonnes C ha^{-1}), which is more than double compared to High-SI (161 tonnes C ha^{-1}) or No-SI sites (134 tonnes C ha^{-1}). However, the secondary succession forest (No-SI) demonstrated the highest annual carbon stock change (4.4 tonnes C ha^{-1} $year^{-1}$), two times higher than the Low-SI mature stand (2.2 tonnes C ha^{-1} $year^{-1}$), emphasising the resilience of forest ecosystems to recover and sustain carbon sequestration capacities after harvesting if forest land use remains unchanged. The study underscores the significant importance of anthropogenic interventions on carbon dynamics, especially for living tree biomass, which has consequences in enhancing carbon sequestration and contributing to emission reduction targets.

Keywords: carbon stock; carbon model; trees biomass; dead organic matter; soil organic carbon; silvicultural interventions

Citation: Braga, C.I.; Petrea, S.; Radu, G.R.; Cucu, A.B.; Serban, T.; Zaharia, A.; Leca, S. Carbon Sequestration Dynamics in Peri-Urban Forests: Comparing Secondary Succession and Mature Stands under Varied Forest Management Practices. *Land* **2024**, *13*, 492. https://doi.org/10.3390/land13040492

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1. Introduction

According to the latest assessment report of the Intergovernmental Panel on Climate Change (IPCC) [1], greenhouse gas (GHG) emissions from human activities are the primary drivers of global temperature increases, with carbon dioxide (CO_2) being a significant contributor to atmospheric changes. This escalation in CO_2 levels is linked to the intensification of catastrophic environmental events, underscoring the urgency of addressing climate change [2–5]. In response, European policies, including the "fit for 55" climate package, aim to significantly reduce GHG emissions by 2050, striving for a net-zero emissions target [6].

Forests play a pivotal role in the global carbon cycle, primarily through carbon sequestration via photosynthesis, where CO_2 is absorbed and stored in living biomass and

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Article

Structural Characteristics of the Pine Stands on Degraded Lands in the South-East of Romania, in the Context of Climate Changes

Constandache Cristinel [1], Tudor Ciprian [1,2,*], Laurențiu Popovici [1], Vlad Radu [1], Vlad Crișan [1] and Lucian Constantin Dincă [1]

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Abstract: The present research was carried out in stands of Scots pine and black pine, pure or mixed with deciduous trees, installed on degraded lands from the Curvature Subcarpathian area, Romania, in a representative network of permanent research plots and followed the analysis of the structural diversity and stability indicators of these stands at different ages and in different conditions of degraded lands. The relationships between the quantitative variables with reference to the structure were established by analyzing the significance of the Pearson correlation coefficient (*r*) and also including datasets of slenderness indexes, which were classed into three domains of vulnerability to abiotic factors (like wind and snow). The compositional diversity of pine stands (pure or mixed with deciduous ones) is different in relation to age and is correlated with the structural diversity. The obtained correlation coefficients (*r* Pearson) express very strong and significant relationships between biometric parameters (h x Dbh, h x Lc%, Dc x Dbh, and Lc% x Dbh) of the structural diversity (r = 0.800–0.930), which is important for the analysis of the stability and vulnerability of pine forests. The strong correlation between the analyzed variables expresses a weak vulnerability to the action of harmful abiotic factors and the increase in the stability and resilience of the studied stands, especially of over 50 years old. In the old pine stands, the low-vulnerability domain (I < 0.80) is the best represented one, with an average of 64.01% from the total number of trees. At this age, trees with DBH > 22 cm fall into the low-vulnerability category. The explanation is that the stands were affected in their youth by the action of snow and wind, which, combined with the silvotechnical works performed, led to their compositional and structural diversification and increased stability. The young (<45 years) and pure-pine stands with higher consistency (>0.8) and even-aged structure are the most vulnerable to abiotic factors due to the fact that a large number of trees are passing gradually into the higher cenotic classes.

Keywords: pine stands; degraded lands; structural diversity; stability

Citation: Cristinel, C.; Ciprian, T.; Popovici, L.; Radu, V.; Crișan, V.; Dincă, L.C. Structural Characteristics of the Pine Stands on Degraded Lands in the South-East of Romania, in the Context of Climate Changes. *Appl. Sci.* **2024**, *14*, 8127. https://doi.org/10.3390/app14188127

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1. Introduction

Stands on degraded lands perform multiple functions of environmental protection, and degradation of their structure would cause serious ecological disturbances [1]. For diminishing the negative wind impact, mechanistic models for assessment have been developed [2].

In the south-east of Romania, the Curvature Subcarpathian area represents one of the areas most affected by land degradation processes (erosion, gullying, and landslides) triggered after the cutting of forests, especially to create pastures, after 1890 [3]. Starting in 1930 and especially after 1950, important improvement works were realized for afforesting degraded lands, with Scots pine and black pine as main species [4,5]. Since 1982, a network of research surfaces with a permanent character [6] has been created, which are representative for tracking forest cultures realized on degraded lands from Romania. The evolution of

forests

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Article

The Role of Wood Density Variation and Biomass Allocation in Accurate Forest Carbon Stock Estimation of European Beech (*Fagus sylvatica* L.) Mountain Forests

Stefan Petrea [1,2], Gheorghe Raul Radu [1,*], Cosmin Ion Braga [1], Alexandru Bogdan Cucu [1], Tibor Serban [1], Alexandru Zaharia [1], Dan Pepelea [1], Gruita Ienasoiu [1] and Ion Catalin Petritan [2]

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Abstract: The European beech (*Fagus sylvatica* L.) is one of the most common tree species in Romania, with importance both economically and environmentally. Accurate methods of biomass assessment at the tree compartment level (i.e., stump, stem, branches, and leaves) are necessary for carbon stock estimation. Wood density (WD) is an important factor in determining biomass and, ultimately, the tree's carbon content. The average tree density was found to be 578.6 kg/m^3. For this study, WD was evaluated by the weighting method related to tree volume. Also, to investigate a practical approach to determining the weighted wood density (WWD_{st}), models were run using density at the base of the tree (WD_{Base}), density at breast height level using discs (WD_{DBH}), the wood core density (WD_{ic}), and the diameter at breast height (DBH) as predictors. The biomass assessment was conducted using different model evaluations for WWD_{st} as well as allometric equations using the destructive method. From the results, it was noted that using the WWD_{st}, the total biomass was underestimated by −0.7% compared to the biomass measured in the field. For allometric equations that included DBH and tree height as independent variables, the explained variability was around 99.3% for total aboveground biomass (AGB_{total}), while it was 97.9% for allometric function using just the DBH. Overall, the distribution of biomass across different compartments was as follows: 73.5% in stems, 23.8% in branches, 1.9% in stumps, and 1.3% in leaves. The study findings offer valuable insights into WD, biomass distribution among different components, and biomass allometric quantification in natural beech forest environments in mountainous areas.

Keywords: wood density equations; biomass compartment allocation; mountainous area biomass; allometric equations; carbon content

Citation: Petrea, S.; Radu, G.R.; Braga, C.I.; Cucu, A.B.; Serban, T.; Zaharia, A.; Pepelea, D.; Ienasoiu, G.; Petritan, I.C. The Role of Wood Density Variation and Biomass Allocation in Accurate Forest Carbon Stock Estimation of European Beech (*Fagus sylvatica* L.) Mountain Forests. *Forests* **2024**, *15*, 404. https://doi.org/10.3390/f15030404

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1. Introduction

In order to reduce human-induced emissions and move towards a carbon-neutral economy, a particular role is played by the capacity of forests to absorb CO_2 and store it as carbon in tree biomass. Therefore, accurate estimation of forest carbon stock and change in carbon stock is of significant importance in addressing the challenges posed by climate change. Estimating carbon stock changes in land use management activities, particularly in conversion activities such as deforestation, is of great interest for the forestry sectors as well as for mitigating the impact of climate change [1]. Accurate carbon stock estimation not only helps to assess the impact of these activities (i.e., deforestation) on carbon emissions but also serves as a crucial tool in designing and implementing effective policies aimed at reducing greenhouse gas emissions and promoting carbon sequestration. Also, it can

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Review

Application of Life Cycle Assessment for Torrent Control Structures: A Review

Mirabela Marin *, Nicu Constantin Tudose, Cezar Ungurean and Alin Lucian Mihalache

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Abstract: Mountain areas are prone to the occurrence of extreme events, especially torrential floods, amplified by climatic and environmental changes. In this context, it is mandatory to increase resilience and guide decision-makers toward more effective measures. Life cycle assessment (LCA) is considered as a decision support tool that can provide the qualitative and quantitative criteria required by the Do No Significant Harm, thus contributing to a more accurate assessment of environmental impacts of the torrent control structures. This study aimed to investigate the current state of the LCA applications in the torrent control to provide practitioners perspectives for new research and a pathway for optimized LCA analysis. Our analysis reveals that in the torrent control area, these studies are still limited. Most of the papers considered Ecoinvent as the main database source and cradle to grave as the main system boundary. This study suggests that restoring the functional capacity of dams and other torrent control structures instead of demolition or decommissioning from the end-of-life stage will ensure an orientation towards more sustainable and circular strategies. Although strong partnerships and consistent efforts are needed, general findings reveal that LCA is a useful tool for moving towards more sustainable construction practices.

Keywords: life cycle assessment; torrent control structures; decision-support tool; environmental sustainability

check for updates

Citation: Marin, M.; Tudose, N.C.; Ungurean, C.; Mihalache, A.L. Application of Life Cycle Assessment for Torrent Control Structures: A Review. *Land* **2024**, *13*, 1956. https://doi.org/10.3390/land13111956

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1. Introduction

Climate change, with increasingly evident effects in recent years, affects the sustainable use of resources and the sustainability of the environment [1,2]. Water, one of the most important natural resources, is essential for ensuring human well-being, sustainable land management, and the provision of ecosystem services [3]. Water resources are limited, and climate change is altering their availability [4,5]. Projections related to the changes of temperature and precipitation as well increased frequency and intensity of extreme events will modify the main components of the hydrological cycle [6–8]. Additionally, industrial and technological development, population growth, and unsustainable activities amplify environmental problems, including environmental degradation and resources depletion [9].

The environment, along with the economy and society, represents one of the main pillars of sustainability [10]. Achieving sustainability is essential for securing human wellbeing and requires an integrated approach regarding the human–environment interaction and sustainable practices to address current challenges [11]. When ecosystems can no longer adapt to different pressures, major transformations occur at their level, often irreversible and with uncertain results that can endanger the security of resources [12].

Mountainous areas are prone to the occurrence of extreme hydrological events, especially torrential floods, exacerbated by climate and environmental changes [13]. Recent studies have shown that in these areas, both liquid and solid flows will intensify in the coming years as a result of climate and land use changes [14–17]. Therefore, to protect humans and the environment in the context of current and future challenges, there is a need

Unele considerații privind amenajarea albiilor torențiale în contextul cerinței de refacere a râurilor prin înlăturarea „barierelor”

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1. Introducere

În ultimele decenii, accentul pus de Uniunea Europeană pe refacerea ecosistemelor naturale, conservarea biodiversității și restabilirea conectivității ecologice a condus la schimbări semnificative în abordările privind managementul resurselor de apă. În particular, Strategia Europeană pentru Biodiversitate 2030 promovează refacerea funcțiilor naturale ale râurilor prin eliminarea construcțiilor hidrotehnice care constituie bariere pentru migrarea faunei acvatice și care perturbă fluxul natural de sedimente și nutrienți (Comisia Europeană 2020). În acest context, Comisia Europeană a stabilit ca obiectiv ambițios refacerea până în anul 2030 a 25 000 km de râuri cu curgere liberă prin îndepărtarea sau adaptarea barierelor care afectează conectivitatea longitudinală și laterală (Comisia Europeană 2020).

Pe lângă directivele europene relevante, precum Directiva Cadru privind Apa (2000/60/EC) (Comisia Europeană 2000) și directivele „Păsări” (2009/147/EC) (Comisia Europeană 2010) și “Habitate” (92/43/EEC) (Comisia Europeană 1992), strategia actuală subliniază necesitatea unei abordări integrate, în care aspectele hidrologice, ecologice, economice și sociale sunt luate în considerare împreună. Cu toate acestea, în literatura de specialitate și în strategiile existente există încă lacune de cercetare semnificative referitoare la aplicabilitatea practică și impactul unor astfel de măsuri în bazinele torențiale, zone distincte ca morfologie și dinamică hidrologică față de râurile mari (Belletti *et al.* 2020, Wohl *et al.* 2015).

În România, rețeaua hidrografică amenajată din bazinele hidrografice torențiale are o lungime de aproximativ 2 200 km, și include aproximativ 19 000 de construcții hidrotehnice (dintre care 16 000 transversale și 3 000 longitudinale) (Mihalache 2022). Dintre acestea, aproximativ o treime sunt în prezent cuprinse și descrise într-un inventar informatic inițiat și dezvoltat de INCDS Marin Drăcea (abht.ro). Pentru o fundamentare solidă a deciziilor strategice, referitoare la lucrările hidrotehnice transversale, ca posibile bariere în conectivitatea longitudinală a cursurilor de apă, este necesar ca inventarul existent să fie extins pentru a răspunde la întrebări precum: i) *Câte posibile bariere sunt în bazine torențiale traversate de cursuri de apă temporare și câte sunt în bazine traversate de cursuri de apă permanente/semipermanente?* ii) *Câte dintre posibilele bariere cotate ca fiind depășite ar putea fi înlăturate și câte ar trebui să fie păstrate?*

Pe de altă parte, schimbările climatice, prin creșterea temperaturilor și modificarea precipitațiilor, afectează disponibilitatea resurselor de apă, deja limitate (Marx et al., 2018, Bisselink *et al.* 2020, Rosinska *et al.* 2024). În plus, activitățile umane alterează distribuția spațială și temporală a apei și influențează disponibilitatea acesteia (Li *et al.* 2021, Liang *et al.* 2020, Wang *et al.* 2023,Wu *et al.* 2024). Astfel de modificări vor intensifica apariția fenomenelor extreme și vor perturba procesele hidrologice (Hao et al., 2018; Yang et al., 2021), cu precădere în zonele montane, care sunt areale extrem de vulnerabile la schimbări climatice (Bîrsan *et al.* 2014, Duvillard *et al* 2019, Wang *et al* 2023, González-Moreno *et al.* 2025).

Știută fiind vulnerabilitatea ridicată a țării noastre la apariția fenomenelor hidrologice extreme (Antal *et al.* 2023, Antonescu *et al.* 2023, Cheval *et al.* 2024) este nevoie de un management proactiv, care să sporească reziliența și capacitatea de adaptare la schimbări de mediu și să ghideze factorii de decizie în adoptarea de măsuri eficiente pentru gestionarea evenimentelor extreme (Angeler *et al.* 2019, Levin *et al.* 2022, de Albuquerque *et al.* 2024).

Evaluarea urgenţelor de intervenţie asupra lucrărilor de corectarea torenţilor utilizând gradientul indicelui de stare

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1. Introducere

Lucrările transversale de corectarea torenţilor, datorită capacităţii lor de atenuare în scurt timp a riscurilor legate de viiturile torenţiale, au fost folosite la scară largă, în întreaga lume, în vederea reducerii intensităţii viiturilor torenţiale, reducerea transportului de aluviuni, consolidarea versanţilor, a terenurilor alunecătoare şi a depozitelor de aluviuni, precum şi pentru crearea condiţiilor propice pentru instalarea vegetaţiei forestiere pe versanţi dar şi în albiile majore (Abbasi et al. 2019).

Eficienţa pe termen lung a acestora este strâns legată de volumul şi frecvenţa lucrărilor de întreţinere şi reparaţii. Când aceste intervenţii lipsesc pot apărea deficienţe structurale majore ce pot conduce la prăbuşirea lucrărilor, însoţită de amplificarea transportului de aluviuni şi sporirea riscurilor torenţiale în zonele din aval (Sodnik et al. 2013, Piton et al. 2017, Cucchiaro et al. 2019, Ramirez et al. 2022).

Pentru un management eficient al bazinelor hidrografice torenţiale se impune asigurarea bunei funcţionări a sistemelor de lucrări deja existente, ceea ce implică o monitorizare continuă şi sistematică a acestora pentru identificarea din timp a avariilor ce pot afecta integritatea fizică a lucrărilor şi capacitatea funcţională a sistemului de lucrări (Dell'Agnese et al. 2013, Cucchiaro et al. 2019).

Pentru a evalua şi gestiona eficient lucrările hidrotehnice, au fost elaboraţi indici şi metodologii de evaluare a stării lucrărilor în diverse ţări (Lee et al. 2022, Dell'Agnese et al. 2013, Chahrour et al. 2021), cu scopul de a evalua starea actuală a lucrărilor şi elaborarea unei strategii coerente de gospodărire a bazinelor torenţiale. Această strategie include atât intervenţia cu lucrări de reparaţii, cât şi amplasarea unor lucrări de completare a sistemului existent.

În ţara noastră, în cadrul programelor de cercetare NUCLEU, a fost dezvoltată o reţea de monitorizare a lucrărilor de corectarea torenţilor în care au fost cuprinse până în prezent 5584 lucrări hidrotehnice (5199 lucrări transversale – baraje, praguri şi traverse şi 385 lucrări longitudinale – canale): PN 09460303 - *Comportarea în exploatare a diverselor tipuri de lucrări hidrotehnice utilizate în amenajarea bazinelor hidrografice torenţiale*, PN 09460312 - *Evaluarea stării lucrărilor hidrotehnice de amenajare a albiilor torenţiale destinate protecţiei căilor de comunicaţie*, PN 19070404 - *Gospodărirea integrată a terenurilor forestiere şi albiilor în vederea reducerii riscurilor induse de excedentul de apăşi* PN 23090203 - *Contribuţii ştiinţifice noi pentru un management sustenabil al bazinelor hidrografice torenţiale, terenurilor degradate, perdelelor forestiere şi al altor sisteme agrosilvice în contextul schimbărilor climatice*. Toate aceste lucrări se regăsesc pe site-ul abht.ro, inclusiv informaţii detaliate privind descrierea elementelor geometrice ale acestora, avariile observate la momentul fiecărei inventarieri, cât şi aprecierea cantitativă a stării fizice a lucrărilor, cea din urmă fiind exprimată sintetic prin intermediul unui indice de stare definit de Davidescu et al. (2012) şi îmbunătăţit de Tudose et al. (2015).

Prima inventariere a lucrărilor s-a desfăşurat în perioada 2009–2018, cuprinzând lucrări din toate marile bazine hidrografice, cât şi o tipologie largă de lucrări, atât în ceea ce priveşte materialele de construcţie, cât şi tipul constructiv (baraje de greutate, baraje cu fundaţie evazată, baraje filtrante etc.). A doua inventariere a lucrărilor s-a efectuat în perioada 2020-2023, când au fost reinventariate un număr de 493 lucrări hidrotehnice transversale, fiind consemnată starea actuală a lucrărilor, inclusiv calculul noii valori a indicelui de stare.

Inventarierile efectuate au avut ca obiectiv: *i)* cunoaşterea şi evaluarea cantitativă a stării actuale a lucrărilor, şi *ii)* identificarea ritmului anual de degradare. Pentru evaluarea ratei anuale de degradare a lucrărilor a fost propus un indice al ratei de degradare, denumit

FORESTRY

Investigations on the structure of pine stands on degraded lands

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1. Introduction

The assessment of the structural dynamics of stands requires that research interests to be directed towards the tree, as a fundamental element in the constitution of a stand: size, age, growth, crown biometrics, taking into account the requirements of different species and environmental conditions (Kaźmierczak & Zawieja 2016, Vlad et al. 2019).

Nowadays, of significant importance are the research limited to the development of mathematical models for estimating biometric parameters based on satellite images taken by unmanned drones (Tudoran et al. 2021).

The analysis of the stand structure could be expressed through mathematical models based on the interaction between neighbouring trees (Pacala et al. 1996). The development of trees with high physiological capacities in a stand is influenced by its competitors (Hari 1985). However, the benefits brought by the existing reserves in the growth space on the trees lead to the reduction of competition ratios with neighbouring trees, favouring their development and the creation of stable vertical structures (Stoll & Schmid 1998, Muth & Bazzaz 2003).

Within the stands located on lands with degradation phenomena, the evolution over time of the structural parameters is influenced by harmful abiotic and biotic factors that determine the destabilisation of the structure of the stands and endanger the dynamic balance (Giurgiu 2004).

Through the modest climatic and edaphic requirements, protective forestry cultures with pine species have ensured the fulfilment of some objectives of socio-economic interest (Constandache et al. 2016). Although they tolerate difficult soil conditions very well, pine cultures with high densities and relatively regular structures are vulnerable and sensitive to risk factors, only bringing damage to their structural dynamics (Vlad & Constandache 2014).

2. Materials and methods

2.1. Research location

From the point of view of the phytogeographic area, the research was carried out in pine stands located on degraded lands in the central-eastern area of the Vrancea and Buzău Subcarpathians (Fig. 1A-B), areas with a wide spread of multiple degradation processes (pluvial erosion, landslides, ravines), caused by the interaction between pedogenetic factors (relief, rock, climate, soil) and anthropogenic factors.

In the Vrancea Subcarpathians, in the phytoclimatic zone of beech and sessile oak-beech (FD3), the research was carried out in Scots pine and Black pine stands, located in the experimental plots (EP) belonging to the improvement perimeters (IP):

- IP1. Caciu-Bârsești Improvement Perimeter (CA) (45°55'19.69"N, 26°44'44.74"E);
- IP2. Pârâul Sărat-Valea Sării Improvement Perimeter (PS) (45°52'35.57"N, 26°47'51.97"E);
- IP3. Roșoiu-Andreiașu Improvement Perimeter (RO) (45°44'56.24"N, 26°49'55.96"E).
- *In the Buzău Subcarpathians, in the forest-steppe zone (Ss) and the phytoclimatic zone of oak forests with mixtures of different species of oaks in the region of low hills and sub-hilly plains (FD1),* the research was carried out in Scots pine and Black pine stands located in the experimental plots (EP) belonging to the improvement perimeters:
- IP4. Livada-Râmnicu Sărat Improvement Perimeter (LI) (45°23'55.78"N, 26°55'29.49"E);
- IP5. Murgești Improvement Perimeter (MU) (45°23'39.43"N, 26°53'30.86"E).

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O STAȚIUNE NOUĂ CU *QUERCUS PUBESCENS* WILLD. ÎN SUBCARPAȚII VRANCEI: IMPORTANTĂ RESURSĂ GENETICĂ PENTRU RECONSTRUCȚIA TERENURILOR DEGRADATE

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REPERE

Arboretul cu stejar pufos de pe Dealul Clipicești are potențialul de a deveni o sursă valoroasă de semințe, contribuind astfel la producerea de material genetic semincer de calitate, inclusiv pentru restaurarea ecologică a unor ecosisteme forestiere degradate.

REZUMAT GRAFIC

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REZUMAT

Studiul se concentrează pe descrierea unei populații noi de stejar pufos (Quercus pubescens Willd.*) din bazinul inferior al râului Putna, în Subcarpații Vrancei. Aceasta reprezintă o resursă genetică valoroasă pentru restaurarea terenurilor degradate. Cercetarea include analiza comunităților vegetale, a caracteristicilor solului, precum și contextul ecologic în care se dezvoltă această populație, având ca scop îmbunătățirea*

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