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HANS EM
FACULTY OF FOREST SCIENCES
LANDSCAPE ARCHITECTURE AND
ENVIRONMENTAL ENGINEERING



BOOK OF ABSTRACTS

INTERNATIONAL SCIENTIFIC CONFERENCE



*Better forestry,
for better forests,
for a better planet.*

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Hans Em Faculty of Forest Sciences, Landscape Architecture and
Environmental Engineering
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Republic of North Macedonia
e-mail: sumarski@sf.ukim.edu.mk
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Contents

Modelling of potential distribution of the atlas cedar (<i>Cedrus atlantica</i> Manetti) in Morocco.....	12
Mycodiversity in the coniferous communities of Shar Mountain - Literature review of macrofungi in coniferous forest on mountain Shar Planina in North Macedonia	13
Morphological variability of bulbs, fruits, and seeds of the genus <i>Galanthus</i> L. (Amaryllidaceae) in Serbia	14
First report of <i>Cryphonectria carpinicola</i> in the Balkans and <i>Cryphonectria radicalis</i> in Bulgaria	15
The role of Tharandt Botanic Garden in search for alternative tree species in climate change	16
Correct planning and proper landscape design - key to quality urban life Case Study: Macedonia Park, Skopje, North Macedonia	17
Genetic differentiation of hungarian oak (<i>Quercus frainetto</i> Ten.) Populations in Serbia based on morphological characteristics of acorns and seedlings	18
Prevention of Waste-Contaminated Forests by ICT, standards and legislation ..	19
Accuracy assesment of supervised classification employing the MLC and RF algorithms on Sentinel2 image for the preparation of a vegetation map in the eastern part of the Republic of North Macedonia	20
Data on Distribution and Habitat Preferences of Edible Truffles in the Republic of North Macedonia.....	21
Urban forestry and disaster relief: The importance of urban forestry and greenery in the 1963 post-earthquake reconstruction of Skopje	22
The role of urban trees in reducing land surface temperature.....	23
Conservation strategy targeting priority species of the Balkans: the example of the INTERREG programme CONSE-PP	24
Collection of experiences from 25 years work on seed propagation of allochthonous dendroflora at the Hans Em Faculty of Forest Sciences, Landscape Architecture and Environmental Engineering in Skopje and the surroundings	26
Analysis of the influence of CoVid-19 pandemic on residents' perception on the importance of the urban greenery on quality of life.....	28
Mapping and evaluation of cultural ecosystem services in City Park Skopje	29



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LANDSCAPE ARCHITECTURE AND
ENVIRONMENTAL ENGINEERING



Protected areas: History of their evolution and management practices	30
Policy support measures in forestry and nature conservation for climate change governance.....	31
Importance of NWFPs for good forest governance	33
Intrapreneurship as a way for employee innovation behaviour in state-owned forest enterprises	34
Identifying runoff sensitivity in forests and seminatural areas; Case study: Skopska Crna Gora.....	35
Development of soil erosion and desertification maps of Republic of North Macedonia.....	36
Natural revegetation and overgrowing on forest roads in beech stands and under mountainous conditions	38
Contribution of forest certification to sustainable development goals.....	39
Real growth rate and age structure of Brown hare (<i>Lepus Europaeus</i> P.) at the Serbian hunting grounds	40
The tradition of sustainable management in lowland forests of Croatia	41
Spatial optimization for forest planning	43
Recent changes in the population structure of <i>Cryphonectria parasitica</i> in Turkey	44
Detected changes of population structure within a <i>Cryphonectria parasitica</i> population at the site Osoj, North Macedonia, during a time-span of over two decades	45
The effect of temperature on the growth of the phytopathogenic fungus <i>Ophiostoma novo-ulmi</i>	46
Pedunculate oak (<i>Quercus robur</i> L.) phenological varieties exhibited a different response and recovery potential to extreme drought in Serbia	47
Forest resource dynamic in Republic of North Macedonia in the period from 1961 to 2016	48
Urban hedges—an important green element in the system of landscape design.	50
Criteria for Evaluation of Urban Green Spaces: A Case of Macedonian Cities...	52
Soil erosion and Torrential Flood Prevention: Curriculum Development at the Universities of Western Balkan Countries.....	54
Dendroecology analysis of Macedonian pine (<i>Pinus peuce</i> Gris.) radial growth and climate relationships at National Park Pelister in North Macedonia	56



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LANDSCAPE ARCHITECTURE AND
ENVIRONMENTAL ENGINEERING



Influence of elevation on some structural elements of Macedonian pine (<i>Pinus peuce</i> Gris.) stands in National Park Pelister in North Macedonia	58
Human dimension of large carnivores' management and conservation in Serbia	60
Spatial structural characteristic of Macedonian pine (<i>Pinus peuce</i> Gris.) forest in National Park Pelister in North Macedonia	61
Analysis of Croatian <i>Ophiostoma novo-ulmi</i> populations – insight into changes occurring over time	63
The valorization and valuation of historical park - Topcider in Belgrade	64
Current status of forest soil mapping in Serbia	65
Nationwide fuel models structure analysis using discrete ALS data in Portugal .	66
<i>Corythucha arcuata</i> (Say) predilection research results in 70 pedunculate oak clones (<i>Quercus robur</i> L.)	67
Growth of scots pine (<i>Pinus Sylvestris</i> L.) in international provenance tests in Žepče, Bosnia and Herzegovina	68
The role of site ecology into planning and designing of the conifers seed orchards in Serbia	69
Diversity of pedunculate oak (<i>Quercus robur</i> L.) in Serbia based on phenotypic traits	70
Possibilities of hybrid drives of forest vehicles	71
Cooperation and networking of non-wood forest products-based enterprises in the Topličko and Moravsko forest region	72
Forests in women's hands: Activities on the development of the National action plan for Serbia	73
In situ conservation of rare and endangered forest tree species at the locality „Jelovarnik” - National Park „Kopaonik” in Serbia	75
Influence of tree crown status on the growth of common beech (<i>Fagus sylvatica</i> L.) in Croatia	76
Interrelations of various tree vitality indicators on a common beech (<i>Fagus sylvatica</i> L.) plot	77
Conservation of forest fruit trees gene pool in the protected area „Košutnjak forest” (Serbia)	78
Climate changes' impact on management and activities in protected areas: Managers' and Stakeholders' attitudes	79



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LANDSCAPE ARCHITECTURE AND
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The impact of pest insects and fungal diseases on the dieback of pine forests in the R. of N. Macedonia	81
Bioecological characteristics of two mass outbreaks of <i>Altica Querceorum</i> foudr. in the R of N. Macedonia.....	82
Effect of Wildfire on Forest Soils in Maleshevo–Pijanec Region	83



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Effect of Wildfire on Forest Soils in Maleshevo–Pijanec Region

Boris Najdovski^{1*}

¹ University of Novi Sad – Faculty of Agriculture, Republic of Serbia, PhD student

* Corresponding author: borisnajdovski@gmail.com

Abstract:

For the last three decades, wildfires have been a significant problem for forests and forestry, causing great economic and environmental damage. They are common in Malesh and Pijanec region, as well as throughout the country. In 2021, a total of 192 wildfires were recorded in North Macedonia. The big wildfire in Maleshevo–Pijanec region occurred in the period 2-11 August 2021, estimated at 6,378 hectares of burned oak and pine forests area. The burnt area is mostly represented by Complex of Mollic and Umbric Leptosol, Regosol and Leptosol with 30.8% of the territory, followed by Complex of Mollic and Umbric Leptosol with 17.4%, Complex of Albic Livisol and Regosol with 11.2% and Chromic Luvisol on Saprolite with 9.4%. In this research, the effects of fire on biological, chemical and physical properties of soils are analysed. The most affected areas after the fire show increased biological activity and an abundance of symbiosis between plants, fungi and bacteria as a result of increased pH and release of nutrients from the ash. The fire significantly affected the soil fauna due to the burning of the root system, so it is severely disturbed up to 2 cm of depth, moderately disturbed up to 8 cm, partially disturbed up to 15 cm and weakly disturbed in the deeper soil layers. Food sources for soil fauna are significantly reduced. Occurrence of certain types of fungi has been recorded in the burned area. The increased biological activity and the increased amount of nutrients have enabled the accelerated multiplication of bacteria. The fire has decreased the capacity for cation exchange (CCE). Sandy soils show lowest CCE after the fire, of 100 meq/100 g of soil in pine stands and 180 meq/100 g of soil in oak stands. Increased soil acidity and increased soil biological activity indicate improved nitrification, especially in burnt acid soils. The fire decreased organic carbon (C) content in soils and caused structural changes in aliphatic compounds, while humic acids remained unchanged. Carbonated plant debris in large quantities are accumulated on the soil surface (to a depth of 2 cm), where it makes up 30-40% of the soil. Burnt soils are black coloured as a result of the coal-fired organic waste and the black ash created by incomplete combustion. Surface accumulated ash (up to 1.5 cm of depth) contains Ca, Mg, K, Si and P. Soil water repellency is present in the burned soils, but it is not strongly expressed and is not a limiting factor for future revitalisation activities. The aggregate composition is significantly changed to a depth of up to 15 cm, mainly through changes in porosity and water retention capacity. It can be concluded that it will take relatively long time for the soils to return to their original condition.

Keywords: wildfire, burned forest soils, soils properties.



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