

The project is co-financed by the Governments of the Czechia, Hungary, Poland and Slovakia through Visegrad Grants from International Visegrad Fund. The mission of the fund is to advance ideas for sustainable regional cooperation in Central Europe.

# Faculty of Forestry and Wood Technology Mendel University in Brno



- MENDELU
- Faculty of Forestry
- and Wood
- Technology

# Mendel University in Brno

- A public institution with long tradition of excellence in research and teaching activities
- Established in 1919
- 5 faculties, 1 institute
- University Forest Enterprise, University Farm
- About 8 300 students



- MENDELU
- Faculty of Forestry and Wood
- Technology

# Faculty of Forestry and Wood Technology

- 12 departments
- About 250 staff members
- About 1,800 students (PhD students about 200)
- Arboristics
- Furniture design and furniture technology
- Forestry
- Landscaping
- Timber structures and wood building construction
- Wood technology and timber management



● MENDELU  
● Faculty of Forestry  
● and Wood  
● Technology

# Faculty of Forestry and Wood Technology

- National research infrastructures
- Extensive academic background knowledge
- Up-to-date technologies
- Extensive permanent plot web covering various vegetation zones
- Training Forest Enterprise Masaryk Forest Křtiny as biggest living laboratory allowing forestry experiments, sawmill practical usage and economic data analysis of running enterprise



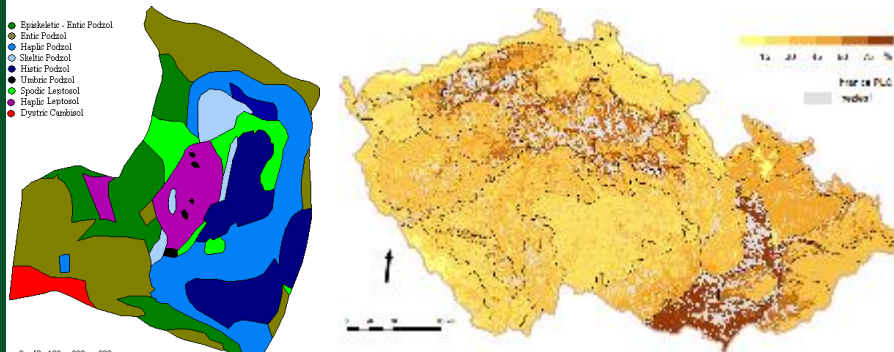
# Department of Geology and Soil Science

- Forestry Soil Science
- Environmental Soil Science
  - Ing. Aleš Kučera, Ph.D.
  - ales.kucera [at] mendelu.cz
- Soil Biochemistry and Biology
  - doc. Ing. Valerie Vranová, Ph.D.
  - valerie.vranova [at] mendelu.cz
- Landscape Forming Processes
  - doc. Mgr. Aleš Bajer, Ph.D.
  - ales.bajer [at] mendelu.cz



# Forest soil investigation

- **Soil profile descriptions and field survey**
  - soil taxonomy, humus forms
  - infiltration, penetrometry
- **Soil sample analysis**
  - elementary analysis (C, H, N, S); soil carbon (TOC, TIC)
  - respiration (gas chromatography)
  - microbial functional diversity, C/N/P/S sources consumptions (BIOLOG™)
  - enzymatic activity (fluorescence, spectrophotometry)
  - undisturbed sample, retention curves (soil hydrophysics)
  - granulometry
- **Soil sensors, meteostations**
  - soil moisture and temperature
  - air temperature and precipitations
- **Spatial analysis** (soil and growth conditions mapping with spatial models and statistical tools)
  - **Spatial analysis**; Sample vectorization; Spatially weighted modelling; Kriging; Fuzzy modelling
  - **Temporal analysis**; Time-series exploratory analysis; Lag regression



# Department of Forest Botany, Dendrology and Geobiocoenology

- Geobiocoenology and ecology
  - prof. Dr. Ing. Petr Maděra
  - petr.madera [at] mendelu.cz
- Tree physiology
  - doc. Ing. Roman Gebauer, Ph.D.
  - roman.gebauer [at] mendelu.cz
- Dendrology and botany
  - doc. Ing. Luboš Úradníček, CSc.
  - lubos.uradnicek [at] mendelu.cz
- Tropical and subtropical forestry
  - doc. Dr. Ing. Jindřich Pavliš
  - jindrich.pavlis [at] mendelu.cz



# Conservation of the endangered endemic *Boswellia* trees on Socotra Island (Yemen)

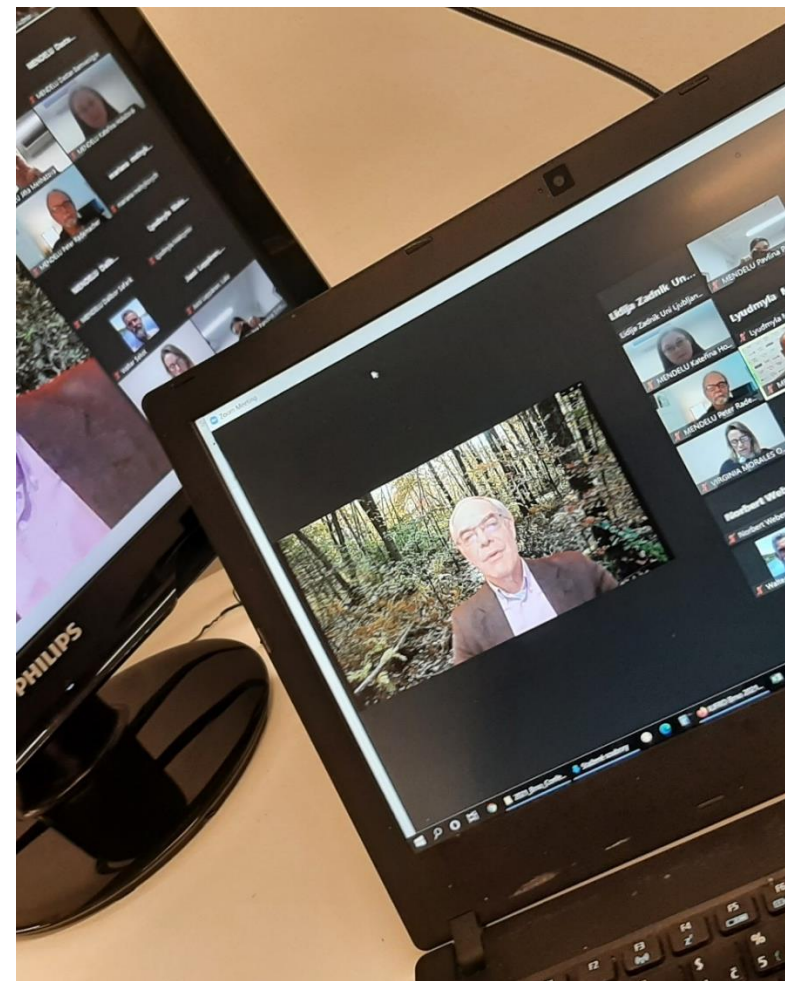
- Conserve the endemic *Boswellia* species on Socotra Island
- Knowledge on distribution and abundance of *Boswellia* species populations gained and their conservation status re-evaluated
- At least 5 forest nurseries, at least 2,000 newly produced *Boswellia* seedlings
- Conservation measures applied by local communities and agencies
- Fondation Franklinia
- prof. Dr. Ing. Petr Maděra, petr.madera [at] mendelu.cz
- [https://fraxinus.mendelu.cz/tropicalforestry/ceske\\_lesnictvi\\_ve\\_svete/jemen/conservation-of-the-endangered-endemic-boswellia-trees-on-socotra-island/](https://fraxinus.mendelu.cz/tropicalforestry/ceske_lesnictvi_ve_svete/jemen/conservation-of-the-endangered-endemic-boswellia-trees-on-socotra-island/)





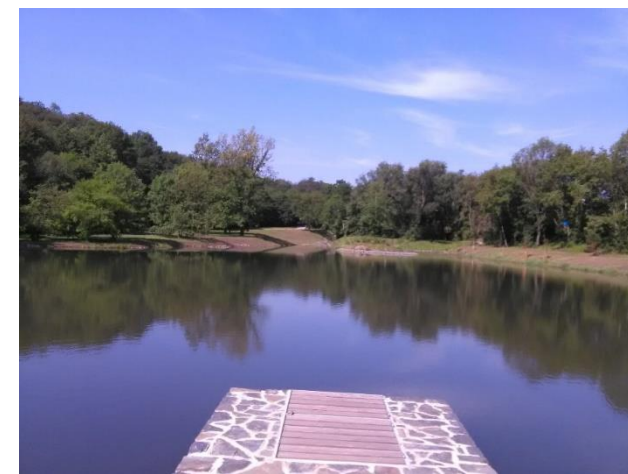
# Department of Forest and Wood Products Economics and Policy

- Assessment of the significance of forest enterprises and nature and landscape protection organizations to local economy
  - Ing. Jitka Meňházová, Ph.D.
  - jitka.menhazova [at] mendelu.cz
- Economy of wood-processing enterprises
- Analysis of wood and wood products market
  - Ing. Dalibor Šafařík, Ph.D.
  - dalibor.safarik [at] mendelu.cz
- Example of activities
  - <https://iufro2021.lfd.mendelu.cz/>



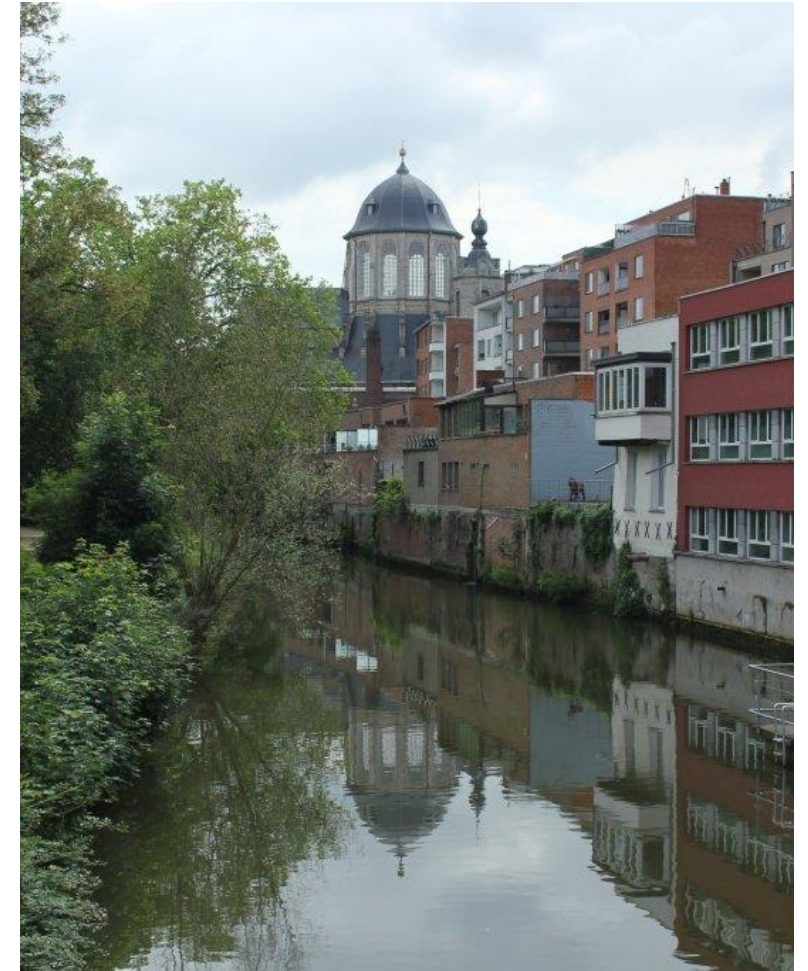
# Department of Landscape Management

- Spatial planning and regional development
- Recreology – forest and landscape
  - doc. Ing. Jitka Fialová, MSc., Ph.D.
  - jitka.fialova [at] mendelu.cz
- Landscape water management
  - Ing. Petr Pelikán, Ph.D.
  - petr.pelikan [at] mendelu.cz
- Functions of forests and woody vegetation in the landscape
  - doc. Ing. Petr Kupec, Ph.D.
  - petr.kupec [at] mendelu.cz
- Forest transport network
  - doc. Ing. Petr Hruza, Ph.D.
  - petr.hruza [at] mendelu.cz



# Platform of Vocational Excellence Water

- Ensure that VET is at the forefront of research and technological developments in the water sector
- Ensure that current and future water sector professionals have the work attitude, knowledge and competences that the rapid changing EU water industry demands
- Identify the existing and emerging labour market needs and enhance the responsiveness of initial and continuing VET systems to these needs
- doc. Ing. Petr Kupec, Ph.D., petr.kupec [at] mendelu.cz
- <https://www.povewater.eu/>
- This programme has been funded with support from the European Commission. Project number: n° 612632-EPP-1-NL-EPPKA2-SSA-P



# Department of Engineering

- Impacts of forestry and woodworking machinery and technology on natural environment and forest
  - prof. Ing. Jindřich Neruda, CSc.
  - jindrich.neruda [at] mendelu.cz
- Multi-criteria methods of forestry technology optimization
- New designs of logging and hauling machinery
  - Ing. Tomáš Zemánek, Ph.D.
  - tomas.zemanek [at] mendelu.cz
- Energy utilisation of biomass
  - Ing. et Ing. Jan Klepárník, Ph.D.
  - jan.kleparnik [at] mendelu.cz



# Department of Forest Protection and Wildlife Management

- Comprehensive research on tree pests and diseases
  - prof. Dr. Ing. Libor Jankovský, libor.jankovsky [at] mendelu.cz
- Quarantine and invasive pests and diseases
  - doc. RNDr. Michal Tomšovský, Ph.D.
  - michal.tomsovsky [at] mendelu.cz
- Bionomics of insect pests
  - Ing. Petr Martinek, Ph.D., petr.martinek [at] mendelu.cz
- Genus *Phytophthora*
  - Dr. Thomas Jung, thomas.jung [at] mendelu.cz
- Forest decline and stress ecology
  - doc. Ing. Petr Čermák, Ph.D., petr.cermak [at] mendelu.cz
- Management of wild animals populations
  - prof. Ing. Jiří Kamler, Ph.D., jiri.kamler [at] mendelu.cz



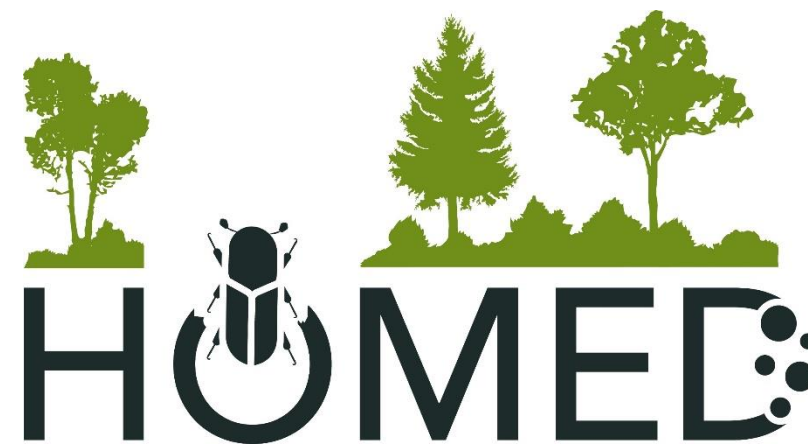
# Phytophthora Research Centre

- Excellence research team focused on research of Phytophthora diseases
- Deeper understanding of factors affecting diversity, adaptation and hybridization processes
- Innovative technologies based on microbiology, bioinformatics, biology, ecophysiology, anatomy of plants and bioclimatology, evolutionary history of this genus and molecular mechanisms driving susceptibility and resistance
- Management and protection of European ecosystems
- <http://www.phytophthora.org/>
- Dr. Thomas Jung, thomas.jung [at] mendelu.cz
- Supported by the European Regional Development Fund, Project Phytophthora Research Centre Reg. No. CZ.02.1.01/0.0/0.0/15\_003/0000453



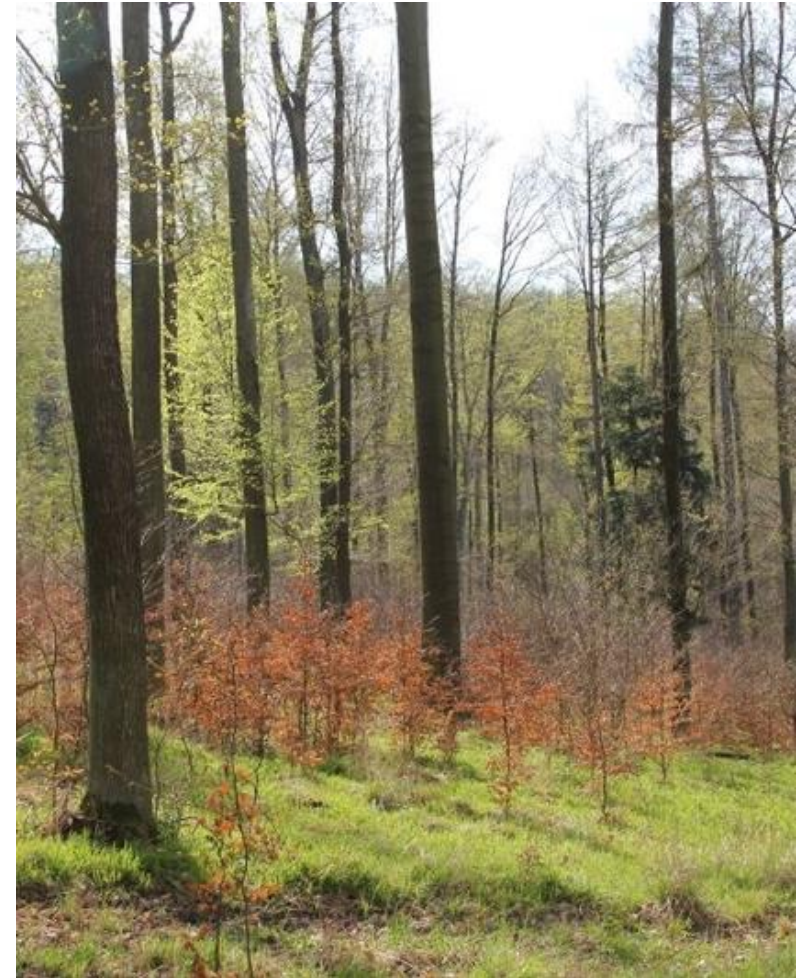
# Holistic management of emerging forest pests and diseases

- Drivers for forest emerging native and non-native pests and pathogens emergence or invasion
- Quantitative and spatialized predictions
- Generic framework for economic assessment
- Knowledge on natural regulation
- Options for eradication, containment and control
- Provide practical solutions for the management
- <https://homed-project.eu/>
- doc. Ing. Miloň Dvořák, Ph.D., milon.dvorak [at] mendelu.cz
- This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 771271.



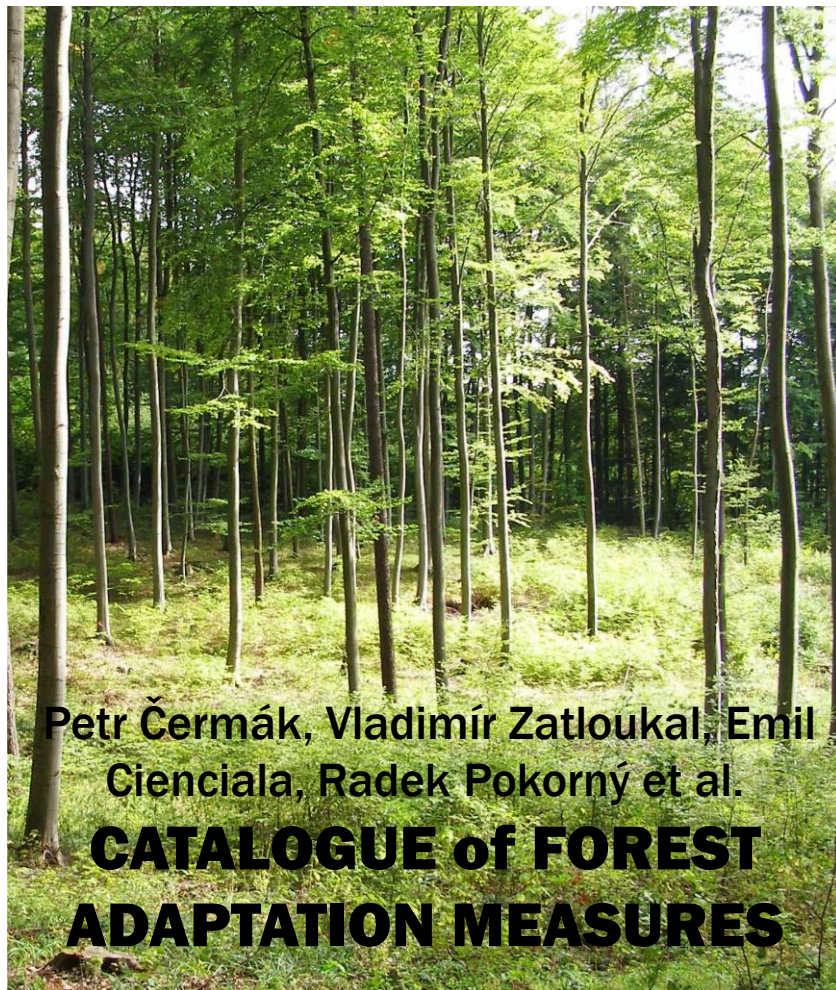
# Department of Silviculture

- Establishment of Forests
  - prof. Ing. Oldřich Mauer, DrSc.
  - oldrich.mauer [at] mendelu.cz
- Forest Tree Breeding
  - Ing. Roman Longauer, CSc.
  - roman.longauer [at] mendelu.cz
- Silviculture, Intensive Forest Plantations
  - doc. Ing. Radek Pokorný, Ph.D.
  - radek.pokorny [at] mendelu.cz
- Agroforestry
  - doc. Ing. Antonín Martiník, Ph.D.
  - antonin.martinik [at] mendelu.cz





# Adaptation Measures – New Forest Structure



Mixed forest stands with PFC and diversified structure

2-3 target tree species (mostly one of them – coniferous)



2-3 ameliorative tree species (mostly one or more of them – valuable tree sp.)



Effect of elevated [CO<sub>2</sub>], N- deposition etc.

# Cross-border risk management in forestry in consequence of bark beetle calamity

- Harmonized and optimized system of adaptive forest management with target to minimize the risk at cross-border regions
- Cross-border development tools for specific management and risks control in forestry enterprises
- Good-practice examples with implemented an adaptive management and preparation of cross-border manual
- doc. Ing. Radek Pokorný, Ph.D., radek.pokorny [at] mendelu.cz
- Interreg V-A Austria-Czech Republic
- ATCZ251



# Department of Forest Management and Applied Geoinformatics

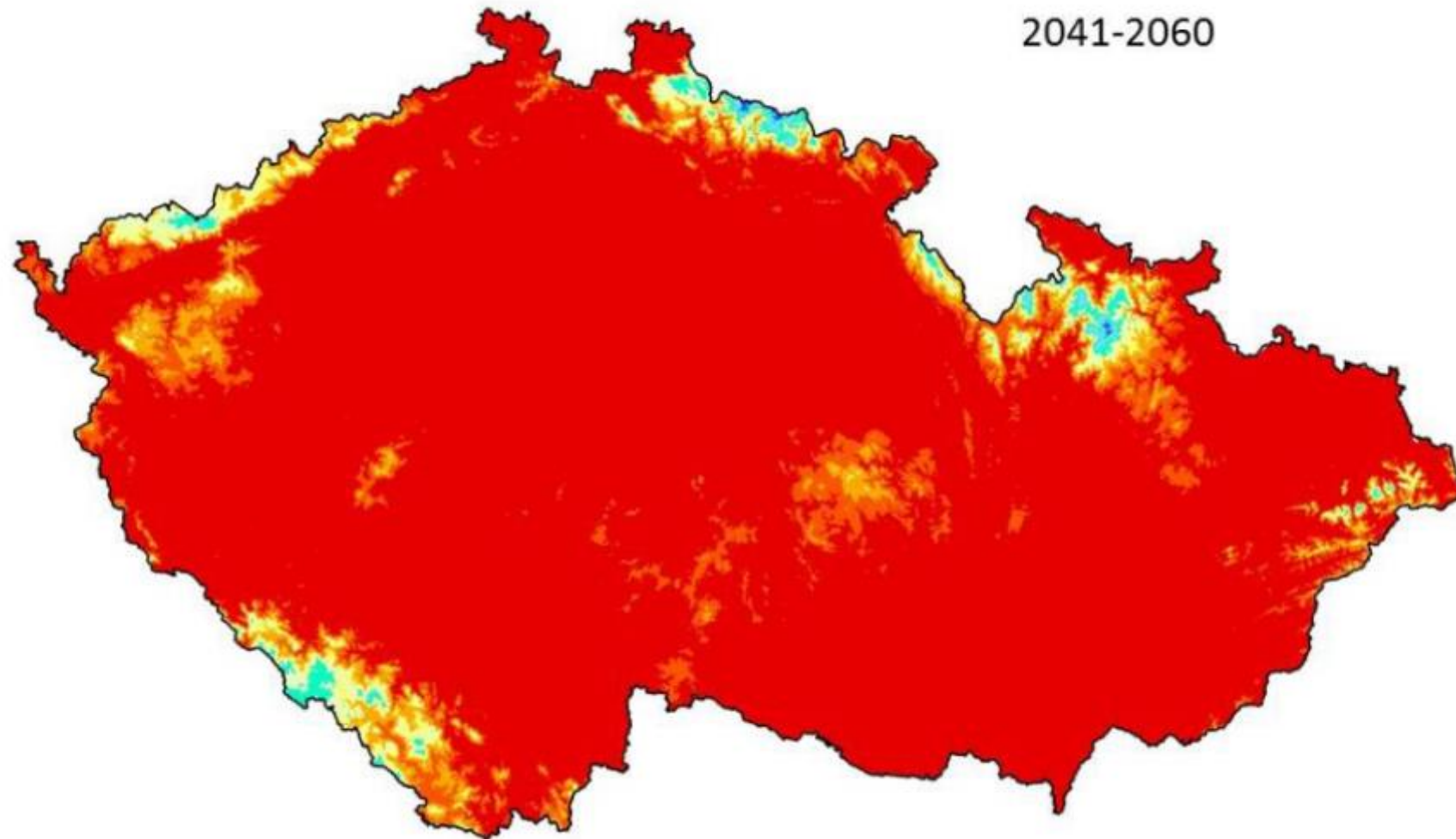
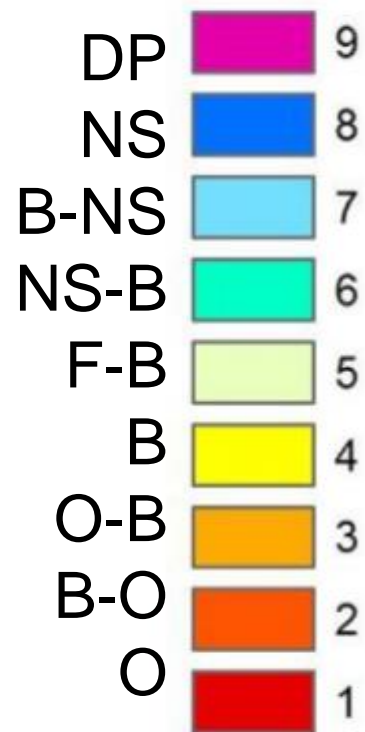
- Main focus is precision forestry
- Design and optimization of data collection methods for forestry planning
- Analysis of biometric data
  - doc. Ing. Karel Drápela, CSc., karel.drapela [at] mendelu.cz
- Models of growth processes in forest ecosystems using growth simulators
- Forest inventory, coppice and coppice with standards
  - doc. Dr. Ing. Jan Kadavý, jan.kadavy [at] mendelu.cz
- GIS, photogrammetric methods and laser scanning
  - doc. Ing. Martin Klimánek, Ph.D., martin.klimanek [at] mendelu.cz
  - doc. Ing. Tomáš Mikita, Ph.D., tomas.mikita [at] mendelu.cz



# Forest vegetation zones

GCM –IPSL model

2041-2060



Map created by doc. Ing. Tomáš Mikita, Ph.D., tomas.mikita [at] mendelu.cz

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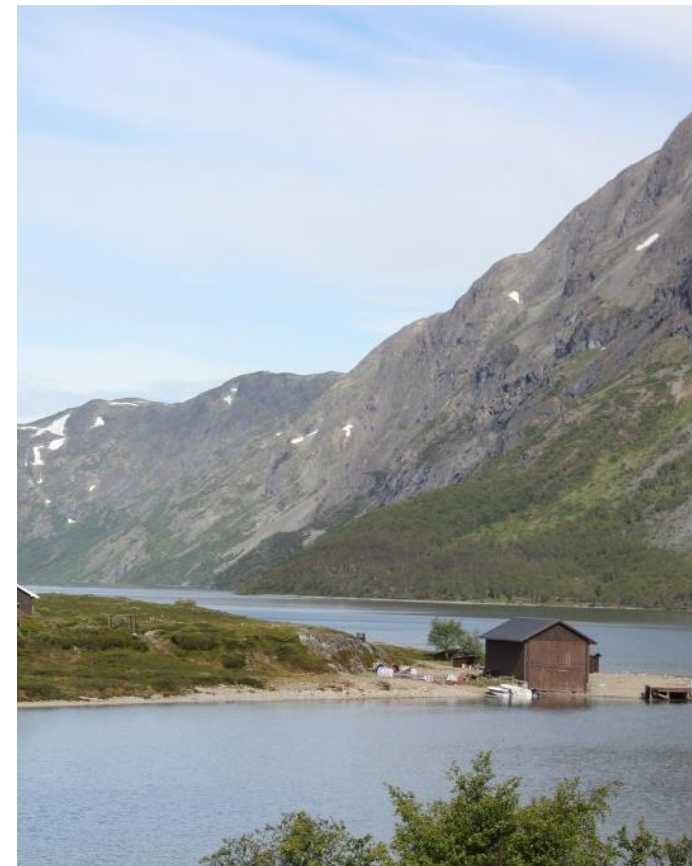
# Department of Forest Ecology

- Primary forest production
- Structure and processes of forest ecosystems
- Biodiversity and analysis of energy and substances flows in forest ecosystems
  - Ing. Jan Světlík, Ph.D.
  - jan.svetlik [at] mendelu.cz
  - Ing. Jan Krejza, Ph.D.
  - jan.krejza [at] mendelu.cz
- Secondary forest production
  - Ing. Vladimír Hula, Ph.D.
  - vladimir.hula [at] mendelu.cz
  - Mgr. Miroslav Kutal, Ph.D.
  - miroslav.kutal [at] mendelu.cz



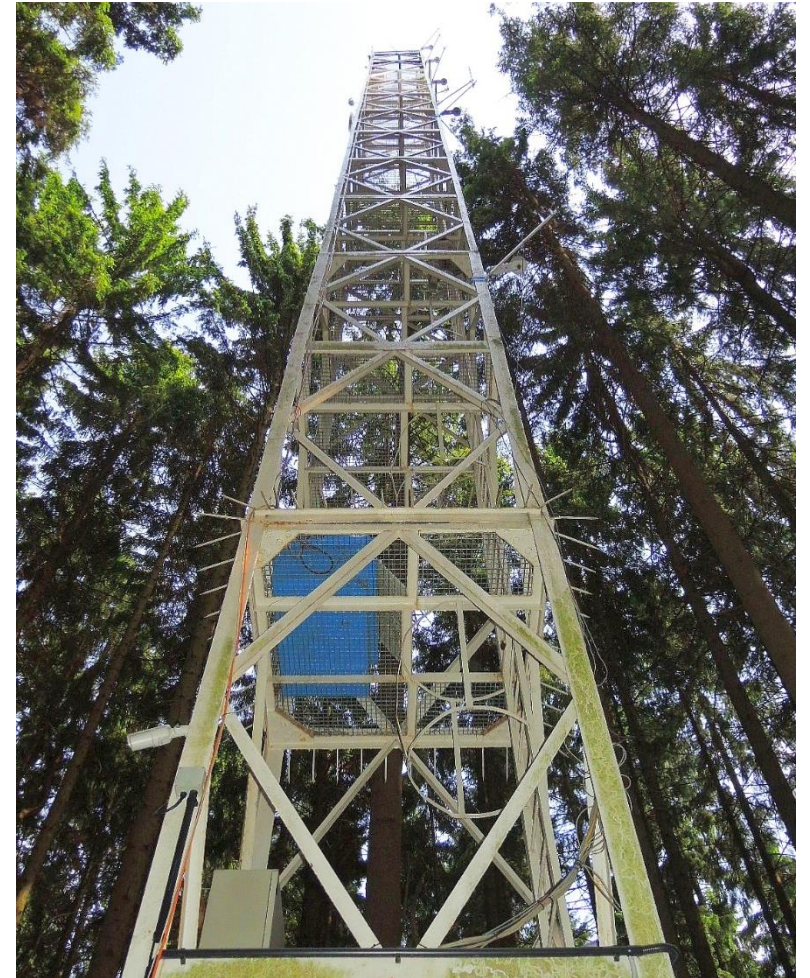
# Forest functions in the past, present and future - what can society expect from forests under climate change?

- Ability of managed forests to provide ecosystem functions in future conditions characterized by higher drought and heatwaves occurrence – wood production and climate change mitigation in the CZ and Norway
- Potential for adaptation of important tree species
- Potential for silvicultural measures implementation
- Climate models for predictions (till 2050); remote sensing and validation of its outputs with detailed field measurements both in long-term research plots
- Ing. Jan Světlík, Ph.D., jan.svetlik [at] mendelu.cz
- <https://eeagrants.org/archive/2014-2021/projects/CZ-RESEARCH-0002>



# Rájec – Němčice Research Facility

- Cooperation with CzechGlobe – Global Change Research Institute of the Czech Academy of Sciences
- Part of the international network of workplaces for long term ecological research ILTER (International Long Term Ecological Research)
- Part of the national research and development infrastructure for carbon monitoring in the Czech Republic – CzeCOS
- Long-term monitoring of energy and substance fluxes
- Researching physiological processes (photosynthesis, respiration and transpiration)
- Understanding the functioning of the spruce ecosystem as a whole and predicting its future behaviour in changing climate conditions
- Ing. Jan Světlík, Ph.D., [jan.svetlik \[at\] mendelu.cz](mailto:jan.svetlik@mendelu.cz)



# Department of Furniture, Design and Habitat

- Expert and advisory activities in furniture manufacturing and furniture design in quality and safety of products
- Accredited Testing room of Furniture
- Consulting and professional partner of CEN and the Czech Normalization Institute in the standard setting area
- Red Dot Awards obtained by the department members
  - doc. Ing. Milan Gaff, Ph.D.
  - milan.gaff [at] mendelu.cz
  - MgA. Petr Novague, Ph.D.
  - petr.novague [at] mendelu.cz
  - Ing. Martin Plachý, Ph.D.
  - martin.plachy [at] mendelu.cz





# Department of Wood Science and Technology

- Wood anatomy
  - prof. Ing. Vladimír Gryc, Ph.D.
  - vladimir.gryc [at] mendelu.cz
- Dendrochronology
  - doc. Ing. Michal Rybníček, Ph.D.
  - michal.rybnicek [at] mendelu.cz
- Physical and mechanical properties of wood and wood-based materials
  - Ing. Václav Sebera, Ph.D.
  - vaclav.sebera [at] mendelu.cz
- Modelling, DIC
  - Ing. Jan Tippner, Ph.D.
  - jan.tippner [at] mendelu.cz



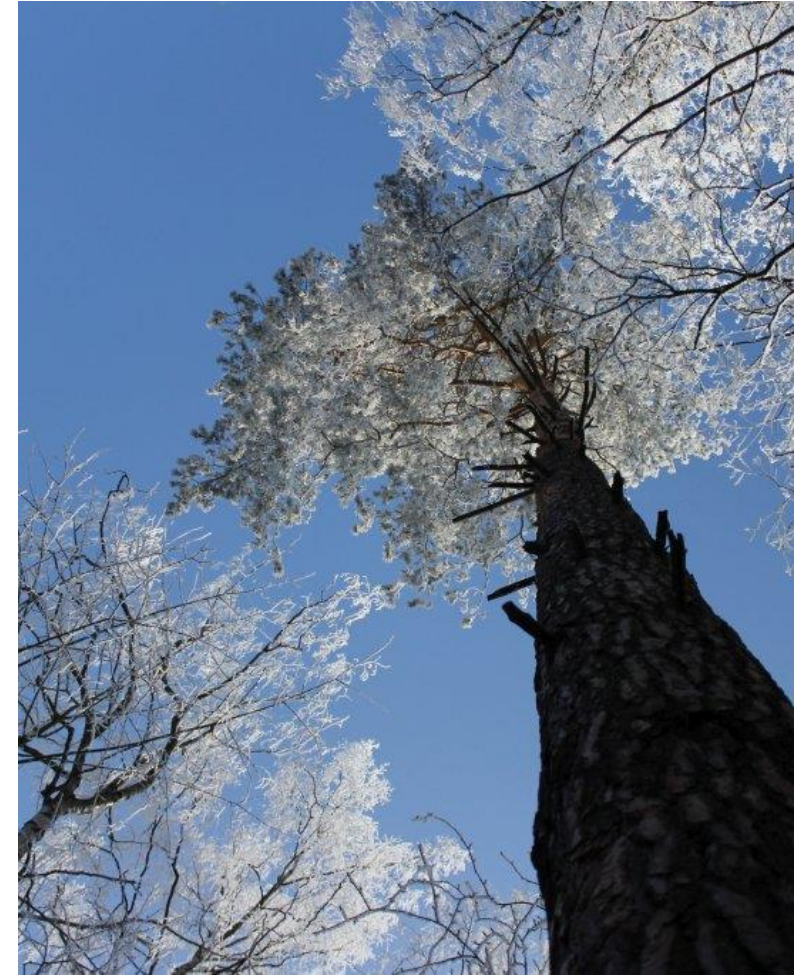
# Department of Wood Science and Technology

- Wood protection
  - Ing. Jan Baar, Ph.D., jan.baar [at] mendelu.cz
- Wood modification
  - Ing. Petr Čermák, Ph.D.
  - petr.cermak.und [at] mendelu.cz
  - Ing. Petr Pařil, Ph.D., petr.paril [at] mendelu.cz
- Wood-based composite materials, development of new materials
  - Ing. et Ing. Tomáš Pipíška, Ph.D.
  - tomas.pipiska [at] mendelu.cz
- Arboriculture and biomechanics
  - Ing. Luděk Praus, Ph.D.
  - ludek.praus [at] mendelu.cz



# Tree Dynamics: Understanding of Mechanical Response to Loading

- To develop experimentally validated complex physical model of tree dynamic response in frequency and time domain
- Relationships between detailed geometry, material and realistic loading and which allows description of influence of tree parameters on the response.
- ERC CZ
- Ing. Jan Tippner, Ph.D., jan.tippner [at] mendelu.cz

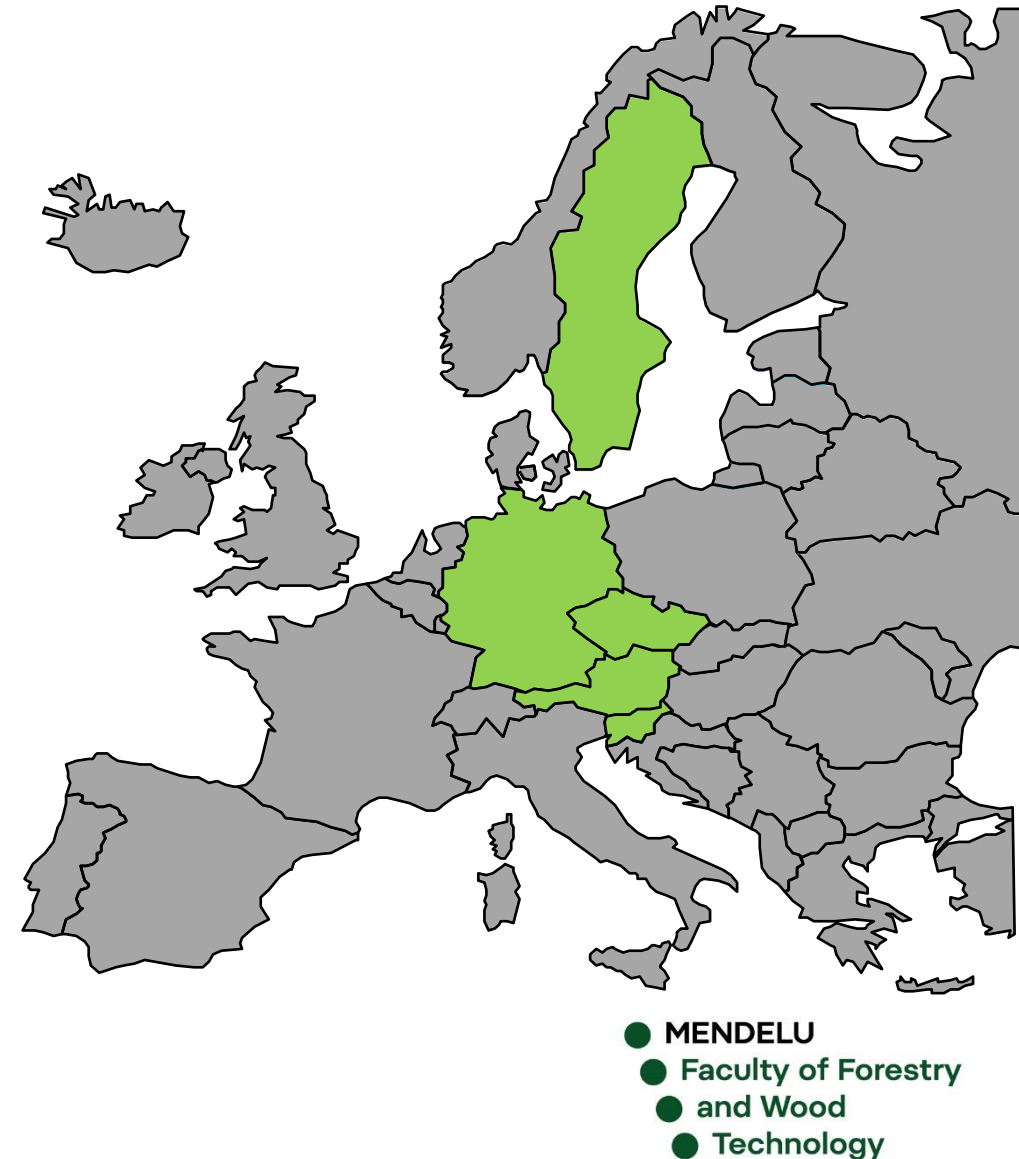


# Adaption strategies in forestry under global climate change impact - ASFORCLIC

- Call: H2020-WIDESPREAD-2018-2020 (Twinning), duration 36 months
- To strengthen research excellence in the highly demanding field of global climate change
- To create a robust research team covering whole value chain
- To team up for analyses of changes within the forest-wood value chain including higher appearance and use of the lesser-used tree/wood species (luWS)
  
- <https://asforclic.ldf.mendelu.cz/>
- Peter Rademacher, peter.rademacher [at] mendelu.cz
- Pavlína Pancová Šimková, pavlina.simkova [at] mendelu.cz
- This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°952314.

# Adaption strategies in forestry under global climate change impact

- Coordinator: Mendel University in Brno, CZ
- Consortium: 8 partners
- Austrian Institute of Technology GmbH (AIT), AT
- Bayerische Landesanstalt für Wald und Forstwirtschaft (LWF), DE
- Johann Heinrich Von Thuenen-Institut (THUENEN), DE
- Swedish University of Agricultural Sciences (SLU), SE
- Technische Universitaet Muenchen (TUM), DE
- Universitaet fuer Bodenkultur Wien (BOKU), AT
- University of Ljubljana (UL), SI



# International Networks

- International Union of Forest Research Organizations (IUFRO)
- European Forest Institute (EFI)
- Forest Stewardship Council (FSC)
- InnovaWood Network
- International Association for Landscape Ecology (IALE)
- International Forestry Students' Association (IFSA)
- ProSilva



# University Forest Enterprise

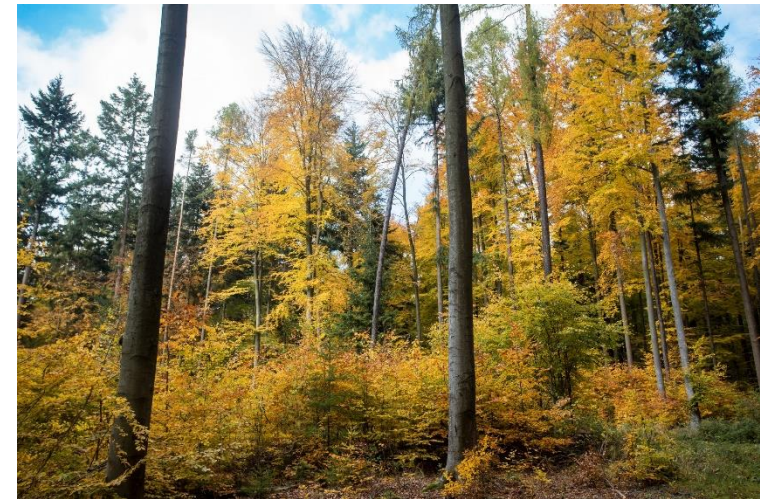
- Headquarter
  - 3 forest units
  - Nursery
  - Sawmill
  - Forest machinery developing
  - Chateau Křtiny
- 
- 3 forest arboretum – collection of 800 species from whole world, oldest est. 1928
  - 60 meadows with exotic tree species
  - 50 buildings with springs
  - 90 memorials for important people in forestry
  - 230 km of forest roads - cycleway and 880 km of walking paths



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# Forest management

- 10.200 ha of forest area
- average rotation: 112 years, average regeneration period: 32 years
- average standing volume: 248 m<sup>3</sup>.ha<sup>-1</sup>
- volume increment: 7,4 m<sup>3</sup>/ha<sup>-1</sup>/year
- harvesting volume: 69.400 m<sup>3</sup>/year
- natural regeneration - up to 50 %
- 19 strict forest reserves (9 % of the forest area)
- FSC, PEFC certification

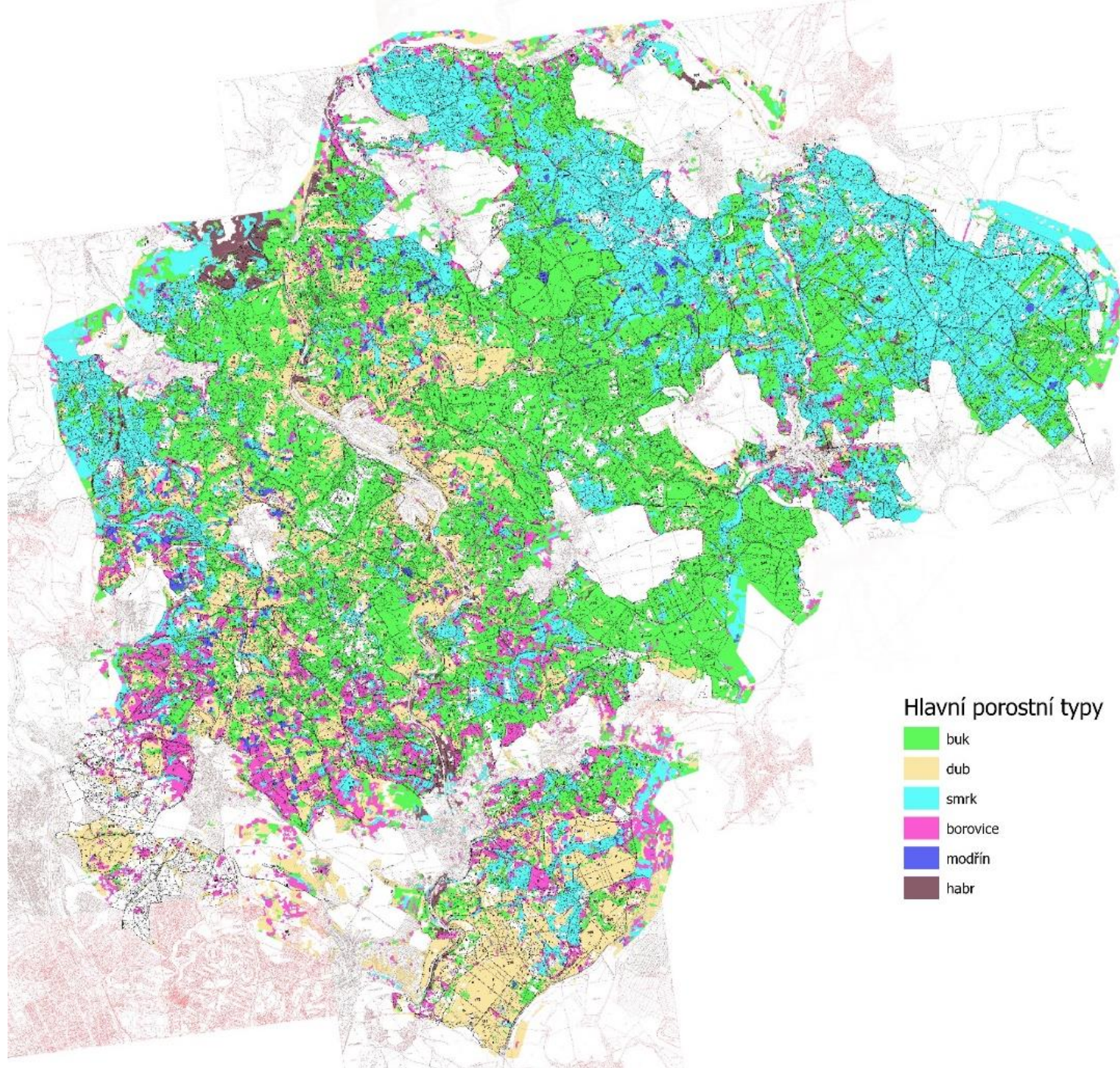




# Forest composition

## - Mixed forests

- 39% conifers (19% spruce, 8% pine, 8% larch, Douglas fir, etc.)
- 61% broadleaved (33% beech, 15% oak, 8% hornbeam, maples, ashes, cherry, etc.)



# University Forest Enterprise

- „We create diversified forests for the climate change and future generations“
- Practical teaching and training in forestry
- Field laboratory for forestry research
- Sustainable multifunctional forestry management
- Organising workshops and excursions for foresters or public - forestry pedagogy for children and all generations
- Special focus on recreation function / forest aesthetics



**Thank you for  
your attention.**



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