“Managing forests in the 21st century“

BOOK OF ABSTRACTS

Conference at the Potsdam Institute for Climate Impact Research

Telegrafenberg, 14473 Potsdam, Germany

3rd - 5th March 2020

Forest ecosystems, their products and services play an important role in achieving ambitious climate change mitigation objectives at the same time requiring profound adaptation to climate change. Forest management schemes to support climate action have to be developed within their regional context but also have to be aligned with national or EU-level climate, forest and sustainability policies.

The conference on “Managing forests in the 21st century” is the final conference of the FORMASAM, REFORCE and FOREXCLIM research projects. The conference brings together scientific experts on forest management from all over Europe facing very specific management challenges. The aim is to discuss and improve the understanding the role of forests and forest management in the context of climate change. The conference addresses climate change impacts, as well as needs for mitigation and adaptation especially with regard to the following scientific questions:

1. What are the impacts of climate extremes and disturbances?
2. What are the management challenges (and options) for resilient forests?
3. What can we do to increase the contribution of forest management to climate change mitigation?

Conference Organizing Team:

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Speaker: Vasilije Trifković, University of Ljubljana, Slovenia

„Factors influencing the diameter growth of beech, spruce and fir in uneven-aged forests in Dinaric Mountains, Slovenia under weak to moderate disturbances“

The dynamics of uneven-aged forests can be described by regeneration, ingrowth, growth and mortality. Models are needed to predict the development of uneven-aged forests. However, extreme weather events may significantly change stand structure, composition and life processes. We quantified the uneven-aged structure by the diameter diversity indices (Gini, Shannon and Coefficient of variation) to be able to discern between even-aged and uneven-aged forests and to control for the possible influence of the stand diameter structure (dbh) on the diameter growth. The objective of this study is to find which factors influence the diameter growth of European beech, Norway spruce and silver fir in Dinaric fir-beech forests, Slovenia under weak to moderate disturbances. The data from permanent sampling plots (n = 6,848) with consecutive measurements of trees (n = 104,930) before the large ice-storm in 2014 were used for the analysis. The diameter growth was modeled with selected tree (e.g. dbh), stand (e.g. basal area, Ddom, Gini index, tree species diversity), site (e.g. site index, altitude) and climate (temperature, precipitation) variables. Multivariate non-linear regression models were used.

Speaker: Xianglin Tian, University of Helsinki, Finland

„Diagnosis of environmental restrictions across various forest types using the ecosystem flux model PRELES“

The response of canopy photosynthetic production to environmental factors, including light intensity, temperature, vapour pressure deficit (VPD), and soil water status, can be generalised and quantified using the light-use-efficiency (LUE) model PRELES. By partitioning the variability of canopy photosynthetic production, the effect of each environmental stress was respectively detected. We analysed the global variation and seasonal pattern of each environmental restriction, by applying PRELES to forests in tropical, subtropical, temperate, and boreal regions. Besides, Water limitations and drought events were assessed based on both PRELES and meteorological indices on daily, monthly and annual time scales. The results showed that the intensities of restrictions varied with the forest-climate types. Similar seasonal patterns were found for most sites in light saturation, temperature acclimation, and the VPD stress. Limitation from soil water occurred more irregularly. Annual meteorological drought indices strongly correlated with each other, and insufficiently described drought conditions across biomes. For the monthly indicators, in comparison to SPI (standardized precipitation Index), SPEI (standardized precipitation evapotranspiration index) showed a higher correlation with the water restriction modifiers in PRELES. The LUE-based model illustrated that those forests only reached 26% (SD±12%) of the potential productivity, while 56% (SD±17%) of the potential productivity was unachieved due to light saturation, 21% (±13%) was temperature limitation, 12% (SD ±10%) was soil water stress, and 9% (±9%) was VPD stress.