PAPER PROJECT

Preliminary title:

Does forest management influence climate sensitivity of trees in European forests?

Target journals:

Ecology; Ecology Letters; Oecologia

Outline:

Forest structure is the spatial arrangement of the various components of a forest ecosystem and it is determined by attributes like tree species composition, tree age, tree spatial distribution and canopy layering. Overstory tree species diversity is a key element in understanding functionality and resilience of forest ecosystems (Seidl et al., 2014) and a basic element of forest structure (Staudhammer and LeMay, 2001). Recent studies have confirmed such interplay between forest structure, tree diversity and ecosystem functioning (Tobner et al. 2016; Rollinson et al. 2020).

As forest management consists of complex anthropogenic disturbances, it should be a key factor in explaining structure, diversity and functionality of forest ecosystems. Therefore, management forests in a way that sustain both forest diversity and ecosystem functioning has become a major challenge in modern forestry (Decocq et al. 2004), particularly because the increasing concern about the role of climate change on tree responsiveness to environmental changes such as climate warning. For instance, growing evidences suggested that drought is increasing causing pulses of tree mortality in forest ecosystems, with consequence on tree diversity and ecosystem functioning (Senf et al., 2020). Therefore, evaluating the capability of forest management to support tree adaptation to climatic change is a crucial issue.

The objective of the study is to assess whether forest management affects the tree responsiveness to climate. Specifically, we used a functional approach to estimate how tree tolerance attributes like shade, drought and waterlogging tolerance are affected by climate in differently managed forests. Some mixed modelling approaches were also tested to evaluate the influence of different species and structural tree attributes on climate response.

References

Decocq, Guillaume, et al. "Plant diversity in a managed temperate deciduous forest: understorey response to two silvicultural systems." Journal of Applied Ecology 41.6 (2004): 1065-1079.

Rollinson, Christine R., et al. "Climate sensitivity of understory trees differs from overstory trees in temperate mesic forests." Ecology 2020 early view https://doi.org/10.1002/ecy.3264 .

Seidl, Rupert, et al. "Increasing forest disturbances in Europe and their impact on carbon storage." Nature climate change 4.9 (2014): 806-810.

Senf, C., Buras, A., Zang, C.S., Rammig, A., Seidl, R., 2020. Excess forest mortality is consistently linked to drought across Europe. Nature Communications 11, 6200. https://doi.org/10.1038/s41467-020-19924-1

Staudhammer, Christina Lynn, and Valerie Marie LeMay. "Introduction and evaluation of possible indices of stand structural diversity." Canadian journal of forest research 31.7 (2001): 1105-1115.

Tobner, Cornelia M., et al. "Functional identity is the main driver of diversity effects in young tree communities." Ecology letters 19.6 (2016): 638-647.

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Core authors outside BOTTOMS-UP:

Please note that if the outline changes substantially (more than 1 aim is revised substantially), or co-author(s) are added to the above lists the governing board should re-vote on the project.

Further opt-in authors:

According to the BOTTOMS-UP Bylaws any member of the BOTTOMS-UP Consortium can declare his/her interest to become opt-in author. The first author is required to preliminarily accept one such offer from each dataset that represents at least 2% of the data in the analysis. It is upon the discretion of the first author whether to accept any opt-in offer beyond this requirement.

Persons interested in opt-in authorship can be nominated until …. with e-mail to the first author (and cc: to the BOTTOMS-UP Governing Board), explaining which dataset(s) they represent and preferentially also how they could contribute. Note however that such a nomination only means the option to become co-author. In the end only those persons will be retained as actual co-authors who have made a significant intellectual contribution to the paper during the course of its preparation (in accordance with BOTTOMS-UP Bylaws and compliance to ethics in academy).

Data to be used:

1. *Aggregated data* (information on EFT and management, possibly stand age). This would serve a first screening to try to group data in forest types and management options. Possible recoding of management information could be needed (support of WG2 fellas)
2. *Raw tree* (overstory) data. Both datasets will be used to extract functional and structural attributes

Time line:

Deadline for permission of data usage from custodians:03.03.2021

Extraction of data from BOTTOMS-UP: 15.04.2021

Data preparation and analysis: 30.06.2021

Raw results to be sent to the wider author team:15.09.2021

Writing up of the paper (including preparation/optimization of figures):15.11.2021

Feedback round of co-authors to MS:15.12.2021

Submission:31.12.2021

Confirmation:

I confirm that I will adhere to the BOTTOMS-UP Bylaws.

Date 17.12.2020

Signature