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Review on the PhD thesis

Title: Disturbance dynamics of mountain temperate primary forests of the Western and Southern Carpathians and its effect on forest structure and bird assemblages

Author: Mgr. Ondrej Kameniar

Supervisor: prof. Ing. Miroslav Svoboda, Ph.D.

Relevance and contribution of the thesis to the state of knowledge

The PhD thesis of Ondrej Kameniar comprehensively describes on 176 pages an impact of historical natural disturbance regime of mountain primary forest of the Carpathians on current forest structure, thereby affecting bird population as a model group. The thesis consists of 3 papers, one already published in renowned scientific journal within the field of forest ecology and publication or submission of two remaining manuscripts could be expected as soon as possible. The work extends previously published findings on disturbance dynamics of primary Carpathian forests bringing out new ideas in the field of bird assemblages across these ecosystems that are central to many ecologist as well forest managers. This topic is of particular interest in the context of prediction of accelerating disturbance frequency and severity within upcoming decades with the specific impact on forest ecosystems. Thus, results presented in the thesis noticeably push forward knowledge within the field of mountain temperate primary forest processes, shaping forest biological communities, and might contribute to their more effective restoration to foster biodiversity as well as to face rapid climate change. As a significant contribution to practical conservation biology, main management recommendations are proposed.

Structure and methodology suitability

Structure of the thesis is well-designed. A storyline is easy to follow as individual chapters, presented as thematically separated manuscripts, are well prefaced and interconnected by detailed and well-elaborated introduction and methodology part, demonstrating great theoretical background and real involvement of the author into the given issue. Sometimes it is difficult to look up all the tables or figures in Supplementary material that is probably missing in Chapter 5.1 (Table A1-A2, Fig. A1-A4). Main objectives of the thesis were accomplished, nevertheless, defining specific hypotheses would be more beneficial.

The point that deserves to be primarily highly appreciated is landscape-level perspective of the study covering multiple forest types throughout the majority of the Carpathian arc, surely related with extremely laborious sample extraction and processing. Likewise, it is necessary to stress that the English language is of very advanced-level. Methods used here correspond

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to modern, standardly applied approaches in dendroecology as well as statistics. Altogether, the thesis gives the impression of very compact publication demonstrating an authors´ great scientific skills and experiences.

Discussion

I have only several minor points to be clarified/discussed:

1. The thesis consists of three manuscripts, only one of them is already published in IF journal. Such an approach is unusual, but it is probably in agreement with the rules of the doctoral programme committee. Although I have no doubt about publication of remaining two manuscripts, I would subjectively reckon the thesis to be superior if incorporating minimally two fully published, reviewed publications. What is the current status of manuscripts?

2. The coherence of individual manuscripts are rather odd in a sense of the study sites. The first chapter addressing a general disturbance pattern of mountain temperate primary forests focuses on processes in Făgăraș Mountains in Romania. Therefore, I don´t understand, why the other two manuscripts, exploring disturbance-bird assemblage relationship, were conducted in Western Carpathians region (Slovakia). Could author explain this arrangement? I assume that disturbance metrics were thus derived from previous studies of the research team, however this is not explicitly stated until individual papers, and title of the thesis as well as abstract are thus misleading.

3. Some criteria invoke many questions when evaluating disturbance histories, and thus justification would be worthwhile in the methodology part. For instance, it is not explicitly clarified, if criteria used within canopy accession event detection are species-specific (conifer vs. broadleaves). If not, is not there a risk of disturbance history underestimation in mixed-species stands? Similarly, the threshold for estimation of the open canopy recruitment is not even mentioned throughout the work. Moreover, if I understand well, author sampled only released trees for age variables estimation (Section 4.3.2). By excluding individuals under suppression, cannot be age structure distorted? Taken together, how does the choice of criteria for detecting canopy accession might impact the resulting picture of stand´s disturbance history?

4. Selecting research plots within 150 m distance from each other seems to be insufficient to avoid multiple bird counts at first glance. Is this distance arbitrarily defined or supported by any observation/expertize?

5. Observed spatiotemporal disturbance synchronicity between beech- and spruce-dominated forest is surprising result. At the same time, difference in bird assemblage composition between these forest types does not support these findings. How could author explicate that despite similar disturbance regimes, bird habitat structures significantly differ?

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In my opinion, effect of very recent disturbances (that are not captured in tree-ring records) in spruce forests of Western Carpathians on current forest structure could be the main reason determining bird assemblages. Here, the question arises, if disturbance history metrics are suitable proxies to elucidate bird population composition in recently disturbed stands.

6. 31 structures parameters were identified to be relevant as bird microhabitat. They are too much in my opinion for testing and most of them are possible to put together to avoid their correlation. On the other hand, for example, uprooted trees were not considered as structures although they had been mentioned in the introduction part as an important nesting microhabitat. Why author did not included this phenomenon into his experiments?

7. Author was writing about need for a complex forest management approaches emulating natural disturbances to foster bird biodiversity (e.g. SBM) that enhance forest resilience to climate change. This is of high importance due to a prediction of disturbance intensification along with accelerating environmental changes in the future, contrariwise resulting in forest structure homogenization. What steps are specifically mentioned to be realized leading to environmental changes impact mitigation within this approach?

Summary

These, however, are minor points that are not disputing overall great quality of the thesis, that is very contributing to practical conservation biology. The author got over many methodological and theoretical issues, even though sometimes controversial. He accomplished main objectives of the thesis, demonstrated his perfect scientific skills and he will be pretty much contributing to his research team after defense. For that reasons, I unequivocally recommend the thesis to the defense with the approval of the degree Ph.D. after successful defense.

Ing. Ivana Vašíčková, Ph.D. Brno, 10th February 2023

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