Příloha č. 4

Závěrečná zpráva projektu specifického výzkumu zakázka č. 2109 / 2020

Název projektu: Veteran trees – a biodiversity hotspot in forest ecosystems

Specifikace řešitelského týmu
Odpovědný řešitel: M.Sc. Ludwig Lettenmaier (Aplikované biologie a ekologie, currently paused)
Studenti doktorského studia na UHK:
Studenti magisterského studia na PřF UHK: Lucy Boulton (former internship/traineeship, study: Systematic biology and ecology)
Další výzkumní pracovníci: doc. Ing. Jakub Horák Ph.D.

Celková částka přidělené dotace: 69 500 Kč

Datum zahájení řešení projektu: 1.3.2020

Datum ukončení řešení projektu: 30. 11. 2021

Stručný popis postupu při řešení projektu (max. 2 strany).

For my study, I searched for former spruce plantation forest stands and natural forest stands in the Krkonoše National Park (KRNAP). The former plantation forest stands and the natural forest stands were always close to each other, therefore, they could be assigned to one forest location. In total, eight locations were chosen with 16 forest stands – i.e., eight former spruce plantation forest stands and eight natural forest stands. In each forest stand, two Norway spruce and two European beech trees were selected, as these tree species are representing the natural part of the tree composition in KRNAP. I chose four trees in each of the two forest stands, resulting in 32 spruces and 32 beeches. I visually recorded tree-related microhabitats according to a standardized survey protocol. I carefully examined the trees for microhabitat structures from the ground to the crown and measured the DBH. To measure canopy openness, I took pictures of the forest canopy with a fisheye lens. The pictures were analyzed with the freeware software *Gap Light Analyser* (GLA). The amount of deadwood, conifers, and broadleaves was estimated in a radius of 10 meters around the targeted tree. To sample saproxylic beetles, traps were attached to the selected trees. Traps were installed at the beginning of the vegetation period and emptied in a four-week interval (May-August). Beetles were identified to species level and considered as strictly saproxylic by an expert and according to a reference list and categorized as conifer-, broadleaf-specialists, and generalists.
The data was analyzed with the statistic program R (version 3.6.3). Imprecise identifications of beetle species were removed. The number of microhabitats was pooled for each tree. For the statistical analyses, only strictly saproxylic beetles were considered. The abundance (number of individuals) and the species richness (number of species) of saproxylic beetles were calculated for each trap. The abundance and number of species of saproxylic beetles served as response variables in GLMM (Generalised linear mixed models). After analyzing VIF (Variance inflation factor) and observing correlations between variables, I chose the following variables as explanatory variables in the models: number of microhabitats, tree species, forest stand, canopy openness, DBH and deadwood in the surrounding. Furthermore, I performed a permutational multivariate analysis of variance (adonis function) to determine any differences in beetle compositions between former spruce plantations and natural forest stands. The results were further analyzed by applying NMDS (Non-metric multidimensional scaling).

Splnění cílů řešení a přínos projektu.

This study evaluated the role of tree-related microhabitat structures on the biodiversity of saproxylic beetles in two different types of forest stands (i.e., former spruce plantation forests and natural forests).
I found a higher number of species and a higher abundance of saproxylic beetles in biodiversity potential forest stands than in natural forest stands. The number of microhabitats promoted the number of species but not the abundance of saproxylic beetles. The community composition slightly differed between former plantation forest stands and natural forest stands. However, the gamma diversity was not different between these two forest stands. Surprisingly, the number of microhabitats played a greater role for saproxylic beetles, which are considered as broadleaf specialists, whereas the forest stand (i.e., former spruce plantation forest vs. natural forest) was insignificant for broadleaf specialists. The opposite pattern was found for conifer specialists, which were more abundant and comprised a higher richness in former plantation forest stands regardless of the number of microhabitats. A higher number of individuals and higher species richness of generalists of saproxylic beetles was found in former plantation forest stands.
Based on the result, I can argue that former spruce plantation forest stands are not necessarily low in biodiversity, as it is often identified in other studies. Especially conifer specialists of saproxylic beetles profit from former plantations. Furthermore, the study highlighted the importance of tree-related microhabitats for broadleaf specialists in both – former plantation and natural forest stands. This study gains insights into the question of how to deal with former plantation forest stands. Furthermore, the results contribute to refining forestry management and conservation actions. For instance, new zonation strategies in National parks can indeed include former plantation forest stands, if trees with microhabitats are actively promoted.

Splnění kontrolovatelných výsledků řešení.

I wrote the manuscript and submitted it to Forest Ecology and Management. It was rejected, but it can be resubmitted with profound changes. However, due to my current pause in the doctoral study, I could not manage to continue it. I plan to continue in the future. I attached the current state of the manuscript.

Uveďte jen výstupy, které vznikly na základě řešení tohoto projektu. Dále uveďte, zda byly publikace skutečně zadány do OBD s vazbou na RIV.

U výstupů Jimp a Jsc uveďte do závorky plánovaný a skutečný kvartil časopisu.

Tab. 1 Sumář výstupů řešení projektu

Typ výstupu	Plán	Skutečnost	Poznámka
Hodnocené výstupy projektu			
Jimp (databáze WoS)	1	0	Plán v 3. roce projektu
Jsc (databáze Scopus)			
B (recenzovaná odborná kniha)*			
C (kapitola v recenzované odborné knize)*			
D (článek ve sborníku ve WoS, Scopus)			
P (patent)			

* Pouze renomovaná nakladatelství Elsevier, Springer, Bentham apod.

Počet výsledků			
Nehodnocené výstupy projektu			
Počet obhájených dizertačních prací			
Počet obhájených diplomových prací			
Počet výsledků			

Ke zprávě přiložte:

a) výpis z OBD – výstupy podpořené tímto projektem.

Datum: Podpis odpovědného řešitele: