

# Vegetation changes in Czech lowland forests over the past decades

Martin Kopecký

## ABSTRACT

To explore decadal changes in plant species diversity and composition of typical lowland forests in the Czech Republic, I compared vegetation on plots sampled decades ago with vegetation on the same plots sampled recently.

First I evaluated the robustness of the approach used in my thesis. In Chapter 1, we provided the first direct test of the effect of uncertainty in original plot location on results from vegetation resurvey. We found that temporal trends in vegetation diversity and composition were comparable between exactly relocated permanent and only approximately relocated semi-permanent plots. Therefore, we conclude that the resurvey of semi-permanent plots is robust to the uncertainty in original plot location.

Then, we showed that vegetation in lowland oak forest shifted from species-rich communities of thermophilous forest toward species poorer communities of mesic forest (Chapter 2). The species typical for thermophilous oak forests and nationally endangered species suffered the most significant decline. We identified as the main driver behind these changes shift from traditional coppicing toward high forest management after WWII.

Further, we explored the processes behind temporal shifts in species diversity and composition after the abandonment of coppicing (Chapter 3). To disentangle simultaneous changes in species richness and composition, we developed a novel Temporal Nestedness Analysis. We found that the main process was the ecologically non-random extinction of originally present light-demanding species. Therefore, the current vegetation is impoverished, compositionally nested subset of previously species rich assemblages historically maintained by regular coppicing.

We also assessed the long-term effects of highly invasive herb *Impatiens parviflora* on forest plant community in lowland forest (Chapter 4). Specifically, we tested if the invasion of *Impatiens parviflora* contributed to the vegetation changes described in Chapter 3. We found that, despite common believe, the massive invasion of this species did not affect plant communities even after decades from its invasion. *Impatiens parviflora* was therefore passenger, not driver of the observed vegetation change.

In summary, my thesis showed that 1) vegetation of studies lowland forests substantially changed during last decades, 2) important driver of these changes has been abandonment of traditional coppicing, 3) the main process after abandonment of coppicing was the non-random extinction of light-demanding species and 4) at least some highly invasive species are passengers rather than drivers of these changes.