

ABSTRACT

The structure of forests is changing and forests, earlier more open due to grazing, today have closed canopies. Also, many forests that earlier were more natural, are today clear cuts or plantations. These changing conditions are problematic, since some species may be lost due to structural changes. This thesis is based on a study of 25 closed canopy deciduous forests in southern Sweden, dominated by broadleaved trees (mainly oak) and subjected to secondary succession for 40-70 years. By partial cutting, one may harvest bio-fuel in such stands (a CO₂-neutral energy source), leading to a more open forest that potentially may favour species that today decreases.

The thesis evaluates conservation problems for small, valuable broadleaved oak-rich stands. For wood living beetles species richness and species assemblages differed markedly between standing and lying dead oak wood (snags and logs). Species eating fungi or mycelia seem to prefer the oak logs (which were rich in species), whilst some species that prefer less decayed wood are more common in snags. Thus, for protection of the saproxylic beetle fauna of oaks wood we need to save, and/or create both standing and lying dead oak wood.

Factors, and scales at which these factors influence local biodiversity of three invertebrate groups (wood living beetles, land molluscs and mycetophilids), were studied for the 25 stands. Local species richness of land molluscs, the least mobile species group, was influenced by local factors such as litter-pH (positive influence in regression models) and canopy openness (negative influence), but also by the degree of openness in the surrounding landscape, (negative influence), and the amount of woodland key habitats (conservation forests, positive influence). In addition, similar factors influenced species composition of the molluscs (ordination analyses). For species richness of the more mobile groups, the mycetophilids and the beetles, landscape factors were more important than local factors. For mycetophilids, precipitation was the most influential variable in regression models, followed by longitude and amount of mixed-species woodland key habitat within a 1 km radius of sites. For species richness and composition of saproxylic beetles, the amount of oak dominated woodland key habitat within a 1 km radius and regional amounts of dead oak wood were most influential, while local habitat variables had weak influence in the models. Thus, the surrounding landscape is important for the local fauna of these groups, and for future conservation and management of these and probably other invertebrates, the landscape must be considered in planning.

The final experimental study concerns forest secondary succession and the loss of openness in these forests. Conservation oriented partial cutting was evaluated, where we saved old, hollow, and dead trees (valuable for biodiversity), and harvested 20 to 30% of the standing basal area of trees. Comparisons between experimental and reference plots before and after felling showed that, on a short-term basis, species richness of oak connected saproxylic beetles and herbivorous beetles increased in harvested plots, and composition of both beetle groups changed. Sixteen out of 62 tested species increased in the managed stands and no species decreased. Species of special conservation concern (red-listed) were not, or little affected. Thus, the short-term impact was positive for the diversity of beetles and this forest management technique is one way of altering secondary succession in these forests, and increasing bio-energy harvest.

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