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Biodiversity and forest structures at the Zurich Wilderness Park Sihlwald

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Summary

To understand biodiversity patterns and to improve conservation measures, detailed knowledge of the influencing environmental factors is needed. One of the most important factors is the availability of specific required habitats. Instead of looking into size and connectivity of habitat patches, the new habitat amount hypothesis proposes that only habitat amount in the local landscape affects species richness (FAHRIG, 2013; SEIBOLD et al., 2017). In forest ecosystems, dead wood plays a major role as habitat for hundreds of species that depend on it, so called saproxylic species (STOKLAND et al., 2012). This species guild is often used as an ecological indicator for near natural forests because saproxylic species are sensitive to the amount and quality of dead wood and other old-growth structures (LACHAT et al., 2012; NORDÉN et al., 2007). Considering this, the communities of saproxylic beetles, wood inhabiting fungi, mosses and lichens are investigated in the Zurich Wilderness Park Sihlwald.

The Sihlwald forest was used for timber production for over 500 years and is protected as a natural forest reserve since 2007. Therefore, the forest is still recovering from the intensive wood harvesting, which already stopped in 2000, and stands at the beginning of its development back into an old-growth forest. On the one hand, we want to understand how the forests history and development, which are reflected in the currently available forest structures, influence the present biodiversity. On the other hand, we want to draw a picture about a possible development. Therefore, we posed the following questions:

1. Which environmental factors are influencing the different species groups?
2. How does habitat availability (e.g. dead wood) in terms of quantity and distribution influence biodiversity and at which spatial scale can we find effects?

The four species groups (saproxylic beetles, wood inhabiting fungi, mosses and lichens) were investigated at 69 plots selected from the cantonal forest inventory. The plots were chosen along a gradient of dead wood amount and spatial connectivity. These gradients were calculated from a dead wood map, which was created with LiDAR-data and completed manually with 3D aerial photographs. The cantonal inventory provides information about forest structures and development at each plot, as it was carried out three times since 1981 and will be repeated in 2017. At each plot, wood inhabiting fungi, mosses and lichens were inventoried. Saproxylic beetles were collected with two flight interception traps installed on each plot.

For further testing of the habitat amount hypothesis, we use an experimental approach, where we control the size of the local habitat patch. At each plot four beech branch bundles of different sizes were installed. The bundles stay in the forest for one season and will be colonized by saproxylic beetles, before they are collected in autumn 2017 and reared in emergence traps for one year. With this experiment, we can study the effect of habitat amount and connectivity on dead wood colonization processes in different constellations: from high habitat amount and well connected to low habitat amount and isolated.

In total over 400 wood inhabiting fungi, 150 mosses and 130 lichens were recorded in the Sihlwald forest and their dependence on dead wood and old-growth forest structures is now analysed. Within these three groups, already some rare and highly specialised species, characteristic for old-growth forests, were found. The determination of the saproxylic beetles is still under way and the first results are expected for autumn.

References

FAHRIG, L. (2013). Rethinking patch size and isolation effects: the habitat amount hypothesis. Journal of Biogeography, 40(9), 1649–1663.

LACHAT, T., WERMELINGER, B., GOSSNER, M. M., BUSSLER, H., ISACSSON, G., & MÜLLER, J. (2012). Saproxylic beetles as indicator species for dead-wood amount and temperature in European beech forests. Ecological Indicators, 23, 323–331.

NORDÉN, B., PALTTO, H., GÖTMARK, F., & WALLIN, K. (2007). Indicators of biodiversity, what do they indicate? – Lessons for conservation of cryptogams in oak-rich forest. Biological Conservation, 135(3), 369–379.

SEIBOLD, S., BÄSSLER, C., BRANDL, R., FAHRIG, L., FÖRSTER, B., HEURICH, M., HOTHORN, T., SCHEIPL, F., THORN, S., & MÜLLER, J. (2017). An experimental test of the habitat-amount hypothesis for saproxylic beetles in a forested region. Ecology, 98(6), 1613–1622.

STOKLAND, J. N., SIITONEN, J., & JONSSON, B. G. (2012). Biodiversity in Dead Wood. Cambridge.

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