

# Nitrogen deposition and leaching in European forests

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## Abstract

This presentation will review the evidence from intensive and extensive forest monitoring and experimental research on the nitrogen deposition to European forests and the impacts on nitrogen leaching. The influence of region, climate, forest type and age and soil type across different spatial scales on the variability of nitrogen deposition and leaching will be discussed. The form and fate of nitrogen in deposition and leaching will be considered. The role of the forest canopy in nitrogen generation and transformation will be discussed as well. The importance of small-scale nitrogen deposition variability and its impact on nitrogen leaching will be demonstrated.

Keywords: nitrogen deposition, forests, forest soils, nitrogen leaching, Europe

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## 1. Nitrogen deposition

Recent evaluations reported that the average deposition of inorganic nitrogen across all land-use types in Europe decreased and the trends were spatially heterogeneous (Schmitz et al., 2019). Forests in Central and Western Europe have seen a decrease in nitrogen deposition while not reduction has been observed in Northern Scandinavia and parts of Southern Europe. However, with 62% of European ecosystems area exceeding the critical nitrogen loads in 2015 (Slootweg et al., 2015), forests are still at risk of eutrophication and concerns about forest nutrient imbalance, nitrate leaching, changes in forest carbon and GHG mitigation potential and the impact on biodiversity remain.

## 2. Nitrogen leaching

European wide (Iost et al., 2012) and site-specific studies (e.g. Vanguelova et al., 2010) from the 1990's to 2006 have not detected decrease in inorganic nitrogen in soil solution in forest ecosystems. A more recent European evaluation (from 1995 to 2012; Johnson et al., 2018) showed a weak significant ( $p < 0.1$ ) reduction in nitrate concentration at deep 40–80 cm soils and no significant trend in shallow 10–20 cm soils. Nitrogen leaching is influenced by forest type, age and soil type amongst other factors and will also widely depends on the amount and fate of nitrogen deposition. Thus, trends of nitrogen leaching are region and scale specific.

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## References

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