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# **IUFRO 2015**

## **International Congress**

### **GreenInUrbs & IUFRO RG 7.01**

**International Congress**

# **Global Challenges of Air Pollution and Climate Change to Forests**

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## Modelling the impact of climate change and atmospheric N deposition on french forests biodiversity

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### Abstract

Since the 1980's, within the Geneva Convention on Long-Range Transboundary Air Pollution, European countries have joined their efforts to abate atmospheric acid pollution. Nevertheless, nitrogen emissions and depositions remain significant under ongoing climate change. Nitrogen atmospheric deposition is known to severely impact ecosystem functioning by influencing soil biogeochemistry, nutrients balance and, consequently, tree growth, forest health and biodiversity. The concept of "critical loads" was used and models were improved to mitigate the impacts of N deposition, by considering conjointly effects of climate change and N atmospheric deposition, to assess the evolution of forest ecosystem status over time. The purpose of this study is to predict forest vegetation response to the combine effects of nitrogen atmospheric deposition and climate change by using a dynamic coupled biogeochemical-ecological model (ForSAFE-Veg). The Veg module is composed of 476 understory plant species representative of the main French forest ecosystems, and parameterized for a set of environmental factors based on expert advices. In this study, we propose a new parameterization for six main factors using statistical regressions models based on measured data for about 4000 forest sites. After validation using another independent set of vegetation relevés, the biogeochemical model ForSAFE-Veg was run using the most appropriate Veg module, on three forest sites from the french ICP Forest network. Changes in biodiversity were estimated by analysing the evolution of plants cover over 100 years, and considering the impacts of climate change and atmospheric nitrogen deposition scenarios separately and conjointly. The modelling outputs were considered at both species and ecological functional groups scales, to evaluate their relevance in characterizing nitrogen deposition influence on biodiversity. This will allow generalizing this approach to other species for which environmental factors are not easy to parameterize.

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