

# Critical Load of atmospheric nitrogen deposition in French forests: modelling soil and vegetation response in a context of climate change

Simon RIZZETTO<sup>1,2</sup>, Noémie GAUDIO<sup>1,2</sup>, Salim BELYAZID<sup>3</sup>, Jean-Claude GEGOUT<sup>4</sup>, Didier ALARD<sup>5</sup>, Emmanuel CORCKET<sup>5</sup>, Harald SVERDRUP<sup>6</sup>, Anne PROBST<sup>1,2</sup>.

<sup>1</sup> Toulouse University; INP, UPS; EcoLab (Laboratoire écologie fonctionnelle et environnement), ENSAT, Avenue de l'Agrobiopole F-31326 Castanet Tolosan

<sup>2</sup> CNRS; EcoLab F-31326 Castanet Tolosan

<sup>3</sup> Belyazid Consulting and Communication AB Österportsgatan 5C, S-21128 Malmö

<sup>4</sup> AgroParisTech, UMR 1092 INRA-AgroParistech, Laboratoire d'Etude des Ressources Forêt-Bois (LERFoB), 14 rue Girardet, F-54000 Nancy, France

<sup>5</sup> UMR BioGeco INRA Bordeaux, France

<sup>6</sup> Applied Systems Analysis and Dynamics Group, Chemical Engineering, Lund University, Box 124, S-22100 Lund

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Anthropogenic activities highly contributed to increase nitrogen and sulfur atmospheric emissions since 1880. Nitrogen deposition is known to severely impact ecosystem functioning by influencing soil biogeochemistry, nutrients balance and, consequently, tree growth, forest health and biodiversity. Since the 1980's, within the Geneva Convention on Long-Range Transboundary Air Pollution, European countries have joined their efforts to abate atmospheric pollution. The concept of "N critical loads" was developed to mitigate the impacts of N deposition. Moreover, because climate influences greatly soil processes, climate change and atmospheric deposition must be conjointly taken into account 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 the dynamic coupled biogeochemical-ecological model (ForSAFE).

We run this model for various climatic and deposition scenarios on several temperate French forest sites, from nowadays to 2100. The outputs of the biogeochemical model were used as inputs to a vegetation table compiling reference ecological parameters for more than 450 species. We present the results of the biogeochemical response namely the changes in soil parameters and illustrate the response of the vegetation groups regarding vegetation cover.