Project Database of ICP Forests

PROJECT DESCRIPTION

PROJECT INFORMATION

Project title:	**Evaluation of forest dieback effect on dead wood amount and ground vegetation biodiversity**
Project ID:	211
Contact person:	Jérémy Cours // jeremy.cours@inrae.fr

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My thesis focuses on the effects of forest dieback and decline on stand structure, more specifically tree-related microhabitats, and biodiversity. Forest dieback and decline induce tree mortality that deeply alters forest ecosystems: environmental conditions become more open and deadwood resources increase accordingly. This may deeply change the habitat availability for forest organisms and have marked cascading effects on forest communities. In this context, we also work with French Forest Health Department (DSF), supplier of annual crown condition data in France on the 16*16km systematic grid.

We expect that forest dieback and decline (both characterised by crown condition and tree vitality) should have a positive influence on the deadwood pool at the stand scale. However, this has not yet been duly demonstrated. Since forest decline can be a gradual and long-term phenomenon, we also hypothesize delayed impacts on the deadwood pool. According to their physiological or morphological features, tree species can vary in their tolerance and response to disturbances and may therefore differently accumulate deadwood resources. At a larger scale, we also expect the disturbance regimes behind forest diebacks and declines to be different for each biome (e.g. windstorm under oceanic climate, fire under Mediterranean climate), which would likely affect the pattern of deadwood accumulation. Furthermore, we expect a strong impact of these disturbances on ground vegetation due to changes in microclimatic conditions (e.g. more light) and changes in nutrient cycling within forest ecosystems. Therefore, we would like to test several hypotheses:

(i) Forest decline gradually increases the amount and diversity of deadwood pool at the stand scale;
(ii) Changes in deadwood pool depend on forest biome (Mediterranean, temperate, mountain and boreal forests) and dominant tree species;
(iii) Forest dieback and decline should have marked cascading on ground flora communities.

In this framework, we would use univariate and multivariate statistical methods. To assess changes in deadwood pools along the dieback/decline gradient, we would implement mixed regressions, with biome and tree species as fixed effects and geographic random effects. We also want to achieve independent analyses for each biome and tree species that include sufficient data amount. In addition, to take into account the cumulative effect of dieback/decline over time, we would implement time series analyses. The evaluation of changes in ground flora communities would imply the use of classical statistical tools in community ecology, such as assemblage comparisons (PERMANOVA). Regressions would also be performed to study relationships between the forest dieback/decline level and diversity indices of ground flora.

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Extensive data from ICP Forests (16*16 systematic grid, EU Forest Monitoring Level I) represent a great opportunity to conduct a correlative study between past crown conditions and deadwood pool. They consist of a large number of plots and variables, including annual surveys of crown condition. The deadwood pool was described in 2005-2008 in the framework of the BioSoil project. In addition, we could rely on ground vegetation data on these plots (vascular plants, and even bryophytes and lichens on a few plots). Therefore, we make an official request for access to your data. We will obviously respect the rules for the use of data.

Supervisors: Dr Christophe Bouget; Dr Aurélien Sallé