LeafMap

Long term after-effects of forest management practices

Principle investigator: Pierre MONTPIED

Partners: BEF, LOTERR (UL EA 7304)

Collaboration: B. Zeller (BEF), X. Rochel (LOTERR), J.-L. Dupouey (EEF)

Context — The long-term effects of a former agricultural land use on the current state of forest ecosystems after forest recolonisation are relatively well documented. The long-term after-effects of forest management are much less known whereas it is important to assess its consequences on soils, productivity or biodiversity in the context of the current incentives to increase extraction of biomass from forests.

Significant changes in forest management occurred during the nineteenth century in relation to industrial revolution, which resulted in a decrease in the timber extraction on some forests that were previously assigned to intensive production of fuelwood. If the immediate effects of this overexploitation have been widely studied, the long-term resilience of forest ecosystems to these practices remains widely unknown.

Objectives — The objective of the study was to test the hypothesis that intensification of wood extraction from forest would in the long term impair future productivity and biodiversity through soil and floristic impoverishment.

Approach — We compared formerly over-exploited forests with neighbouring less exploited ones to study the long-term impacts of these high harvest levels on soil and vegetation of forest ecosystems.. Tree inventories, floristic surveys and soil analysis including innovative NIRS-MIRS methods were carried out for this purpose. Two annual campaigns were realized, the first one (2014) compared the former "quarts en réserve" and "coupes affouagères" in the municipal forests of the Plateau Lorrain, the second one (2015) studied forests formerly devoted to fuelwood production for the "Salines de Lorraine".

Key results —

- Weak long-term impact of the past management intensity on the vegetation and the studied soil parameters;
- Some species have been highlighted as preferring the formerly over-exploited forests or conversely less intensely exploited;
- The NIRS-MIRS soil analysis revealed differences in spectra between the former levels of exploitation intensity which were not in relation with results from soil analyses and remain therefore difficult to interpret.

Main conclusions including key points of discussion — Report of an apparently weak long term impact of the former modes of management on the Lorraine forests should not lead to the conclusion of the harmlessness of these management policies as far as strong uncertainties remain on the respect, till the beginning of the XIXth century, of the prescriptions we find in archives. It is very possible, in particular, that, often, the extraction of fuelwood was as strong in the "protected" forests than in the others and that, consequently, the overexploitation was generalized.

Future perspectives — This study has highlighted the difficulty of identifying accurate controls when studying the impact of ancient land uses on current ecosystems. More targeted studies, such as case studies, based on accurate historical (archival) data, would allow to improve our knowledge.

Valorisation —

Presentations at conference

Dupouey J.L., Bergès L., Chauchard S., Cordonnier T., Feiss T., Leroy N., Montpied P., Rochel X., 2017, Forest ecosystems: all ancient human actions do not equally matter. Into the woods, Overlapping perspectives on the history of ancient forests, Int. Conference, Padua, Italy, 18-20/04/17. [invited conference]

Student theses

Vauchelet C., 2014. Long term impacts of forest management on forest ecosystem : the case of “quart de réserve” in Northeast France. Mémoire de master 2, Université de Lorraine, Nancy, 40 p.

Gaudare R., 2014. Impacts à long terme de la gestion forestière sur l'écosystème forestier, Mémoire de master 1, Université de Lorraine, Nancy, 24 p.

Balloux, G., 2015. Impact de la gestion forestières à long terme sur l'écosystème forestier : Le cas des bois de salines de Lorraine. Mémoire de master 2, Université de Lorraine, Nancy, 22 p.

Tacussel V., 2015. Impacts à long terme de la gestion forestière sur l’écosystème forestier : cas des forêts des salines de Lorraine, Mémoire de master 1, Université de Lorraine, Nancy, 23 p.

Reports

Dupouey J.L., Besoain R., Chauchard S., Feiss T., Laigle I., Montpied P., Rochel X., Cordonnier T., Bergès L., 2014, Identifier les facteurs historiques de vulnérabilité dans la relation sylviculture-biodiversité, projet FORGECO, programme ANR Systerra, Compte-rendu de fin de projet, Annexe Ia, 52 p.

Dupouey J.L., 2014 & 2015, Impacts des occupations anciennes sur la biodiversité et la fertilité des sols, Formation nationale ONF "Patrimoine culturel, historique, archéologique et gestion forestière", Velaine-en-Haye.

Dupouey J.L., 2015, Changements à long terme des écosystèmes forestiers et de leur place dans les paysages, Journée du Conseil Scientifique de l'ONCFS, Paris.

Public conference

Dupouey J.L., 2016, Les changements d'usage des sols et leurs impacts sur la biodiversité, conférences du Château de Tichémont (Giraumont, 54).

Dupouey J.L., 2016, Les changements d'usage des sols et leurs conséquences sur la forêt, ou l'alliance de l'histoire et de la biologie, conférence invitée à l'Association Philomatique d'Alsace et de Lorraine, Strasbourg.

Media

08/06/16 – L'action de l'homme sur les forêts est difficilement réversible, selon l'Inra. Agrafil.

08/06/16 - Quel avenir pour nos forêts ? Juste Avant de Zapper, Mirabelle TV.

10/06/16 - L'action de l'homme sur les forêts, difficilement réversible, La Moselle Agricole.

10/06/16 – L'action de l'homme sur les forêts est difficilement réversible, selon l'Inra. La Marne agricole.

13/06/16 – L'action de l'homme sur les forêts est difficilement réversible, selon l'Inra. AgraPresse Hebdo.

07/06/16 – 19/20 FR3 Lorraine, reportage de L. Parisot, Y. Quemener et A. Parvillez.

2017 – Arte, série « 24h en France », reportage sur les changements d'usage du sol. Réalisateurs : R. Théron et E. Darblay (Point du jour). Diffusé les 16/01/17 et 16/09/17.