CL/01

FORBIO - Results

Assessment of the effects of tree species diversity on forest biodiversity and ecosystem functioning

DURATION OF THE PROJECT
15/12/2007 – 13/06/2010

BUDGET
99.698€

KEYWORDS
Ecosystem functioning, functional biodiversity, biodiversity experiments, temperate forest, mixed forest, stakeholder perceptions, sustainable forest management.

CONTEXT

Forests are biodiversity hotspots worldwide with 70% of terrestrial biodiversity being included in forested landscapes. However, deforestation, forest degradation and fragmentation lead to an increasing rate of species extinctions. Hence, predicting the consequences of changes in species numbers, in distribution patterns of taxa, and of shifts in dominance, has become a major challenge for community and ecosystem ecology. However, until now the relationships between biodiversity and ecosystem functioning in forests have been largely underexplored

OBJECTIVES

Therefore, the overall aims of the BELSPO cluster project FORBIO are: to review, synthesize and disseminate existing knowledge about the benefits and drawbacks of mixed stands vs monocultures (WP1); and to establish a highly innovative, large-scaled forest biodiversity experiment to evaluate the impact of increasing tree diversity on forest ecosystem functioning (WP2).

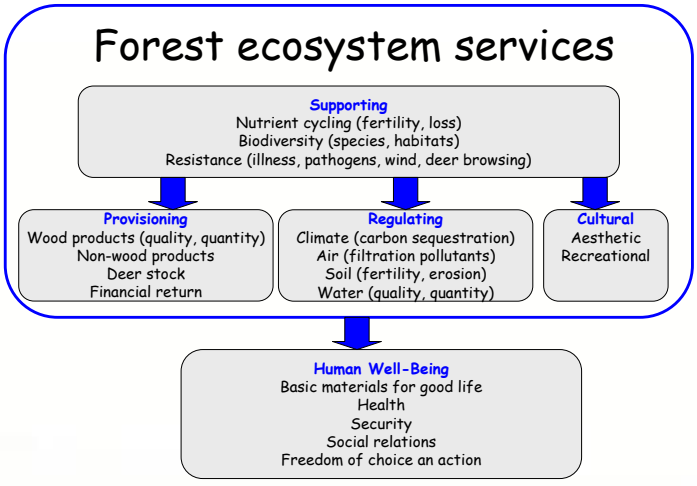

Figure WP1.1: Forest ecosystem goods and services addressed in this study and their relation to well-being (modified from MEA 2005 & Sepälä et al. 2009).

MAIN CONCLUSIONS/RECOMMENDATIONS

To achieve the first objective, a so-called 'white paper' has been compiled by the FORBIO team members which has been published in Dutch as a special issue of the BosRevue and in French as a special issue of Forêt Wallone. Among stakeholders, many different opinions exist about the functioning of mixed forests and therefore the scientific evidence was confronted with stakeholder perceptions on ecosystem services in mixed forests compared to monocultures. The principal outcome was that stakeholders appear to have quite strong opinions on the functioning of mixed vs monoculture stands, whereas the review of the scientific literature highlighted the lack of specific information on forest ecosystem services in mixed forests compared to monocultures, in particular from studies where confounding factors can be eliminated or accounted for.

The second objective was met by establishing two large-scaled tree diversity experiments in Zedelgem (Flanders) and Gedinne (Wallonia). Based on a state-of-the-art experimental design, 32 810 and 33 304 trees of five different species were planted in 42 and 44 experimental plots in Zedelgem and Gedinne, respectively. A third experiment with a similar design will be established in Hecthel-Eksel (Flanders) in 2011

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Figure WP2.12: Diversity treatments allocated to the 42 experimental plots at the Zedelgem site.

CONTRIBUTION TO A SUSTAINABLE DEVELOPMENT POLICY

FORBIO's short-term contributions to sustainable development are mainly related to the fact that the project has introduced the state-of-the-art concepts and empirical support on the various relationships between biodiversity and ecosystem functioning to a large audience of forest owners, managers, users and scientists in Belgium. In the long-run, FORBIO will significantly contribute to a better understanding of the importance of tree species diversity for the functioning of forest ecosystems and the ecosystem services that they provide thanks to the establishment of the two (and soon three) large-scaled tree diversity experiments. Furthermore, the experiments, embedded in the worldwide TreeDivNetwork, will most likely continue to act as an attractor for researchers from Belgium and abroad.

TreeDivNet: the world's largest experimental platform for ecosystem research

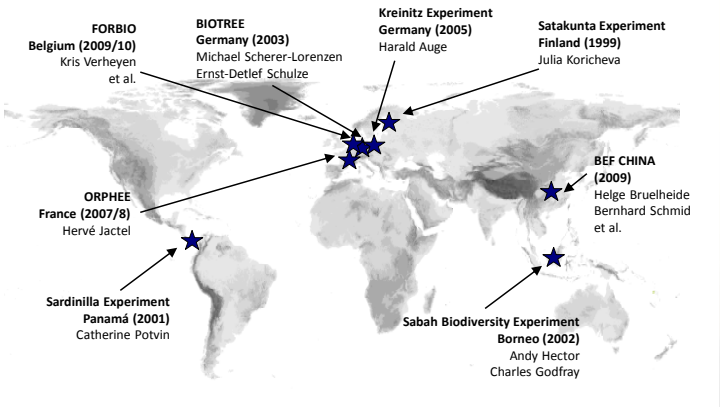

Figure WP1.4: Map showing the locations of the tree diversity experiments that participate in TreeDivNet. Together these experiments make the world's largest experimental platform for ecosystem research

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