

IUFRO Spotlight is an initiative of the International Union of Forest Research Organizations. Its aim is to introduce, in a timely fashion, significant findings in forest research from IUFRO officeholders and member organizations to a worldwide network of decision makers, policy makers and researchers.

IUFRO will encapsulate, and distribute in plain language, brief, topical and policy-relevant highlights of those findings, along with information on where/how to access the full documents. The **IUFRO Spotlight** findings will be distributed in a periodic series of emails as well as blog postings.

Mixed species growth predictions made easy – well, easier

IUFRO Spotlight #25 / August 2014

A recent study indicates why it is difficult to predict how mixed-species forests or plantations will grow, but makes those predictions easier by discussing the processes that drive changes over space and time in species interactions.

Since tree species mixtures are regarded as one of the most important approaches to reduce the risks to forests posed by global change, the study's conclusions will be of interest to forest managers or policy makers using mixed-species forests or plantations.

Entitled ***The spatial and temporal dynamics of species interactions in mixed-species: From pattern to process***, the study is by Dr. David Forrester, Chair of Silviculture, Faculty of Environment and Natural Resources, Freiburg University, Germany.

He says many studies have examined how species interactions influence the growth of mixtures, but few have examined how spatial and temporal differences in resource availability or climatic conditions can influence these interactions.

This study gives a conceptual model that fits all the studies found in the literature – something that had not been done previously, Dr. Forrester says.

The reason it had not been done before, he notes, is because no explanation was given for why positive interactions between tree species might increase as resource availability or climatic conditions improve.

There has been a perception that positive interactions will increase in importance as growing conditions become harsher, often indicated by site quality. While often true, this can be a misconception, he says, partly due to a large amount of literature from environments that are too harsh to support forests and where stand densities are likely to be much lower.

Secondly, he adds, this review notes that site quality is often not a good predictor of species interactions because it does not necessarily correlate well with the actual availability of water or of a given nutrient and it is these resources that influence species interactions, not site quality per se. However, many studies that examine spatial dynamics of species interactions do actually use site quality.

The study also points out important methodological contrasts between studies examining facilitation between tree species in forests or plantations compared with studies done in less productive ecosystems with lower densities and where facilitation is among herbs, grasses and shrubs rather than different tree species, he adds. Those studies sometimes confound stand density with species composition, which is an important distinction in productive systems like forests.

The take-home messages for managers and policy makers, says Dr. Forrester, are:

- that mixed species forests or plantations could be useful ways to improve productivity levels and product diversity in comparison to monocultures;
- that different types of mixtures will be good where resource availability is low compared with sites where availability is high; and
- that matching the types of species interactions with the existing growth limiting factors is critical.

Dr. Forrester's review shows the different spatial and temporal patterns that have been observed and provides explanations about the processes involved and is now being used as a framework to test process-based growth models that could be used as a tool by foresters and policy makers.

The full study can be found at:

https://www.waldbau.uni-freiburg.de/news_events-en/Review_Mixture_interaction_en?set_language=en

The findings reported in *IUFRO Spotlight* are submitted by IUFRO officeholders and member organizations. IUFRO is pleased to highlight and circulate these findings to a broad audience but, in doing so, acts only as a conduit. The quality and accuracy of the reports are the responsibility of the member organization and the authors.

Suggestions for reports and findings that could be promoted through *IUFRO Spotlight* are encouraged. To be considered, reports should be fresh, have policy implications and be applicable to more than one country. If you would like to have a publication highlighted by *Spotlight*, contact: Gerda Wolfrum, IUFRO Communications Coordinator, wolfrum(at)iufro.org

The International Union of Forest Research Organizations (IUFRO) is the only worldwide organization devoted to forest research and related sciences. Its members are research institutions, universities, and individual scientists as well as decision-making authorities and other stakeholders with a focus on forests and trees. Visit: <http://www.iufro.org/>



Measuring transpiration by collecting sap flow data from a Eucalyptus globulus tree that is growing in a mixed species plantation with Acacia mearnsii. This will be used to under-stand the processes driving species interactions in these mixtures. (Photo by David Forrester; Cann River, Australia)