PhD opportunity

The influence of tree diversity on drought resistance and resilience

As part of a recently funded BIODIVERSA project **MixForChange,** the Chairs of Silviculture and of Geobotany at the University of Freiburg invite applications for a 3-yr joint doctoral position focusing on the role of tree diversity on resistance and resilience of trees and forest communities to drought. **Starting date 01.01.2021, subject to the final approval of funding**.

Project description: The ongoing increase in the severity of droughts and biotic attacks driven by climate change puts forests under threat and compromises their ability to act as carbon sinks. In the face of climate change, adaptation of and mitigation by forests are ultimately linked, because the ability of forests to sequester carbon in the long run depends on the ability of tree species and communities to cope with multiple stresses. A growing body of evidence suggests that mixed forest plantations, i.e., plantations where several tree species (or varieties) are mixed, can be more efficient in sequestrating C, while better coping with climate change-related stress and other biotic disturbances.
The overall objective of the MixForChange project is to promote mixed-species forest plantations as nature-based solutions to fight the causes and consequences of climate change, by providing science-based recommendations and guidelines endorsed by forest owners, managers and policy-makers. The project will rely on an existing unique global network of forest biodiversity experiments (TreeDivNet, http://www.treedivnet.ugent.be/index.html), which are based on a common, statistically sound design that allows for the effects of tree species composition on ecosystem services and functions to be tested. One goal is to provide a mechanistic understanding of why and how tree diversity, species identities, water availability and management (thinning and fertilization) influence the potential of forest mixed plantations to mitigate (C sequestration) and adapt (stress resilience) to climate change.
The major task of this PhD project is to analyse (a) how tree diversity enhances overall tree growth and survival in relation to drought stress, and (b) whether vulnerability of individual tree species to drought stress and related mortality increases or decreases with diversity and to what extent this depends on species-specific traits (related to water use and hydraulic safety) in relation to those of the tree community weighted means of traits. This work will be based on inventories conducted in selected TreeDivNet experiments, following very dry years in large parts of Europe (2018-2020). In addition, the growth response of trees to droughts will be quantified retrospectively using a dendro-ecological approach using tree cores to determine resistance, recovery and resilience of diameter growth in stems and coarse roots. Water-related traits will be taken from available datasets and additional measurements will be carried out for *ca.* 15 missing species. The water use efficiency of trees will be assessed using δ13C isotope measurements of wood from dry and moist years in contrasting experiments.

Candidate profile: We are looking for a highly motivated and co-operative person with a strong background in forest ecology and growth, tree physiology, or related fields. The ideal candidate will have demonstrated his/her ability to successfully carry out relevant research, data analyses and communicate the results. Experience in publishing in scientific journals is desirable. The applicant should be able to independently plan and undertake field sampling

and coordinate the work with other project partners. Prolonged periods working in the field at different sites in Europe are required. A strong statistical background and experience with R is desirable. A strong command of English is indispensable. For international candidates, knowledge of German (or a willingness to learn) would be beneficial during fieldwork and to enhance the experience of living and working in Germany.
Salary is the German standard for doctoral students (TV-L E13 65%) and a starting date in January 2021 is anticipated. The University of Freiburg is an equal opportunity employer and encourages women to apply. Severely disabled applicants with equal qualification and aptitude will be given preferential consideration. For international candidates, the University of Freiburg offers support with the logistics of relocating to Germany (http://www.welcomecenter.uni-freiburg.de).

Founded in 1457, the University of Freiburg is one of the oldest German universities and now one of the nation's leading research and teaching institutions. Freiburg is a vibrant student city at the foot of the Black Forest in close vicinity to France and Switzerland, with a rich cultural and academic life and excellent recreational opportunities.

Your application will consist of a letter of motivation, a CV, academic transcripts (non-official copies are acceptable), and contact details of at least two academic references. Please send your application **as a single PDF** by email with the subject "PhD position in MixForChange" by 15th November, 2020 to Ursula Eggert (ursula.eggert@waldbau.uni-freiburg.de). Questions regarding the content of the project may be addressed to Profs. Bauhus and Scherer-Lorenzen (juergen.bauhus@waldbau.uni-freiburg.de, michael.scherer@biologie.uni-freiburg.de).