Multi-Trophic Interactions in a Forest Biodiversity Experiment in China

We offer **nine positions within the newly established DFG Research Unit *MultiTroph* FOR 5281.**

The Research Unit *MultiTroph* is part of the Biodiversity-Ecosystem Functioning China **(BEF-China)** research platform. The platform was established in 2008 by Chinese, German and Swiss researchers (https://bef-china.com) and comprises the worldwide largest tree diversity experiment.
MultiTroph aims to identify mechanisms underlying the relationships between biodiversity and ecosystem functions across different trophic interactions along the experimental tree diversity gradient of BEF-China. **The ultimate goal is to connect the different interaction types to large food webs in the context of tree diversity loss**. Prof. Dr. Alexandra-Maria Klein from the University of Freiburg, (www.nature.uni-freiburg.de) leads the Research Unit in collaboration with Prof. Dr. Chao-Dong Zhu, Institute of Zoology, Chinese Academy of Sciences, Beijing, China (http://english.ioz.cas.cn) and with the German Centre for Integrative Biodiversity Research Halle-Jena-Leipzig (iDiv, www.idiv.de).

The **starting date for all positions is October 1st, 2022** with some flexibility if necessary.

The **submission deadline for applications is July, 15th 2022.**

1) Six research positions (f/m/d, 13 TV-L, 65%) for a period of 4 years aiming for a PhD degree

PhD 1 **Wood decomposition and decomposer interactions**
Subject: MultiTroph_SP1_PhDposition
Prof. Dr. Heike Feldhaar, University of Bayreuth, Dr. Simon Thorn, University of Würzburg. The PhD student will be enrolled at the University of Bayreuth.
The candidate will study saproxylic insect communities. The candidate will extend previous work by including tree diversity as a driver of saproxylic insect communities and the entailing decomposition process. The goal is to disentangle the direct effects of tree diversity on decomposer communities from indirect effects mediated through environmental changes affecting the local species pool, thereby altering community assembly processes in dead wood or interactions between decomposers and organisms of other trophic levels.
Submit application documents to Feldhaar@uni-bayreuth.de

PhD 2 **Trophic-interaction and soil-erosion effects on soil-plant stoichiometry**
Subject: MultiTroph_SP2_PhDposition
Prof. Dr. Yvonne Oelmann, Prof. Dr. Thomas Scholten, Dr. Steffen Seitz, University of Tübingen
The candidate will study nutrients and their stoichiometry in soil, soil microorganisms and in plants. The candidate will continue the long-term monitoring of soil properties within BEF-China and study the influence of tree diversity on lateral matter transport by erosion including the redistribution of nutrients and other aboveground surface components like litter, pollen, plant debris, and organisms. The aim is to resolve whether higher trophic levels, for example soil microorganisms that consume tree litter, share the same responses to tree diversity as lower trophic levels and whether this is linked to erosion.
Submit application documents to yvonne.oelmann@uni-tuebingen.de

PhD 3 **Plant-herbivore-predator food webs, stoichiometry and functions**
Subject: MultiTroph_SP3_PhDposition
Assoc. Prof. Dr. Jana Petermann, University of Salzburg, Prof. Dr. Andreas Schuldt, University of Göttingen. The PhD student will be enrolled at the University of Salzburg.
The candidate will study plant-herbivore-predator arthropod food webs and will extend previous work in BEF-China by including multiple trophic levels and by linking these multitrophic communities and their interactions with biomass distributions and stoichiometry to enable an analysis of trophic pyramids and energy-based networks. The student will use classic collection techniques in the field, morphological species identification (assisted by barcoding approaches) and will study nutrient stoichiometry from trees to herbivorous insects and predatory arthropods.
Submit application documents to jana.petermann@sbg.ac.at

PhD 4 **Linking cavity-nesting bee and wasp food webs to other trophic interactions**
Subject: MultiTroph_SP4_PhDposition
Prof. Dr. Alexandra-Maria Klein, Dr. Felix Fornoff, University of Freiburg, Dr. Manuela Sann, University of Hohenheim. The PhD student will be enrolled at the University of Freiburg.
The candidate will generate and analyse interaction networks of cavity-nesting bees and wasps including their food resources and natural enemies using DNA barcoding and metabarcoding approaches. The candidate will use reed nests and layer nests to continue our long-term monitoring of trophic networks with direct feeding observations. The candidate will build up a reliable DNA barcoding approach that serves as the basis to establish high-resolution metabarcoding of cavity-nesting Hymenoptera food webs.
Submit application documents to alexandra.klein@nature.uni-freiburg.de

PhD 5 **Trophic interactions across tree regeneration stages**
Subject: MultiTroph_SP5_PhDposition
Prof. Dr. Alexandra Erfmeier, Prof. Dr. Tim Diekötter, Kiel University
The candidate will study seed predation and herbivory across tree regeneration stages with an entomocentric view of the Janzen-Connell hypothesis. By aiming to identify generalist and specialist agents of seed predation and seedling herbivory, this subproject will add a decisive component of the trophic network in forests. The candidate will quantify regeneration stages as well as pre- and post-dispersal seed predation and seedling herbivory of selected tree species with observational and experimental approaches in the field. Methods will include seed traps, bagging of fruits and seed cards to study seed predation, quantification of herbivory and recruitment success for selected tree species, and molecular techniques to identify insect agents delivering these functions.
Submit application document to aerfmeier@ecology.uni-kiel.de

PhD 6 **Trophic interactions and ecological functions of ants**
Subject: MultiTroph_SP6_PhDposition
Dr. Michael Staab, Technical University Darmstadt, Prof. Dr. Heike Feldhaar, University of Bayreuth. The PhD student will be enrolled at the Technical University Darmstadt.
The candidate will quantify ant diversity and trait distribution to functionally characterize ant communities in the BEF-China experiment. To investigate realized trophic niches, the candidate will perform resource-choice experiments and measure $\delta^{15}N$ isotope values. By integrating across components of biological organization in a key arthropod taxon, the research will unravel how the interplay among tree diversity, ant diversity, trait distribution and trophic interactions influences forest ecosystem functionality.
Submit application documents to michael.staab1@tu-darmstadt.de

Besides methodological skills relevant for the specific positions, you should have the following profile for all above-listed positions:

- Scientific university degree (master's degree in biology, environmental sciences or equivalent)

- Scientific curiosity and high motivation to develop own ideas related to ecological theories
- Statistical knowledge (preferably in R) including complex models and high motivation to expand your statistical skills
- Basic skills and great motivation for scientific writing and presentations to researchers and beyond
- Sound language skills in English and preferably basic to advanced language skills in German or Chinese
- Enjoy working independently in the laboratory and some demanding field conditions
- Open communication and high motivation to work in an international, inter-disciplinary research team

2) Three postdoctoral positions (f/m/d, 13 TV-L, 100%) for a period of 4 years

Postdoc 1 **Scientific and administrative coordination of the Research Unit**

Subject: MultiTroph_Z1_coordination

Prof. Dr. Alexandra-Maria Klein, University of Freiburg

The scientific coordinator will closely work with the spokesperson Prof. Klein and her Chinese partner Prof. Zhu to coordinate fieldwork, workshops and meetings and help with the administration of the Research Unit. Besides being a central contact person for all PhD students, the scientific coordinator will develop own research and/or use existing data to facilitate overall research goals of the Unit and BEF-China in general. The coordinator will be employed at the University of Freiburg, but partly be working in Beijing and at the field station of the project.

The scientific coordinator should have the following profile:

- Strong coordination and collaboration skills or motivation
- MSc or PhD degree, preferable in Ecology or Biology but other fields are also accepted
- Scientific curiosity and high motivation to support the development of ideas and create own ideas with the framework of the Research Unit
- Statistical knowledge
- Advanced skills and great motivation for scientific writing and presentations to researchers and beyond
- Robust language skills in English and preferably basic to advanced language skills in German and Chinese
- Enjoy working independently in the field and laboratory
- Open communication and high motivation to co-lead and coordinate an internationally, inter-disciplinary research team

Submit application documents to alexandra.klein@nature.uni-freiburg.de

Postdoc 2 **Synthesis researcher of the Research Unit**

Subject: MultiTroph_Z2_Synthesis

Prof. Dr. Andreas Schuldt, University of Göttingen

The synthesis researcher will develop and conduct synthesis connecting *MultiTroph*'s subprojects to link network structure, multidiversity and multifunctionality across time, space and trophic levels. You will have access to a wide range of data on biodiversity and ecosystem functions that have been assembled over more than a decade of research in the BEF-China experiment, and connect new data created in *MultiTroph* to assess multidiversity assembly and trophic interactions from belowground microorganisms to aboveground arthropods. We will use linear mixed models and structural equation modelling to analyse the relative effects of direct and indirect pathways between tree diversity, the structure of mutualistic and antagonistic networks, and the associated multitrophic diversity of higher

trophic levels. Moreover, we will relate diversity and network data to individual ecosystem functions and multifunctionality. Generalized multilevel path analysis will be applied to quantify total energy flow and storage across trophic levels, based on extensive data on ecosystem process rates in a unique framework, allowing you to combine new research ideas with legacy data from past observations over different spatial and temporal scales.
The synthesis researcher should have the following profile:

- Completed scientific university education with an excellent Master in Ecology, Biology, or a related discipline
- Highly qualified PhD degree in Ecology, Biology (with an ecological focus) or a related scientific discipline
- Research experience in biodiversity-ecosystem functioning research, preferably with previous experience in the synthesis of complex datasets
- Advanced skills in ecological statistics (including linear mixed models and SEM, preferably in R) and knowledge of ecological network analysis
- Excellent scientific writing skills and proven ability to successfully publish and present scientific results in an international context
- High motivation to work and communicate in an interdisciplinary and international research team
- Fluency in written and spoken English, and the motivation to acquire basic German language skills

Application documents should be submitted online using the following link: http://obp.uni-goettingen.de/de-de/OBF/Index/72681.
For more information contact andreas.schuldt@forst.uni-goettingen.de

Postdoc 3 **Data Manager for the Research Unit and BEF-China (TV-L 13 30-100%)**
Subject: MultiTroph_Z2_Data management
Prof. Dr. Helge Bruelheide, University of Halle, iDiv

Ecological research is generating data faster and in larger volumes than ever before. Thus, data management has become a key element for successful integrative projects. The data manager will ensure efficient data management in the processing of data among *MultiTroph*'s subprojects through extensive services provided by training courses and the maintenance and ongoing development of the BEF-China data portal, as well as by supporting data and code open access publication strategies. Data management will be conducted along the entire data lifecycle, specifically by optimising the functionality of the BEFdata portal, thus also supporting other projects on the platform such as the international DFG research training group TreeDì and other projects using BEFdata, by providing reproducible computational workflows and training on data integration, and by managing paper proposals that guarantee a safe environment for data sharing.
The data manager should have the following profile:

- Highly qualified PhD degree in Ecology, Biology, Mathematics, Physics (with an ecological focus) or a related scientific discipline
- Strong motivation to organize large and complex ecological data
- Excellent management skills
- Excellent scientific writing skills and proven ability to successfully publish and present scientific results in an international context
- High motivation to work and communicate in an interdisciplinary and international research team
- Fluency in written and spoken English, and the motivation to acquire basic German language skills

Submit application documents to helge.bruelheide@botanik.uni-halle.de

Our Research Unit *MultiTroph* offers:

- A stimulating interdisciplinary research environment offering opportunities for personal development and international academic exchange
- The opportunity to conduct extensive field research
- A highly diverse, subtropical experimental forest with extensive background data
- Cultural exchange between Germany and China and beyond
- Training in ecological theory building, statistical analysis, data management, scientific writing and dissemination of research to the wider public in China, Germany and beyond
- Family-friendly working environment with flexible working hours and individual support by our gender equality programme

Disabled people will be given preference, if they have the same suitability, ability and professional qualifications. Gender balance and diversity will play a key role in the selection process.

Please send a single pdf of your application documents, including your motivation, curriculum vitae and publication lists and copies of your qualifications and names of two references per email to the respective persons and by using the respective subject listed above.
For general questions you can email the contact person for the positions of your interest or email the spokesperson Alexandra-Maria Klein; alexandra.klein@nature.uni-freiburg.de