UNIVERSITY OF GOTHENBURG

DEPARTMENT OF BIOLOGICAL AND ENVIRONMENTAL SCIENCES

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Development plan when funded by an external scholarship

Project
Change in the composition, diversity, and function of plant communities worldwide

Background
Human activity is leading to rapid changes in the distribution and diversity of species on Earth. Understanding these changes and their consequences for human well-being is vitally important but is hampered by a lack of global, comprehensive monitoring data. Recent studies have shown that, at the local scale, the number of species remains relatively constant, but there can be large amounts of turnover (change in species composition) despite no net change in species richness. The consequences of this change for ecosystem functioning are as yet unknown.

Purpose
To determine how the composition, diversity, and function of plant communities has changed over the past century. The general goal of this project is to understand how plant biodiversity has changed over the past century, but the specific topic of this position is flexible. Potential topics include understanding what traits enable a species to cope with climate change, identifying the drivers of taxonomic and functional diversity change, or investigating whether recent biodiversity change has led to a shift in traits relevant for ecosystem functioning.

Method
Quantitative ecological methods, including Bayesian hierarchical modelling

Work plan/Schedule
Together with international collaborators, we have compiled a large dataset of plot-based plant community monitoring data from many habitats across the globe. The postdoc student will learn to the analyse the dataset and be involved in the writing for a large synthesis project using the already-compiled database of plant community monitoring. Although the dataset is largely "ready" to use, some additional data cleaning and curation may be necessary, depending on the specific question(s) we choose to address. The postdoc will need to learn advanced quantitative methods, ideally Bayesian modeling to appropriately deal with the complexities inherent in such a large and varied dataset. For example, Bayesian hierarchical modeling techniques can be used to deal with the nested structure of the data

(plots within sites within regions) and uncertainties in species identification or trait measurements.

The first ~3 months will be dedicated to the compilation and cleaning of the dataset. This task generally requires much more time, but the dataset itself is nearly ready to use (two previous postdocs in the group have spend a great deal of time on it). And additional ~3 months will be spend learning new techniques such as Bayesian methods. This will be accomplished through a mix of “official” Bayesian courses, independent learning, and instruction from the postdoc supervisor (who has used Bayesian methods extensively). Approximately 6 months will be devoted to analysis (which will necessarily include additional learning), while the final 12 months will be dedicated to writing the manuscript, communicating with co-authors, incorporating suggestions/edits, and submitting to a journal.

Learning outcome

The postdoc will learn how to handle large, complex datasets. This will include both the compilation and cleaning of data from multiple different sources as well as the analysis of this data to answer questions about the patterns in and drivers of plant diversity change across the globe. The postdoc will gain experience in conducting and writing a major, global synthesis in the field of global change ecology. In addition, the postdoc will gain experience collaborating with over 100 co-authors who have contributed data to the database or been involved in the conceptualization of the project.