

Final Report: Junior Research Stay at Hebrew University of Jerusalem

Sebastian Fiedler

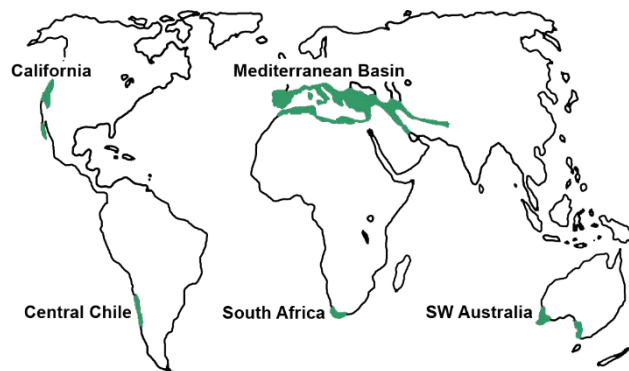
Institute of Biology, Freie Universität Berlin

Role of plant traits for the resilient supply of ecosystem services across  
Mediterranean-type regions

19<sup>th</sup> July to 16<sup>th</sup> September 2019

### Who I am and what I do?

I am a PhD student in my fourth year in the Theoretical Ecology group at the Freie Universität Berlin led by Prof. Dr. Britta Tietjen. In my PhD project I aim at assessing the role of plant traits, such as plant growth form, leaf type, and rooting depth, as well as global change (e.g. climate warming, increase in CO<sub>2</sub>) on the long-term and sustainable supply of ecosystem services such as carbon sequestration, water supply and soil retention in Mediterranean-type ecosystems. This project will support ecosystem restoration of degraded Mediterranean-type ecosystems by suggesting plant species and plant traits that altogether increase multiple ecosystem services at the same time and in the long-term. The final chapter of my PhD project aims at synthesising the role of these plant traits across different Mediterranean-type ecosystems (see Fig. 1) that share similar climatic conditions (i.e. winter rainfall and summer drought) to assess whether there are similar or different traits favourable for a maximised supply of ecosystem services and why.



**Figure 1.** Map showing distribution of Mediterranean-type regions of the world (after Cowling et al., 1996).

### Motivation for my Junior Research Stay

As myself being a theoretical ecologist using computer simulation models to answer my research questions, I strongly benefit from the expertise of field ecologists in order to improve my model and to discuss the simulated results. Therefore, I visited the Hebrew University of Jerusalem at the campus in Rehovot (nearby Tel Aviv) for two months and worked together with my hosts Dr. Efrat Sheffer and Prof. Dr. José M. Grünzweig who both have strong expertise in the ecosystem functioning of Mediterranean-type ecosystems in Israel.

### My work routine on the campus in Rehovot

During my stay I mainly worked on (1) the theoretical construction of so-called plant functional types, i.e. types of plant species representative for Mediterranean-type ecosystems, that I needed to assess the role of plants on ecosystem services across Mediterranean regions with my computer simulation model as well as (2) running first computer scenarios with different initial plant species compositions and global change in order to detect plant species and their traits that sustainably improve ecosystem services of degraded ecosystems in the long-term. In order to do so, I worked from Sundays to Thursdays since weekends being on Fridays and Saturdays in Israel on my private laptop

computer (involving literature research, computer programming and data analyses) in the lab of Prof. Dr. Grünzweig on the HUJI campus in Rehovot (Fig. 2, left), sharing a room with other students and technical staff (Fig. 2, center). I presented and discussed my approach and preliminary results in a lab seminar (Fig. 2, right) as well as in several personal meetings with my hosts. Also, I had the opportunity to discuss my approach individually with other junior and senior researchers from both labs and learned about their projects and discussed potential future collaborations. Unfortunately, the anticipated visit to research sites to better understand the nature of Mediterranean-type ecosystems could not be organised as I visited the HUJI not only in the hottest but also in the holiday season. As I have continued working on other parts of my PhD project, exclusively focusing on the synthesising part of the project and making fully use of my research stay and the local expertise, was most challenging to me while my research stay. However, even though not present in Israel anymore, I continue to discuss my approach and results with my former hosts, which will lead to a joint synthesis manuscript in the beginning of next year.



**Figure 2.** Impressions of my work at Hebrew University of Jerusalem, The Rehovot Campus.

### **Scientific benefits of my stay**

My research stay at the Hebrew University of Jerusalem supported my PhD project, especially my final chapter on the synthesis across Mediterranean-type ecosystems by

- (1) an exchange of knowledge and data on ecosystem processes and plant traits of local Mediterranean-type ecosystems, and
- (2) in-depth discussions of the simulation outcomes and the implications for ecological restoration with local experts.

Additionally, I extended my scientific network for future collaboration projects and increased my expertise in collaborative work with empirical researchers which altogether promotes my personal career as a junior scientist. Also, the stay solidified my future goals in continuing research in applied restoration ecology.

### **Sustainable perspective of my stay**

Looking beyond my PhD work that itself already focuses on sustainability, I experienced different sustainable ways of living outside the scientific world as well (Figure 3). What I liked the most that you find public drinking water dispensers everywhere in Israel which minimise individual water stress as well as plastic waste and energy for producing and recycling plastic bottles. This let me wonder if these water dispensers could also be set up in Germany especially if the summer heat is continuing to increase as expected under global warming. Also, compared to Berlin electric scooters are widely used in Israel (often as a substitute of bikes). However, the incentive for using these scooters might not be due to minimising emissions but rather to avoid physical effort due to the heat. In Israel as opposed to in Germany wasted food can be in some places easily gathered from the garbage bins which is a way of minimising food waste. I liked the fact that there are areas at train stations for sharing second-hand books which is perfect for travelling and of course use of resources. Looking now back to my travel to Israel let me wonder if the advantages of my stay could really overcome the

disadvantages of the high CO<sub>2</sub> emissions that my flights from and back to Berlin caused. For sure, my research stay increased my incentives to minimise CO<sub>2</sub> emissive travelling in the future. A scholarship for collaborations through digital technologies might be a solution for people like me solely depending on a computer for work and not depending on physical presence in the host country.



**Figure 3.** Sustainable impressions from Israel.