ABSTRACT

In this thesis, I aimed to identify factors shaping plant distribution at different spatial scales, correlate them with environmental heterogeneity, identify causal processes and test general hypothesis on the nature of response curve shapes and species richness patterns. General review of the topic is introduced in the first chapter, followed by five chapters presenting three already published studies and two manuscripts.

The first study deals with processes responsible for creation of fine-scaled spatial pattern of spruce seedlings and saplings, emerging after bark-beetle disturbance in mountain spruce forest. Aggregated pattern, replicating previous generation of spruce trees, emerges in consequence to microsite-dependent mortality, as was surveyed through repeated monitoring of the fate of individual seedlings.

The second study explores spatial variability in forest understory temperatures at the landscape scale and its relevance for understory plant distribution. As the main source of variability in understory communities we identified seasonal maximum temperatures. Using GIS modelling approach, we created spatially continuous prediction, which outperformed state-of-art climatic grids used currently by ecologists.

The third study on the shape of species responses along elevational gradients used data from Himalaya collected by L. Klimeš, covering 3500 m wide elevational gradient. Here we show prevalence of asymmetric responses, gradually diminishing towards low elevations and steeply declining towards high elevations. This has practical consequences for ecological model commonly assuming symmetric responses, but it also indicates interesting relations with environment.

In the fourth study we explored patterns in species range size along elevational gradient. Empirical pattern was heavily affected by geographic range truncation. After accounting for this artefact and with a support of our own climate measurements, we had to refuse elevational Rapoport rule, as well as the climate variability hypothesis as the potential explanations of the observed patterns.

The last study focuses on the plant species diversity along elevational gradient, as the synergy of individual species distributions. We used mid-point attractor models to identify central tendency of diversity, accounting for geographic limits of the study.