Abstract

Climate change is threatening ecosystems around the globe. One of the main consequences of climate change is biodiversity loss due to (local) extinctions or range shifts in species. However, species responses to climate change differ in timing and magnitude and hence range shift in species might alter ecosystem communities. Understanding species dynamics is key to biodemography, an evolving interdisciplinary field of science based on the principles of population biology. Population growth rates (λ) and population responses to climate change are based on the underlying vital rates describing the probabilities of survival, growth and reproduction of an organism. Those vital rates are influenced by the environment and its variation. Here, we explore environmental drivers of demographic variation in the Swedish understory forest herb *Actaea spicata* (baneberry) by conducting a detailed large-scale study. We reveal that a mix out of biotic and abiotic drivers influences the population growth rate of this species and that climate drivers might be hidden behind less obvious measurements such as more abstract combinations of temperature and precipitation. Our analysis stresses the importance of large-scale studies on multiple environmental drivers to better understand population dynamics. We further investigate global patterns of plant population responses to climate in two studies. For that, we linked population growth rates from a multitude of published studies with weather data from the time preceding those studies. We find no evidence for consistent relationships between weather variables and population growth rates in plants in one of these studies. Using slightly different methods and study subsets, our second analyses show that precipitation has a stronger ecological effect than temperature. However, our review of previous studies on terrestrial mammal populations reveals that dynamics in vital rates are complex and while overall population growth rate might be unaffected from climate change, the underlying vital rates might be affected in various, ways – e.g. in pikas (*Ochotona curzoniae*) survival rates are projected to decline while reproduction rates are projected to increase in a changing climate. In the same study we further describe a strong mismatch between the location of the studies reviewed and those regions most vulnerable to climate change. Lastly, we investigated biases in our demographic knowledge of plant populations using the COMPADRE Plant Matrix Database. We found that COMPADRE is geographically biased towards temperate ecoregions, mostly located in North America and Europe – potentially driven by the relative wealth of a country and the backyard effect, where researchers invest their resources into data collection close to their home institution. Moreover, we found a taxonomic bias towards herbaceous perennials as well as biases in the data collection processes towards low spatial and temporal replication. This thesis thereby provides insight in our demographic knowledge of animals and plants – particularly in relation to climate change, the patterns influencing populations responses and highlights important knowledge gaps and its implications.