PREDICTING THE FUTURE OF TEMPERATE RAINFOREST LICHENS IN A CHANGING CLIMATE

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Temperate rainforest is a globally rare habitat, consisting of semi-natural woodland, restricted to oceanic zones with a climate of consistently high moisture and mild temperatures. Under climate change, these climatically stable rainforests are susceptible to altered temperature and precipitation regimes. Ecologically, European temperate rainforest is characterised by a unique assemblage of epiphytic lichens and bryophytes, and the UK’s rainforest is particularly rich in communities of otherwise globally rare genera. How these rare lichen species will be affected by a rapidly changing climate is the key question for this research. Ecophysiological acclimation is one of the major processes allowing lichens to adjust their physiological response amplitudes seasonally. However,the success of these processes under current accelerating rates of climate change remains understudied. Here, we aim to determine whether physiological thresholds can be used as suitable predictors for species distribution and determine if species physiology is attributed to distribution patterns. GBIF occurrence and CHELSA climate data are used to explore species distribution patterns within present and future climate scenarios. Species distribution is visualised using ArcGIS and modelled using MAXENT and RStudio to capture a species realised climate space. Simultaneously, the fundamental ecophysiological niche is assessed via gas–exchange measurements of photosynthesis and respiration in a fully controlled experimental system. Determining species physiology and modelling potential distributions will test the following: I) Sudden, unpredicted and short periods of reactivation during the warm summer months lead to carbon losses due to resaturation respiration. II) Warmer temperatures during prolonged activity periods increase the respiratory demands of the mycobiont and unbalance the symbiosis. The implications of this research are that it will identify areas of future suitable climate space for temperate rainforest lichens. Comparing species fundamental ecophysiological niche and realised distributional niche can enable predictions of the impact of climate change and help inform future conservation. Funding: Natural Environment Research Council E4DTP, NatureScot.