European Commission

Science for Environment Policy

Warming boosts plant growth, but reduces species diversity

Wetland biodiversity may fall under climate change, a new study suggests. The researchers' experiments indicated that, overall, plant growth in wetlands will be boosted, but a small number of plants well suited to the warmer conditions will out compete other species. However, climate change's effects on biodiversity may be less severe if plants are able to disperse to cooler locations, towards the poles.

8 May 2014
Issue 371

Subscribe to free weekly News Alert

Source: Baldwin, A. H., Jensen, K., & Schönfeldt, M. (2014). Warming increases plant biomass and reduces diversity across continents, latitudes, and species migration scenarios in experimental wetland communities. *Global Change Biology*, 20(3): 835–50. DOI:10.1111/gcb.12378.

Contact:
baldwin@umd.edu

Read more about:
Biodiversity, Water, Climate change and energy

Climate change is one of the main drivers of ecosystem change. Some species are expected to move to higher latitudes, nearer the poles where temperatures are lower, as their current habitat ranges become unsuitable.

This study focused on the effects of a warmer climate and plants' range shifts on freshwater estuary wetlands. Wetlands are important habitats, providing a number of valuable ecosystem services, helping control floods, stabilising shorelines and improving water quality.

The researchers selected estuaries for study in three latitudinal zones ('north', 'middle' and 'south') from both continental Europe (in Germany, France and Portugal) and the east coast of the US (in Connecticut, Virginia and South Carolina). They took soil and seed samples at three locations in the upper freshwater tidal zones within each estuary.

They used these to create experimental wetlands, which were kept in greenhouses in Hamburg, Germany, either at current 'ambient' temperatures, or at ambient temperature plus 2.8 °C, simulating the effects of atmospheric warming.

Groups of plants grown in the warmed conditions increased in biomass by 16% (i.e. the overall weight of all plants was 16% greater), compared to those in ambient temperatures. However, the number of plant species fell by 14%. The researchers suggest that this is because a select group of species thrive in the warmed conditions and can out-compete others.

The researchers also combined seeds from middle and northern estuaries with seeds from southern estuaries for each continent, simulating the effect of dispersal of plant species to higher latitudes. This resulted in an increase in species diversity of 60% in North America and 100% in Europe. However, it should be noted that such large scale successful dispersal is by no means guaranteed and multiple factors will influence such systems, alongside climate change.

They note that the conditions of their experiments differed from those at the estuary sites. Further research which replicates natural conditions more closely might provide greater insight into warming's effects on wetland plants. Additionally, they were not able to assess long-term effects.

These results suggest that warming of around 2-3°C will increase the total amount of biomass in wetland areas due to a subset of species out-competing less dominant species. The subsequent reductions in biodiversity may be offset somewhat if species are able to successfully shift towards the poles. However, is not clear how these changes might affect the ecosystem services of such wetlands and further research is needed to investigate this issue.