

## Plants Under Pressure

### Natural History Museum

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**As humans cause unprecedented change to the natural world, a time referred to by many as the Anthropocene, this project seeks to understand the distribution of plant diversity and evaluate threats to its survival. The *Plants Under Pressure* programme at the Natural History Museum measures how many plant species are threatened with extinction, where these plants grow and why they are threatened.**



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**Image caption:**  
A peat bog below the top of Doune Hill. Luss Hills, Scotland © Michal Klajban (Wikimedia Commons)

The *Plants Under Pressure* programme is assessing the conservation status and traits of thousands of species across all lineages of plants; establishing threats to plant survival and potential consequences of this loss of plant diversity; studying where these species are found and predicting where they might be found in the future and evaluating the effect of different biodiversity metrics on measuring international conservation targets.

Knowledge of plants around the world is still limited and many species have not undergone critical botanical study for decades: this project is mobilising information about plants from specimen collections and scientific literature to highlight gaps in knowledge. Together with the Royal Botanic Gardens, Kew, the Natural History Museum produced a first IUCN Sampled Red List Index (SRLI) for Plants for the Convention on Biological Diversity, using a sample of thousands of species from around the world drawn at random from major plant lineages. The appropriate category on the IUCN Red List for every species was determined by

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carefully assessing each one against the IUCN Red List Criteria. This work fed into the recent report by the Inter-governmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES) that estimated a total of one million plant and animal species worldwide are being threatened with extinction due to human activities.

In a UK-based 2-year project funded by the Natural Environment Research Council (NERC), the Natural History Museum is collaborating with the Universities of Glasgow and Edinburgh and with Peatland ACTION, a Scottish-based NGO working with Scottish Natural Heritage (SNH), to predict the responses of plant species, particularly bryophytes, in UK peatlands to climate change. UK peatlands are huge carbon stores made up of waterlogged soils full of dead and decaying plant matter. Peat bogs in Scotland are vulnerable to increased drying under future climate scenarios, and the carbon emitted from drying peat bogs can be greater than the carbon captured by the trees that colonize them. The project aims to discover how different land management decisions impact on the future distribution and status of peat bog plant species. This information will help manage competing land-use requirements by advising where it would be possible to increase woodland cover while maintaining the quality and extent of peatland, and the susceptibility of peat bogs to colonization by invasive species, such as birch, spruce and rhododendron.

To demonstrate the importance of functional diversity for ecological stability, the Natural History Museum are extracting plant trait information from taxonomic literature for UK species. It will be used, along with non-taxonomic traits such as growth rates and dispersal distances, to capture species-level dynamics in growth, competition and dispersal between species, predict their occurrence now using additional soil cover and land-use data for the UK, and then simulate the responses of different plant species to changes in their environment caused by future changes in climate. The aim is to determine the measurable threshold for net negative or positive biodiversity change that can be detected by various measures of biodiversity, accounting for the stochastic noise inherent in any biological system. Available distribution data for UK plant species will be used to test predictions of their occurrence, and the impact of planned and expected land-use and climate change to guide future decision making. In coming years the approach will broaden to examine the future for plant species across the whole of the UK under a range of land-use and climate change scenarios.