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Project TEFRA: Terrestrial ecosystems of the Falklands – a climate change risk assessment

The climate of the Falkland Islands is changing. 136 years of records show seasonal rainfall has declined and over 50 years of sunshine records show significant increases in mean summer sunshine and temperature. Increased drought periods will decrease soil water content, threaten plant growth and place increased stress on the shallow peat soils of the Islands already prone to drying out and erosion. This in turn will have a profound impact on plant community diversity, pasture growth, water availability and ultimately the potential of soils to sequester carbon. Urgent action is required to better understand and address these severe threats.





This innovative project's key objective is to provide the Falkland Islands Government with the tools and knowledge to effectively conserve native plants, the habitats they form and the services they provide in the face of a changing climate. The project is using 2020-2080 climate change predictions to model impacts on Falkland native and invasive plant diversity and the delivery of ecosystem services provided by soils and grasslands. The results of these analyses will feed into a large scale risk assessment, carried out in consultation with local and international stakeholders, to assess the likely impacts of climate change on the terrestrial biodiversity and ecosystem services of the Falkland Islands. The project will work closely with local stakeholders including representatives from government, tourism industry, farming community and business sector.

Project update

The TEFRA project is currently in phase I: using a botanical database to develop species distribution models to predict likely impacts of climate change on plant diversity in the Falkland Islands. Species distribution modeling depends on access to reliable and accurate records and the project is fortunate to be able to make use of a pre-existing database.

A major step forward has been the organisation of this database into a format that enables useful screening of botanical records to identify those which can be used in the modeling process. For example, records have been classified according to their resolution, leaving three sets of data, two of which can be used for distribution modeling work.

The higher resolution data are allowing an investigation into the role played by a range of finer scale environmental features, such as water availability and potential solar radiation, in determining

the distribution of species across the archipelago. The lower resolution data are at the same scale as the bioclimatic data available for the Falkland Islands.

Some of the Falkland's most widespread and common plant species have over 1000 records – for example the dominant heathland shrub, *Empetrum rubrum*, has 2045 records – whereas 27 of the 180 native vascular plants have less than 20 records. This is largely because they are genuinely rare but is also owing to the fact that there are still areas of the Falkland Islands that have not been surveyed.

The initial focus is on restricted range native taxa and habitats, using a recent set of climate predictions produced in collaboration with the Climatic Research Unit at the University of East Anglia. The climate of the Falklands is milder in the west and there are a suite of species whose distribution reflects this trend. The cushion plants *Azorella monantha* and *Azorella selago* provide an example of two species expected to respond very differently to the temperature increases predicted for the Falkland Islands. These two plants from the Celery family (Apiaceae) have contrasting distributions and habitat preferences. *Azorella monantha* (photo above) is a coastal species only found in the west of the Falkland Islands between 5-370m above sea level whereas *Azorella selago* is only found inland, predominantly between 450-685m above sea level (cover page photo). *Azorella selago* is restricted to the Falkland Islands, sub-Antarctic islands and the southern-most part of South America, whereas *Azorella monantha* is restricted to the Falklands and South America and reaches further north within Chile and Argentina. Working collaboratively with the GIS unit at Kew, the research is already providing exciting insights into key drivers of distributions of species like these two through the use of, for example, habitat suitability modeling.

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