

Geomorphological assessment of southernmost blanket bogs in Europe

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Introduction

Blanket bogs are a rare type of peatland internationally recognised for habitat provision (Lindsay *et al.* 1988), carbon storage (Limpens *et al.* 2008) and their potential to act as carbon sinks when restored or in pristine condition (Nugent *et al.* 2018). In Europe, they are protected under the Habitats Directive (92/46/ECC) and develop in areas with oceanic climate conditions: high precipitation ($>1,000$ mm yr⁻¹) and low annual mean temperatures (Lindsay *et al.* 1988). Blanket bogs are common in the United Kingdom, Ireland and Norway with some occurrence in Spain, Sweden and France (Joosten *et al.* 2017). The southern edge of range in Europe is in Spain, but many blanket bogs here are currently not recognised and not protected (Chico *et al.* 2019a). This leaves areas of these internationally important landforms exposed not only to natural erosion processes, but also to increasing anthropogenic pressures from livestock, burning and windfarm development (Heras & Infante 2008, Chico *et al.* 2019b). This research provides geomorphological and hydro-morphological assessment of ten currently unmapped blanket bogs on the southern edge of range of this habitat in Europe.

Study area and methods

Potential areas of unmapped blanket bog in northern Spain were identified using erosion features visible in aerial photographs and topographical location determined from digital elevation models (DEMs) in ArcGIS. Peat depth measurements were taken on a 15 m systematic square grid using connectable steel rods in July 2019 and interpolated using a spline algorithm to determine the volume of peat in each site. Surface water flow patterns for each site were modelled from the DEMs using hydrology tools in ArcGIS and enabled interpretation of the individual mesotopes in each site.

Findings

Ten blanket bogs were identified covering a total area of 18.64 ha and containing an estimated volume of 216,000 m³ of peat. Maximum peat depth of 3.78 m at Malverde is the greatest peat depth recorded in Cantabria and Castilla y León. El Coterero Sur is the highest blanket bog recorded in Spain at 1,481 masl. Twenty three blanket bog mesotopes were identified, and a raised bog surrounded by fen units was mapped within the wider blanket peatland complex. Mesotopes are limited by natural geomorphological features such as rock ridges/ outcrops and karst sinkholes. Vehicular tracks have been built across five sites having a negative impacts on the mesotopes units and landforms.

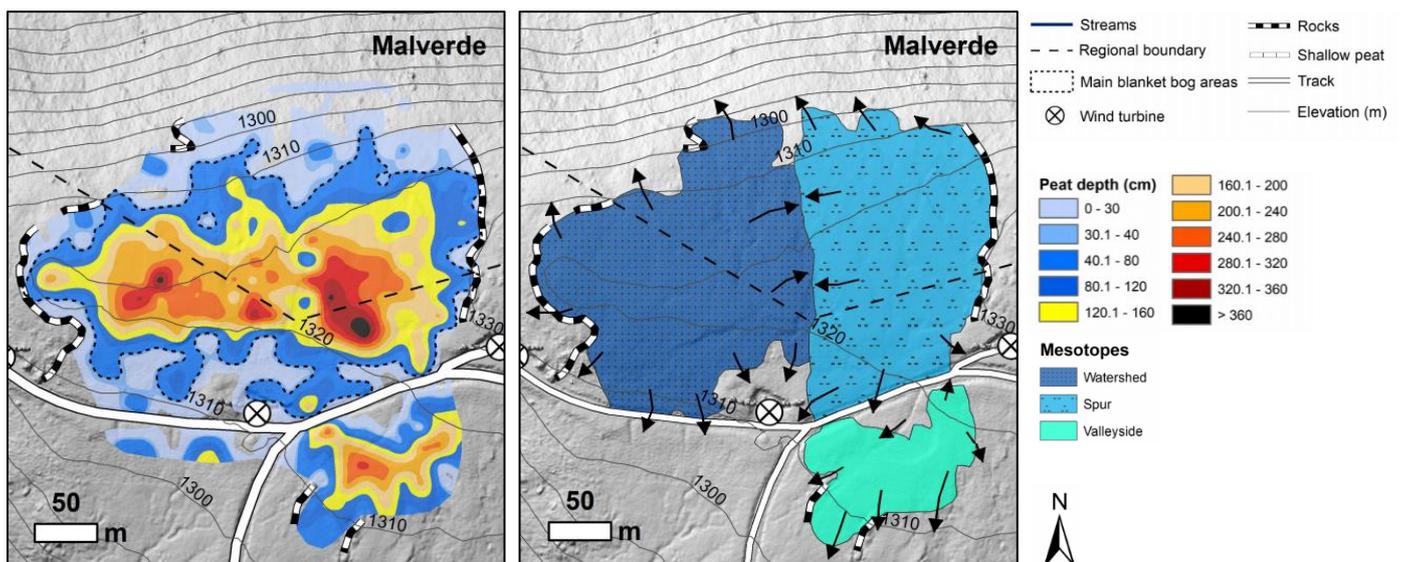


Figure 1. Example of peat depth map and hydrological units (mesotopes) in the southernmost blanket bog of Europe.

Outcomes

This research project supported by BSG has redefined the edge of range of blanket bogs in Europe. This unprotected blanket bogs represent 10.5% of this habitat in Spain and without protection and restoration actions, these peatlands are exposed to high anthropogenic pressures such as windfarm development having a negative impact on the carbon sink peatland function.