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Understanding the importance wet, unimproved Culm grasslands have for the provision of multiple ecosystem services

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It is increasingly recognised that catchments must be carefully managed for the provision of multiple, sometimes conflicting ecosystem services. This requires an increased interdisciplinary environmental understanding to inform management policy and practices by government, landowners and stakeholders.

The Culm National Character Area (NCA) covers 3,500 square kilometres in South West England with Culm grasslands consisting of wet unimproved, species rich pastures, typically on poorly drained soils. Since the 1960's, policy changes have encouraged the drainage of large areas of land for agricultural improvement and consequently Culm grassland sites have become highly fragmented. There are currently 575 Culm grassland sites in the Culm NCA with a mean area of 7 ha. Traditionally, Culm grasslands have been managed by light grazing and scrub management. Since 2008, Devon Wildlife Trust's Working Wetlands project has been working with farmers and landowners to manage and restore and recreate Culm grasslands. It is part of South West Water's Upstream Thinking initiative and is now augmented by the Northern Devon Nature Improvement Area programme. However, from a hydrological perspective, Culm and similar unimproved grasslands remain poorly understood.

In addition to their recognised conservation and biodiversity importance; unimproved grasslands such as Culm are thought to have a high water storage capacity, reducing runoff and therefore flooding during wet periods, whilst slowly releasing and filtering water to help maintain water quality, and base river flows during dry periods. Therefore, if properly understood and managed Culm soils have the potential to play an important role in the management of catchment water resources. Furthermore, Culm grassland soils are thought to have a high potential for the sequestration and storage of carbon, an increasingly valuable ecosystem service.

This study aims to increase understanding of the influence Culm grasslands have upon water and soil resources, relative to other land uses and land covers (wet woodland, scrub and intensively managed grassland). Results will be presented demonstrating that relative to intensively managed grassland, Culm soils have a higher water holding capacity, exhibit a more attenuated response to rainfall events and have higher carbon concentrations. Additionally, results show water leaving a Culm dominated sub-catchment is of a higher quality (i.e. exhibiting lower suspended sediment, dissolved organic carbon and phosphate loads) than comparable intensively managed agricultural catchments.