

The Sustainable Carbon Management of Moorlands: spatial distribution and  
accumulation of carbon on Dartmoor, southwest England

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as a thesis for the degree of

Doctor of Philosophy

In May 2011

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## **Acknowledgements**

Throughout the course of my PhD I have had the good fortune to receive support from many kind and generous people and I would like to give each of them my wholehearted and sincere thanks. I would like say a big thank you to my supervisor Prof. Dan Charman, who has provided me with consistent, kind, supportive and wise advice throughout the course of my PhD. I have been very fortunate to have been supervised by someone that I have come to respect so much. Dr Ian Bailey has given me consistently great supervision and has had his door open whenever I needed advice and I am very grateful this. I am also thankful for the support from Dr Will Blake and Prof. Geoff Millward and other members of the CoRIF laboratory in the radionuclide dating facility.

During the past three years I have spent much time in the field and the laboratory, much of this work would not have been possible without the help of the technical staff at the School of Geography at Plymouth University. Also, my many days spent on Dartmoor gathering data have benefited greatly from numerous volunteers, particular thanks go to Jonny Noades, Stef Honeywill and Brett Metcalfe who have given up substantial periods of their free time and shown considerable enthusiasm, even in the pouring rain and howling wind!

During the course of my PhD I transferred from Plymouth University to the University of Exeter. This transition would not have been so smooth without the thoughtfulness of several members of the University of Exeter's School of Geography particularly Huw Vasey and Thomas Roland. From the University of Plymouth Heather Davies, Jessie Woodbridge, Sally Murrall-Smith and Louise Callard have been great friends. I am forever grateful to my parents Sarah and Richard Parry for being incredibly supportive, particularly during the penultimate three months when they allowed their grown up daughter to move back home!

I would like to thank Great Western Research, The Duchy of Cornwall, Dartmoor National Park Authority, the National Trust and Natural England for the funding provided for my PhD. Additionally thanks go to the Seale-Hayne Educational Trust who generously provided additional funding for radionuclide dating. This funding network has provided me with many stakeholders, who have each provided many ideas, advice, knowledge and perspectives for me to consider in my research. This has helped me to understand the issues faced by moorland managers in the real world and I would like to thank them all for this valuable experience.



## Abstract

Peatlands are unique habitats that have absorbed large amounts of carbon dioxide and locked it away as carbon buried in peat for millennia. In the UK, blanket peatlands form one of the largest terrestrial stores of carbon (Milne and Brown, 1997). Recent research suggests that the carbon sequestering potential and carbon stores of UK blanket peatlands are at risk from changes in land use practices and climate. Although, to date, little research has considered blanket peatland at a landscape scale and a comprehensive understanding of land use and degradation impact upon carbon sequestration has not been gained.

This thesis presents a study of Dartmoor, a blanket peatland in south west England vulnerable to climate change (Clark *et al*, 2010). A landscape scale carbon inventory, using a methodology designed for blanket peatlands is presented. Nearly 1000 peat depths and 30 cores were taken using stratified sampling across Dartmoor's landscape. Functional relationships between peat depth, bulk density and carbon content and topographic parameters were found. In *arc* GIS 9.3 these were used to model landscape scale carbon, this estimates that Dartmoor contained 9.7 (-2.91 + 2.97) Mt of carbon, a value similar to that of the national inventory (Bradley *et al*, 2005).

The thesis then considers the impact of drainage and degradation on carbon accumulation. Fifteen cores were dated from a drained, degraded site with a history of burning and control site using Spheroidal Carbonaceous Particles (SCPs) and radionuclide techniques. Previous studies have raised concern surrounding accuracy dating recent peats. Results indicate that although dating was largely successful, some discrepancies existed related to poor calibration of SCPs and mobility of radionuclides. To avoid error in dating, it was concluded that multiple dates should be used per core. With consideration of this, carbon accumulation was found to be active but significantly lower in the degraded site and unchanged in the drained site. Further analysis suggested that this outcome may vary with changing management and topographic situations. Future carbon accumulation at a landscape scale was calculated under different scenarios. This found degradation could potentially reduce carbon sequestration on Dartmoor by up to 32%. Economic valuation of accumulation values was used to demonstrate how this data could be used to inform management.

This thesis provides an insight into the carbon storage and threats to Dartmoor, an under investigated, yet threatened blanket peatland environment. This helps broaden the spatial understanding of the response and value carbon stored in UK blanket peatlands.



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