For peat's sake

Peatlands, climate change, and the future of archaeology

How can understanding the archaeology of peatlands help to ameliorate the current climate crisis? Rosie Everett and Gillian Taylor share the latest research.

There might not be an immediately obvious link between the archaeology of peatlands and strategies for tackling global climate change. But as a landscape archive for past climatic change and human activity, peatland archaeology has the potential to offer vivid insights into the impact of climate change on society – and both are very much interlinked as part of one of the greatest challenges of our times.

The science and data required to demonstrate the scale of threat that global climate change poses to the planet have become a regular discussion point in mainstream media. As a society we are becoming more aware of the range of actions and changes in behaviour that are required to help support efforts to combat the impact of climate change. We are also aware of the commitment that needs to be made by government bodies and international corporations to take large-scale action to support communities with infrastructure and financial support required to address climate change. Considerable measures will be needed to reduce global emissions, temperature increases, and the risks of flooding.

At the heart of this global crisis are key human activities that contribute directly to the emission of greenhouse gases (such as carbon dioxide) and the loss of biodiversity; these include the production of fuel and energy, intensive agricultural practices, and deforestation to clear land for industrial production. Beyond the ubiquity of pressing media coverage documenting rainforest destruction and melting polar icecaps, we find a lesser-known environmental crisis that lies on our doorstep both here in the UK and across the globe: the destruction of peatlands.

A UNIQUE ECOSYSTEM

So, what are peatlands? In brief, they are a natural wetland environment, whose name refers to the peat soils that develop there and the associated habitats growing on their surface. Their soils are unique, as the constant water-logged environment causes a slow rate of decomposition of plant material that accumulates to form peat. As an ecosystem, moreover, peatlands are highly diverse and support a range of plants and insect species from the damp sphagnum moss and flowering Bogbean to carnivorous Sundew plants, and Green Hairstreak butterflies and rare Northern Emerald dragonflies. These in turn help support animal species from common lizards to a range of birds including Golden Plovers and Hen Harriers.

These landscapes vary in form across the globe; they range from the tropical swamp peatland forests of Southeast Asia to the vast open treeless peatlands across Northern Europe. In

ABOVE Peatland environments represent significant long-term carbon stores, as well as important repositories of organic archaeological remains.

PHOTO: WetFutures Research Group

the UK, there are three main types of peatlands – fenlands, raised bog, and blanket bog – and their geographical spread is associated with how these different peatland types formed. For example, fenlands are associated with lowland coastal marshes and in the UK are usually found in eastern England (Cambridgeshire, Norfolk, and Lincolnshire), whereas raised bogs (formed through the infilling of lakes or depressions) and blanket bogs (formed over acidic bedrock on poorly-drained flat ground and saturated through rainfall) are more often found in upland areas of the UK such as across Dartmoor, the Pennines, and the Solway region, as well as across central and northern Scotland.

Peatlands, climate change, and the role of archaeology

Why are these landscapes important? Although peatlands only cover approximately 3% of the world's land area, due to their wetland environment and build-up of decayed plant matter, they act as the largest long-term carbon store in the terrestrial biosphere (as Joosten and Couwenberg note in their 2008 report for Wetlands International and the Global Environment Centre; see 'Further Reading' on p.50). It has been estimated that there are 550 Gigatons (Gt) of carbon locked up in what are often considered 'wet deserts' – which equates to around two times more carbon than woodlands the world over. In terms of the UK and Ireland's peatland cover, according to figures from the International Union for Conservation of Nature (IUCN), the smallest percentage of peatland cover is Wales, with an estimated 4% of the land area; in England and Northern Ireland this figure is 10-12%; whilst in Scotland, the largest of the total land cover, 20% is peatland, a similar extent to Ireland. Historically, these landscapes have been cut and drained for land reclamation for agriculture, and peat ('turf') dried to burn for fuel, causing damage to the peatland ecosystem through significant drying and the consequential release of carbon and source of carbon dioxide emissions into the atmosphere.

Across Europe, an estimated 100,000km2 of peatland has been lost over the last 50 years, and much of what remains is degraded and at continuing risk, whilst in the UK, the IUCN has estimated that only a fifth of UK peatlands can be described as 'near pristine'. However, UK peatlands also have some of the finest examples of preserved organic archaeological remains and sites associated with past human activity, spanning from Neolithic trackways in Somerset to the famous Lindow Man bog body recovered from Lindow Moss in Cheshire (see CA 233 and 375), to the diverse range of organic finds at Vindolanda Roman fort in Northumberland.

So, where does peatland archaeology fit with action against climate change? The irony is not lost that archaeological discoveries in peatlands are often made thanks to the cutting and extraction of peat to reveal these buried surfaces. However, the impact of degraded peat on archaeology is devastating. The drainage, cutting, and agriculture that has been responsible for the damage and loss of these environments, has caused the same destruction and loss for the archaeology buried within them. This also includes threats to undisturbed and unexcavated archaeology, where drainage and changes in the water table can stop peat growth, causing oxidation and the degradation of in-situ remains. Farming run-off into water systems is also a known destructive process for peatland archaeology, where the ➡

PHOTO: Brian Mac Domhnaill

LEFT Degraded peatland; across Europe, an estimated 100,000km2 of peatland has been lost over the last 50 years, and only a fifth of UK peatlands is described as 'near pristine' by the IUCN.

PHOTOS: Gillian Taylor

ABOVE Monitoring work at Magna Roman fort in Northumberland is helping to improve understanding of its peatland environment, and the impact of climate change on underlying archaeology.

acidification of ground water can cause the disintegration of buried remains in peat. This has led to large-scale emergency excavations of buried peatland archaeology, such as at the Mesolithic site of Star Carr in the Vale of Pickering, Yorkshire (CA 322, News; and CA 349), which is threatened by the increasing pollution of peat soils and the intense use of agricultural chemicals and run-off into groundwater. How, then, does peatland restoration and protection save archaeology?

PEATLAND PROTECTION IN ACTION

A key example can be seen with the latest efforts under way at a peatland site along Hadrian's Wall. The Roman fort of Magna is one of the most fascinating and well-preserved sites along the Roman frontier in Northumberland. The fort holds a commanding position as the junction between three Roman roads – the Stanegate, Military Way, and Maiden Way – and surveys have indicated that activity there stretched from c.AD 80/85 until the end of the official Roman occupation of Britain c.AD 410. Intriguingly, the vallum ditch which runs along Hadrian's Wall is significantly and uniquely diverted at Magna. It has tentatively been suggested that it was diverted due to the presence of a peat bog – but would a peat bog hold back the mighty Roman army?

Climate change is leading to increasingly hotter summers and wetter winters, with more emphasis on localised extreme weather events, such as heavy rain, flooding, and stronger and more frequent storms. These are changing our landscape visually; at Magna these effects are manifested in the way that Roman remains are now emerging from the peat as it compacts and dries out. Our research questions at this site include: how fast are changes occurring? How do we monitor and manage them? And, importantly, how do we embed mitigation strategies for the future, not only at Magna but at other sites impacted by climate change?

At Magna, strategies to keep an eye on these changes have already started. There, ground monitoring piezometers (devices used to measure pore water pressure in the ground) are being used to help understand physical data such as ground water levels, conductivity, oxidation-reduction potential, pH, and soil moisture. It is very important to monitor pH, especially changes in acid/alkaline conditions, as within peatlands the peat is acidic and changes in this acidity can impact upon the preservation and ultimate degradation of artefacts, losing them to future study.

PEATLAND ARCHAEOLOGY FOR THE FUTURE?

Carbon capture and sustainable rehabilitation of peatlands is a unifying goal in climate action for policy makers, NGOs, and peatlands groups across the globe. The protection of archaeology is part of this supporting process and, in turn, promotes this under-appreciated aspect of peatland ecosystems, enhancing a growing awareness of the value of peatland environments. To date, the significance and value of peatland archaeology has been underappreciated and many rehabilitation programmes fail to engage with this specific aspect of these landscapes. With specialists in peatland archaeology promoting fantastic sites such as Magna, however, we hope that increased understanding of the heritage value of peatland environments will contribute to the best practice approach for the rehabilitation, and ultimately the future, of peatlands on a global scale. ❙

Further information

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Further reading

Joosten, Hans & Couwenberg, J. (2008). Peatlands and carbon. Assessment on Peatlands, Biodiversity and Climate Change. 99-117, available at www.gec.org.my/index.cfm?&menuid=48&parentid=287