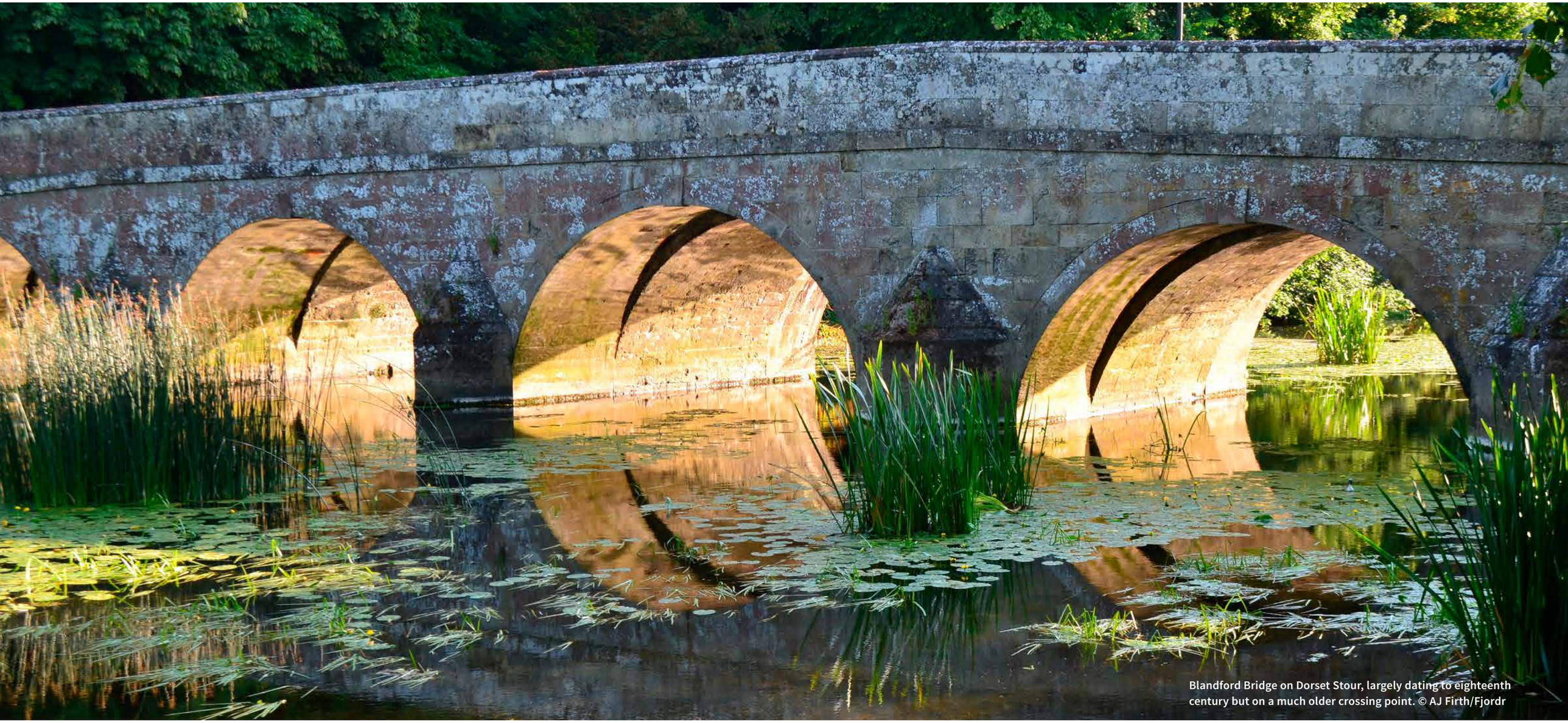
Historic watercourses and climate change: mapping the history of rivers and floodplains

A management tool for historic watercourses using GIS mapping.



Blandford Bridge on Dorset Stour, largely dating to eighteenth century but on a much older crossing point. © AJ Firth/Fjordr

Historic England has funded the development of an innovative approach to rivers and floodplains that is now being applied to different catchments to address climate change and our responses to it. Recognising the degree to which rivers have been affected by human interventions over many centuries, Fjordr Limited – a historic environment consultancy specialising in inland waters – devised a catchment-based approach to mapping the historic character of watercourses. An initial pilot on the Dorset Stour has led to further projects to address the River Culm in Devon, the River Eden in Cumbria, and the River Thames in Oxfordshire, working with a range of partners.

Synthesising sources of information into a GIS

The approach draws together a wide range of different sources – such as archaeological records, maps, aerial imagery and lidar data – into a single, simple to use GIS layer that can be employed directly by catchment managers.

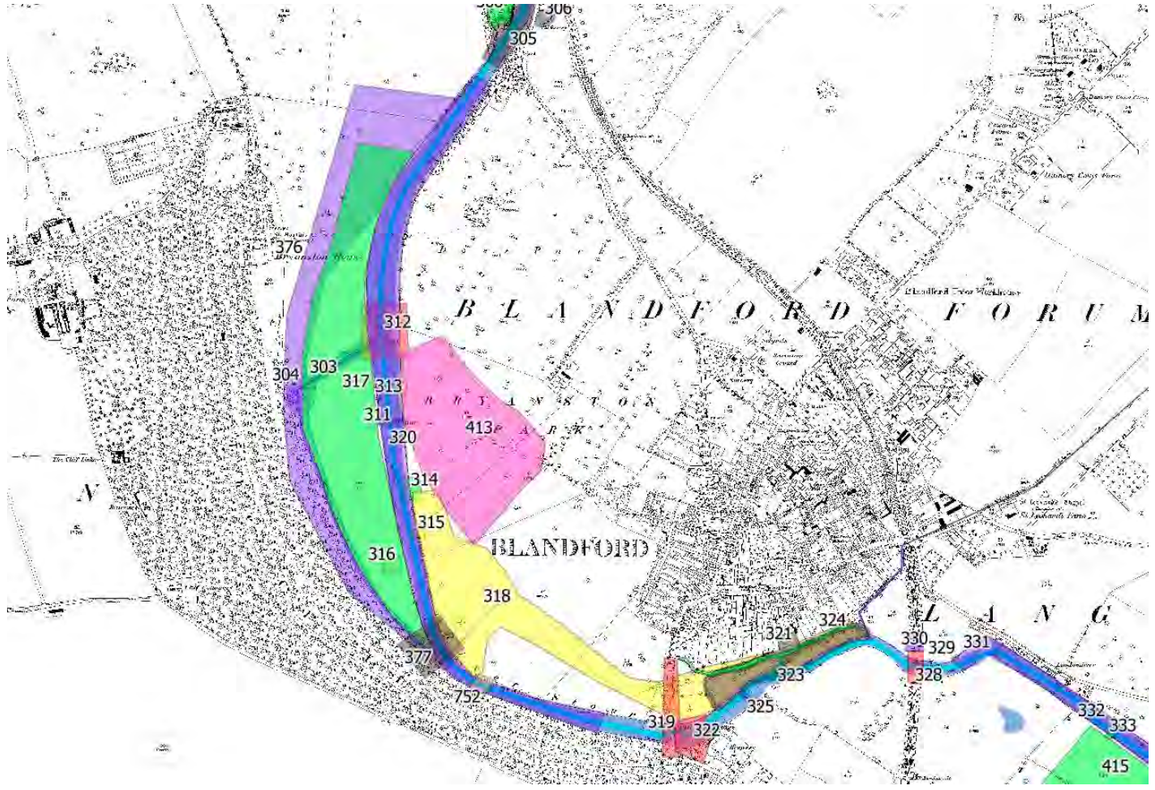
Our mapping and recording of how humans have used and intervened in watercourses is intentionally 'coarse' given the catchment scale it is designed for, resulting in 'Historic Watercourse Polygons' (HWPs) that provide an intermediate level between detailed recording of individual heritage assets within a Historic Environment Record (HER) and the broader brush of Historic Landscape Characterisation (HLC). Each HWP is accompanied by a flat file record (making it easier for managers to incorporate in their own GIS spaces) using controlled terms for type and theme, a description, their association with previously recorded heritage assets, and a signpost to the sources used in their identification and interpretation.

The HWPs highlight the potential for archaeological material that might be impacted by works to alleviate flood risk, for instance. However, they also flag features or former uses of the watercourse that might help explain why a specific place is prone to flooding, and features that might be rejuvenated to help meet objectives relating to climate change or habitat improvement. Looking at the HWPs for a catchment overall helps in gaining a sense of the biography of the river as a whole, at least over recent centuries and often indicating the catchment's human history much further back. This should be a productive basis on which to anticipate or plan changes to watercourses accompanying climate change: more so than approaches that, too often, consider our rivers to be essentially natural or modified only in recent times.

Pilot projects to develop the approach

Two pilot projects on the Dorset Stour and River Culm funded by Historic England have met their primary objectives, resulting in GIS layers – comprising 730 HWPs on the main channel of the Stour and 1233 HWPs across the entire catchment of the Culm – that have been shared with HERs and a range of authorities involved in catchment management. The value of the approach has also resonated elsewhere, however, leading to a series of other projects that underscore the benefit of understanding the human history of rivers to climate action.

On the Stour and the Thames, the Floodplain Meadows Partnership commissioned research that uses this method to understand the historic extent and the potential for restoring meadows which may date back to the Medieval period. Meadows in the floodplain used to be highly valued for the production of hay as fodder and were often managed as commons by each settlement. Surviving floodplain meadows present rich and diverse habitats, provide high levels of carbon capture, and offer attenuation of flooding. But following enclosure and subject to intensive agriculture, the quantity of floodplain meadow habitat is thought to have fallen by more than 90% over the last century. Nonetheless, the form of these former floodplain meadows is often still visible in the landscape, so we have been able to map them out as HWPs indicating their distribution in catchments, their original extent, and locations where they might be restored. >>



Above left: Example of Historic Watercourse Polygons (HWPs) mapped on the Dorset Stour around Blandford. Background: late C19th OS 25-inch mapping, courtesy of Historic England.

Above right: Cut Mill on Dorset Stour, where there has been a mill since before Domesday. © AJ Firth/Fjordr

Above left: River Culm at Collumbjohn adjacent to a sixteenth century mansion site. © AJ Firth/Fjordr

Above right: River Culm with Collumbjohn Chapel in background. © AJ Firth/Fjordr

Working with the Connecting the Culm initiative in Devon, our focus has been on using a greater understanding of the historic environment to identify opportunities for Nature-Based Solutions (NBS) for flooding and drought. For example, long-lost historic features such as mill leats and catchworks (hillside watermeadows) offer scope for increasing connectivity with the floodplain and providing temporary storage. The HWPs are helping to inform discussions about the historic character of watercourses in priority areas, and also contributing to detailed considerations for individual NBS demonstration projects. The history of the River Culm is also playing a major part in public engagement through webinars and online workshops.

The impact of our work in Devon has supported a Green Recovery Challenge Fund project led by the National Trust at Killerton in the lower reaches of the Culm. Here a deeper understanding of the history of the river is informing the vision for richer habitats and a more resilient floodplain. The historic watercourses approach has directly contributed to the design and consenting process, including a programme of palaeo-environmental sampling and a watching brief during groundworks.

On the River Eden in Cumbria, mapping the historic character of the river is integral to a UK Research and Innovation (UKRI) Climate Resilience Programme 'Clandage' project led by the University of Liverpool (see Macdonald and Fluck, this issue) to develop toolkits for increasing community resilience through greater awareness of cultural and landscape responses to long-term changes. Our mapping of historic aspects of the catchment is complementing research into individual and institutional archives in a truly interdisciplinary fashion.

Back in Dorset, plans are underway for the historic watercourses approach to generate key themes that will underpin the Strategy and Business Plan for Stour Valley Park, led by Bournemouth Christchurch and Poole (BCP) Council as part of the Future Parks Accelerator. The intention is that people using Stour Valley Park will appreciate and engage with the historic environment, centred on the heritage of the river that forms the Park's core. As well as adding to current enjoyment and wellbeing, increasing awareness of how people have lived with the river through history will help underpin the resilience and sustainability of communities served by the Park.

The historic watercourses approach developed with Historic England's support is a great example of how understanding the historic character of rivers and floodplains creates tangible benefits as we anticipate the effects of climate change on our water environment. The fact that these benefits are being recognised and pursued by partners from different sectors underlines the potential of this innovative approach ■

The authors

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Antony is a marine archaeologist by background with a special interest in legal and policy frameworks. He has an abiding interest in the history and archaeology of freshwater environments.

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Further information

Firth, Antony, and Emma Firth. 2020. 'Historic Watercourses: Dorset Stour Pilot'. Fjordr ref: 16391, HE 7244. http://www.fjordr.com/uploads/3/4/3/0/34300844/historic_watercourses_dorset_stour_report_280220_web.pdf

Mapping the Historic Character of the Culm: webinar via https://connectingtheculm.com/mapping-the-historic-character-of-the-culm/

Floodplain Meadows Partnership: https://www.floodplainmeadows.org.uk/

Connecting the Culm: https://connectingtheculm.com/

National Trust Killerton: https://www.nationaltrust.org.uk/killerton/features/green-recovery-at-killerton

Clandage: https://www.ukclimateresilience.org/projects/clandage-building-climate-resilience-through-community-landscapes-and-cultural-heritage/

Stour Valley Park: https://www.stourvalleypark.uk/