Forest Research

Project overview

Developing a Woodland Water Code: Phase 1 (2023–2025)

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Woodlands provide a wide range of environmental and societal benefits, including several related to water. Prominent among these are the protection of water quality, reduction in flood flows, and water shading. Woodland creation can therefore provide opportunities for companies, organisations, and individuals to help tackle important water pressures. The aim of this project was to develop a draft Woodland Water Code (WWC), which sets out robust requirements for voluntary woodland creation projects that provide one or more of these water benefits. Through the sale of Woodland Water Units (WWUs), the WWC aims to help bridge the finance gap and incentivise greater levels of woodland creation in the UK.

Calculating woodland water benefits

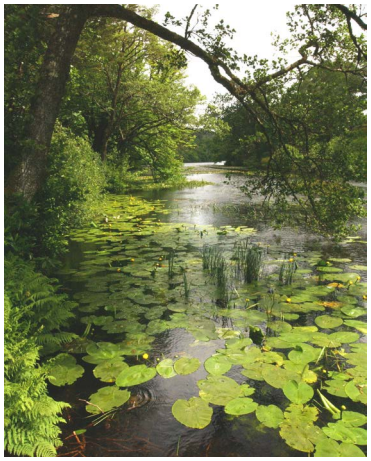
One of the core elements of the project was to develop scientifically robust methods for quantifying three woodland water benefits: improvement in water quality, flood alleviation, and water shading. Outlined in Table 1 are the mechanisms by which the water benefits are quantified in the WWC and the underpinning models. Each of these models is represented by Excel-based water benefit calculators. All three methods draw on biophysical metrics that are spatially explicit, enabling their application by landowners/project developers at the field scale and to a specific location/area of planting. The water benefits, underlying models, and general mechanism of improvement to water are summarised in Table 1.

Table 1 Overview of the WWC water benefits and mechanism of quantification

Quantified water benefit in the WWC	Underlying model	Mechanism for achieving water benefit
Water quality • Nitrate-nitrogen • Phosphorus • Faecal Indicator Organisms (FIOs) • Sediment • Pesticides	Farmscoper	• Land use change to woodland and cessation of agriculture • Reduction in livestock • Creation of riparian woodland buffers
Flood alleviation	Joint UK Land Environment Simulator (JULES)	• Increased soil water infiltration and storage • Increased hydraulic roughness of the woodland, slowing the flow of run-off • Increased rainfall interception and evaporation by the tree canopy
Water shading	The WWC Water Shading Calculator is a novel tool, which predicts tree canopy cover over a watercourse, drawing on National Forest Inventory (NFI) data on canopy radii of native riparian tree species. This is used as a predictive tool. WWUs are generated based on tree canopy cover evidenced by aerial imagery.	• Water shading created from riparian tree planting

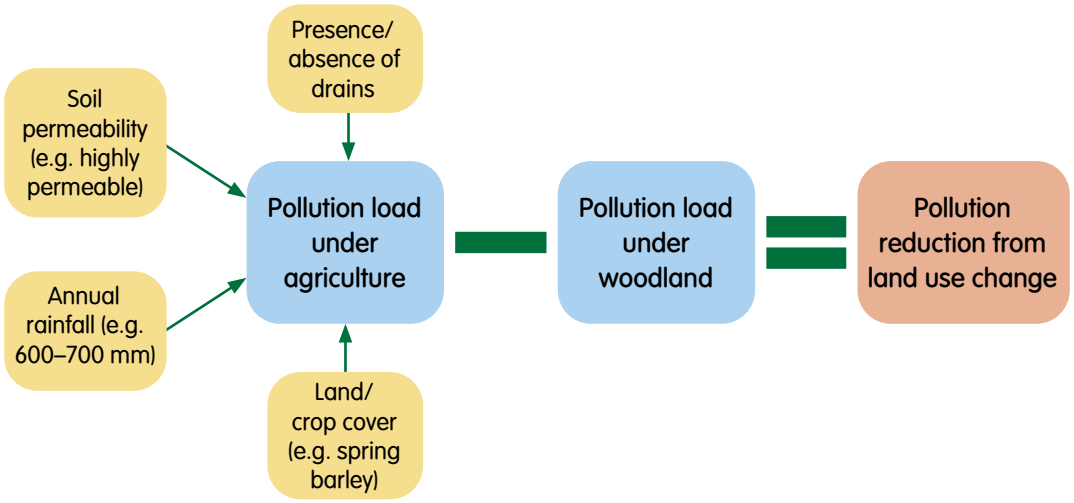
Water quality: woodland creation on farms can improve water quality through the retention of nutrients, soil stabilisation, and the reduction in pesticide spray drift.

Flood alleviation: woodland can alleviate flooding through its canopy interception, bank stabilisation, and by slowing the flow of run-off.



Water shading: riparian woodland canopies create shade over watercourses. This reduces water temperature, providing thermal refuge for aquatic life.

Figure 1 A general schematic of the input data and overall calculation in the WWC Water Quality Calculator to quantify pollution reduction upon land use change to woodland



A schematic to demonstrate how the WWC Water Quality Calculator quantifies the reduction in pollution to water for a site when land use is changed from agriculture to woodland, is displayed in Figure 1.

Prioritising areas to apply the WWC

An initial set of priority maps has been developed for each water benefit to direct the WWC to where water pressures are greatest in the UK. Maps have been co-developed with water regulators across England, Scotland, Wales, and Northern Ireland, which draw on existing spatial data. Further work is ongoing to obtain full UK coverage for each water benefit.

Piloting (case studies)

Twenty-nine project partners were guided in the application of the WWC methods to their local site to assess ease of use, volume of water credits generated, project costs, cost per water unit, and any unforeseen issues. Interviews with individual project developers captured project-specific information and feedback on their experience engaging with the WWC. This information has been invaluable in improving the benefit calculators and guidance, and we continue to work with many of these partners in the next phase of the project.

Aerial view of Blenheim Estate, a project partner piloting the WWC

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Barriers and opportunities

Market research explored the potential barriers and opportunities for landowners (i.e. sellers) and buyers of WWUs. We conducted 12 interviews – six with potential buyers and six with potential sellers – supplemented by a literature review and financial analysis. The research identified several critical barriers and opportunities for engaging with the WWC:

- Overall, there is a strong interest in and support for a WWC among potential buyers and sellers.
- There may be a need for policy to drive demand and for regulation to provide long-term market certainty, including the scope for the WWC to be accredited by the UK Government.
- A common response was that the WWC would benefit from being an add-on to the Woodland Carbon Code, both to build upon its reputation and to minimise the administrative burden and costs associated with generating WWUs.
- Some feedback suggested that the WWC appeared complex, but it was also recognised that detailed methodologies were required to ensure WWUs were high-integrity and that projects avoided unintended negative consequences.

Next steps

Phase 2 of the WWC is now underway, with the primary aim to finalise Version 1 of the WWC. Further end-user testing will be conducted to ensure a robust standardised methodology for the quantification and verification of water quality, flood alleviation, and water shading benefits from woodland creation. This process will include the Soil Association (a validator for the Woodland Carbon Code) providing feedback on the validation process for two pilot sites. We will continue to engage with Defra policy colleagues to explore the potential applications of the WWC in light of future policy developments on green finance and water regulation.

For more information on the Woodland Water Code project, please visit our project webpage.

Research contacts:

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