

THE EDDLESTON WATER PROJECT – Update May 2012

The aims and objectives of the Project

The main aim is to investigate if changes to land use management and the restoration of natural habitats can help improve river ecology and reduce the risk of flooding in Eddleston and Peebles. Specific objectives include:

- demonstrating the multiple benefits and ecosystem services that would be provided by restoring natural habitats at the catchment scale;
- working with local communities, landowners and other organisations to ensure the proposals deliver multiple benefits and meet their requirements;
- helping to adapt to the effects of climate change on flood flows;
- investigating to what extent restoring the ecological status of the river and promoting land management changes can contribute to reducing flood risk through natural flood management;
- looking at how the River Basin Management Planning process can work in reality alongside the new framework for Flood Risk Management;
- examining the opportunities and barriers to changing behaviour and to implementing such measures, in particular the effectiveness of agri-environment incentives to bring about the required action on the ground;
- providing a national platform and demonstration site for testing existing, new and emerging policy and practices in land and water management, such as ecosystem service provision.

Scoping Study

The initial scoping study carried out in 2009 and subsequent work provide a very detailed characterisation and baseline survey of the catchment, using existing and new survey data. This covers land use and habitats; river hydro-geomorphology, in-stream ecology, fisheries, flood flows, soils, groundwater and geology, and extensive modelling of actual and potential flood flows of differing frequencies and impact.

Using detailed modelling of flows in the river system, combined with catchment morphology, a restoration strategy (and associated monitoring programme) was developed which aims to both restore natural habitats and reduce the risk of flooding to Eddleston and Peebles. It focuses on three main areas of the valley, characterised by the source, pathway, receptor model: - the tributaries and upper valley; the floodplain and river channel; and the towns and villages at risk of flooding.

This scoping phase was further strengthened by an in depth report produced from detailed research into the historical management of the Eddleston, with particular focus on the river channel, its original meandering course and the extent and reasons behind drainage works of the 18th and 19th centuries.

Monitoring - The total value of monitoring, including surveys, modelling and design work, amounts to over £400k

1. Surface Water Monitoring:

In March 2011, a very comprehensive Surface Water Monitoring network, consisting of 11 water level/stream flow gauging stations, 4 storage rain gauges, 3 recording rain gauges and 1 automatic weather station (+ rain gauge), was installed by the University of Dundee. Three further stream gauges were installed by Forest Research.

This network, along with the 2 existing SEPA gauging stations, is monitoring surface hydrological conditions with sufficient accuracy and reliability that baseline flows and hydrological behaviour of the catchment can be characterised and post restoration intervention changes will be detected and quantified.

This is now one of the best monitored catchments in the UK. The network has performed excellently, with 100% instrument reliability, allowing detailed assessment of the catchment response to rainfall events. The network will be operated to collect further continuous data and to allow the development of high quality flow rating curves. A new feature is the installation of webcams and remote data collection facilities that can be used for educational purposes.

2. Ground Water Monitoring:

The network characterises the hydrological interactions between river, floodplain and hillslope in order to gather evidence for processes leading to flooding. The monitoring site is broadly representative of upland floodplains. The questions it addresses are:

- What is the nature of surface water – groundwater coupling during baseline and flood events?
- What is the role of groundwater storage and groundwater flooding in a typical floodplain?
- How is this coupling, storage and flooding affected by natural flood management (NFM) measures and natural land cover?

The characterisation has included soil permeability across various land uses (hillslope, ancient forest, plantation, flood plain); geophysics, trial pits, auger holes and detailed logging of samples from 11 piezometers, and construction of a 3D geological model of the Darnhall floodplain and hillslope.

Initial monitoring data indicate there is a complex interaction between surface water and groundwater; a significant contribution of groundwater to localised flooding; and coupling of groundwater between hill slope and floodplain.

3. Ecological Monitoring:

Past water quality, ecology and habitat data for the river and catchment have been analysed. Detailed hydro-morphological surveys were undertaken in 2012 by SEPA to complement earlier surveys done in the scoping study. A new monitoring programme is in progress that includes pre and post works surveys by SEPA and Dundee University for otters, fish, aquatic invertebrates and macrophytes at a number of sites, alongside water chemistry and habitat structure. Further fish monitoring proposals are being designed by the Tweed Foundation. Other detailed monitoring is being planned on tributary streams in conjunction with Forest Research, to analyse the impact of engineered log jams and the effects of tree planting on water temperature, ecology, sediment transfer and water quality.

Implementation of Restoration and NFM measures and liaison with land managers

Tweed Forum has met and liaised with land owners to negotiate appropriate land management changes and secured funding to implement them. These include SRDP, SEPA Restoration Fund, Forest Carbon monies and CEMEX amounting to well over £300k. Habitat enhancements secured so far include:

- 17.15ha, of riparian planting on the Shiplaw Burn
- 8.72ha Nether Falla Farm (Middle Burn, Eddleston and Cowieslinn Burn) of native riparian planting
- 7.46ha native riparian planting on the Longcote Burn. SRDP contract agreed and carbon credit funding
- 1.84ha riparian planting on Cowieslinn Burn. SRDP contract agreed
- Eddleston main stem - water margin 0.55ha, riparian woodland 1ha and 1250sq.m pond
- Re-meandering of the main stem at Cringletie and removal of manmade embankments
- Potential 40 ha riparian woodland work in the catchment being negotiated with developers as part of a windfarm offset agreement
- Middle Burn log jam project on Forestry Commission Scotland land under consideration

Partnership working, engagement and dissemination:

The project has built a strong partnership, with a Project Board led by Tweed Forum and chaired by SEPA along with the Scottish Government and the University of Dundee. This is supported by a wider Steering Group including Scottish Borders Council, British Geological Services, Scottish Natural Heritage, Forestry Commission Scotland, National Farmers Union (Scotland), Tweed Foundation and the Environment Agency. Partners work closely with landowners and the local community who input their ideas and follow the project's progress. Two popular leaflets and reports have been produced, which are available at: <http://www.tweedforum.org/projects/current-projects/eddeleston>. Partners have met the two community councils and attended the Peebles show. Tweed Forum led a number of field visits with local schools as part of the Citizen Science initiative. Presentations, papers, field visits and workshops have been given to a range of audiences including the British Hydrological Society, SNIFFER Scottish Government flood conferences, Swedish West Gotland EPA, Danish Gudenna River Committee, the RELU Managing Borderlands Project, Insight Catchment Exchange and UNESCO HELP conference, NERC Knowledge Exchange, and a SAC/SEPA conference.

New initiatives, investments and added value:

These include:

- Major resources, support and direct staff contributions to the project by SEPA, SNH, University of Dundee, BGS, Tweed Foundation, Tweed Forum, Forest Research and Environment Agency
- Participation, with £25k new funding in a £200k RELU project led by Newcastle University on Flood knowledge and adaptive management in the Borders, which focused on Eddleston and Wooler Waters
- Participation in the national Citizen Science rivers pilot programme for SEPA and Scottish Government and direct links through Education Scotland to the Curriculum for Excellence where school pupils will learn about managing flood risk and the role of natural flood management. Tweed Forum is working directly with schools in the area taking pupils on guided river walks to raise awareness of the importance of river catchments.
- Funding and collaboration from University of Western Australia to measure soil permeability under different land-use and past and present land cover, and to help install piezometers and soil moisture probes.
- Five month Intern project on Wetland Ecosystem services in relation to changing flood scenarios
- Six MSc student projects, looking at groundwater interactions, channel and floodplain modifications, modelled flood flows and past ecology of the river
- PhD student investigating farmers' attitudes to natural flood management
- Site visits and field trips for a range of organisations and classes, from local to international

Summary and Future:

The existing robust and detailed catchment-wide surface water monitoring network, allied to the ground water investigations and ecological studies, provide what is arguably a unique platform for investigation of the effectiveness of habitat improvement measures and natural flood management. We are confident that the interventions will measure real impact and value across multiple benefits. This provides an unparalleled, quality assured, detailed test bed for hydrological model proving and development. The catchment also has the potential to act as a major pilot and demonstration for a range of policy issues beyond the Water Framework Directive and flooding agendas, such as how to incentivise land managers to provide ecosystem services, and the delivery of Rural Land Use Strategy targets.