Confluence 2019

iCASP
Integrated Catchment Solutions Programme

Supporting the Yorkshire NFM pilots to deliver evidence and guidance that will influence national implementation and financing of NFM

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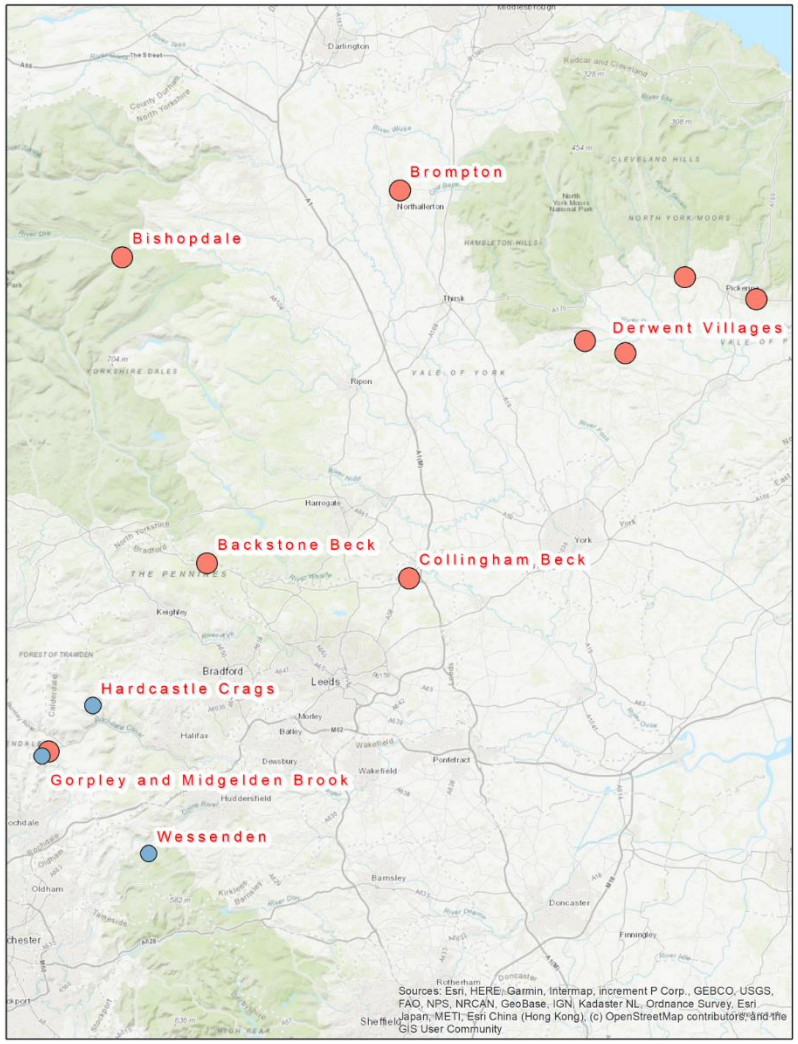


Supporting NFM pilots

Working with Defra and Leeds City Region funded NFM pilots in Yorkshire to:

- Collate baseline data
- Establish monitoring systems and protocols (incl. multiple benefits of NFM)
- Select and site NFM interventions
- Interpret data on NFM outcomes
- Road-test and refine EA guidance
- Consolidate evidence
- Establish community of practice
- **Deliver evidence and guidance to influence national implementation and financing of NFM**

Supporting NFM pilots - impact

Locally:

- Support the success of the NFM pilots

Regionally:

- Experience exchange between pilots
- Broaden knowledge on NFM implementation
- Inform larger flood alleviation schemes (York, Leeds, Sheffield), catchment management plans, YRFCC

Nationally:

- Strengthen guidance, particularly on monitoring of co-benefits
- Influence confidence in funding NFM, including through review of Flood Grant in Aid and the Local Levy

Monitoring and evaluating the DEFRA NFM pilots

Evidence required on how projects have:

→ Reduced flood or coastal erosion risk to homes

→ Improved habitats and increased biodiversity

→ Supported partnership working with communities

→ Contributed to research and development

Time Lapse Photography

The Riverfly Partnership

FreshWaterWatch

Ecological/chemical water quality

iCASP

Bishopdale – delivery mechanisms

NFM farm plan

Scoring criteria

Grant available

Tree Planting

Buffers Strips

Leaky Dams

De-culverting

Hedge Planting

Yorkshire Dales Rivers Trust

iCASP

Derwent Villages

Sinnington

Hovingham

Land conversion: arable to pasture

→ soil improvement & reduced sediment delivery

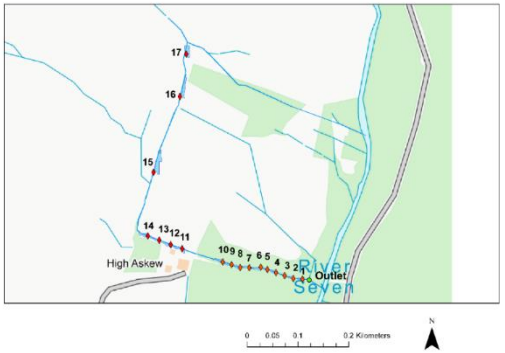
Thornton le Dale

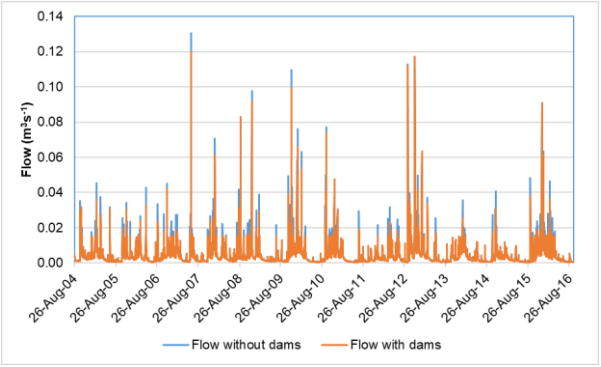
Riparian tree planting and tree felling into stream

→ water retention, bank stabilisation, habitat creation

Modelling activities

- Pilots supported by teams at York, Leeds, JBA, Mott MacDonald
- Some assistance in selecting/siting interventions
- Establishing baseline
- Interpreting and extrapolating outcomes
  - ➢What level of impact of NFM is it plausible to detect?
  - ➢Over what scale does any signal from NFM remain detectable?
  - ➢Range of conditions for optimal performance of NFM?





Community of Practice


Share learning and best practice - Training and dissemination - Influence policy

Update:

- **3 events to date = Hardcastle Craggs, Leeds University, Nethergill Farm.**
- **Terms of reference being developed**
- **Programme of meetings being developed**
- **Next meeting = 11th September with a focus on the sustainability of NFM: payments, maintenance, liability**

Current status

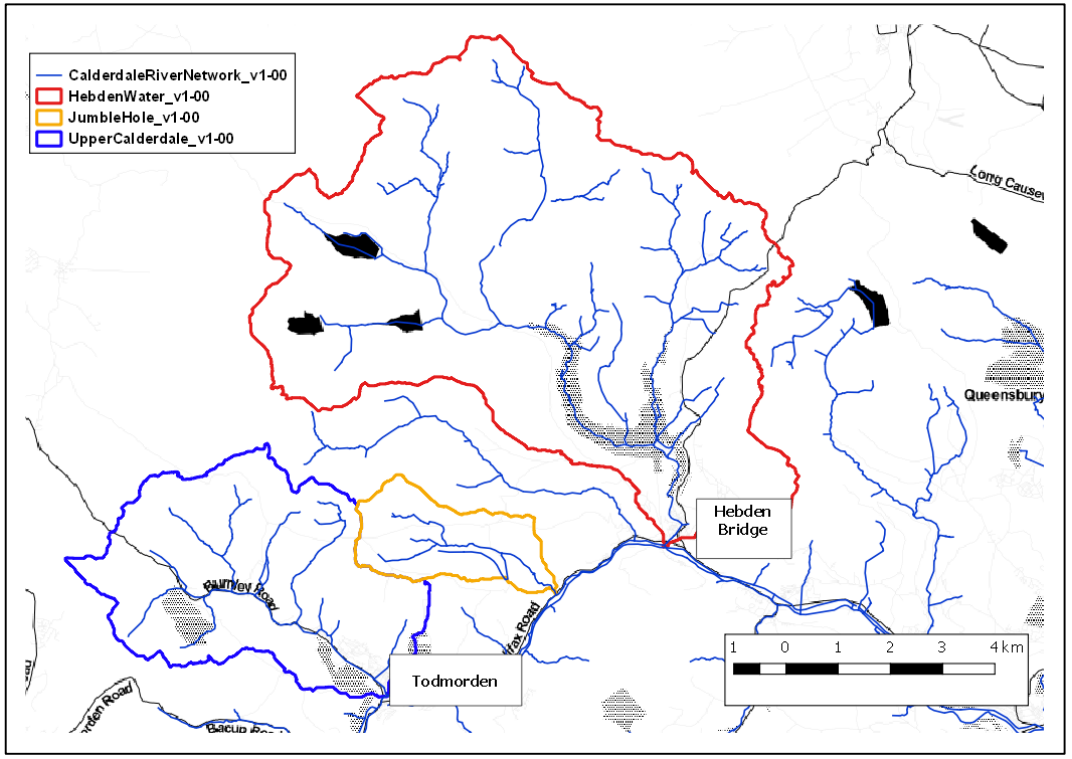
- Most pilot projects have implemented measures
- Monitoring protocols in place and most projects generating data
- Community of practice established
- Now working to establish models to underpin data interpretation

Sustainability

- Pilots will continue implementing measures through 2020
  → Mechanisms to support evidence collection beyond current funded period?
- Baseline against which to measure change is critical
  → Can we identify future locations and initiate baseline monitoring?
- NFM is a long-term commitment for landowners
  → Mechanisms for funding? Body of evidence for efficacy? Maintenance?
  → National Trust / iCASP project on integrating NFM into Payment for Outcomes trial

NFM - Modelling

- ICASP project working with Calderdale Council, Yorkshire Water and the Environment Agency to determine how land use impacts runoff for 3 selected sub catchments in the Upper Calderdale region
- The impact of land use on runoff is modelled with a coupled distributed rainfall-runoff (SD-TOPMODEL) and a hydrodynamic model (LISFLOOD-FP)
- The models will be used to evaluate the impact of NFM interventions on flood risk through the catchment
- The methodology and modelling approaches will also be applied to Bishopdale and Goprley catchments



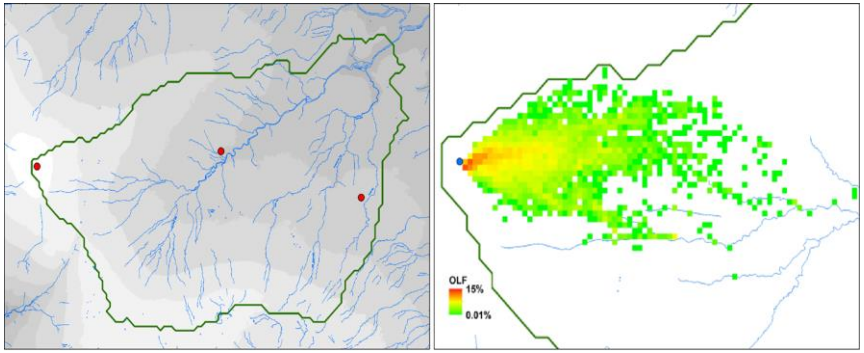
Spatially Distributed TOPMODEL

TOPMODEL developed in 1979 (Beven and Kirkby)

- Developed on the principle of regions of the catchment behaving as homogenous units, described by the Topographic Wetness Index
- Overland flow and subsurface flow linked
- A lumped/semi distributed model, overland flow accounted for each catchment
- Each unit described with a single set of parameters

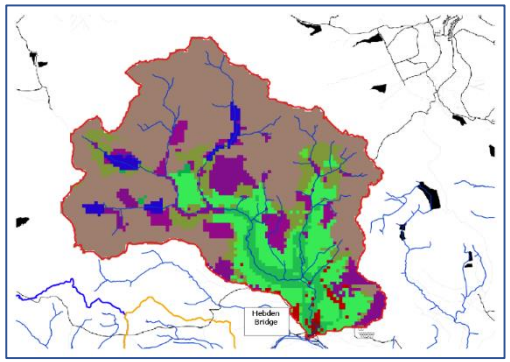
SD-TOPMODEL – developed 2015 (Gao, Holden and Kirkby)

- TOPMODEL rationale applied from the catchment scale to the cell scale
- Overland flow and subsurface flow treated separately and overland flow now be explicitly accounted for in the model
- 3 spatial distributed parameters are used to describe the surface and subsurface characteristics

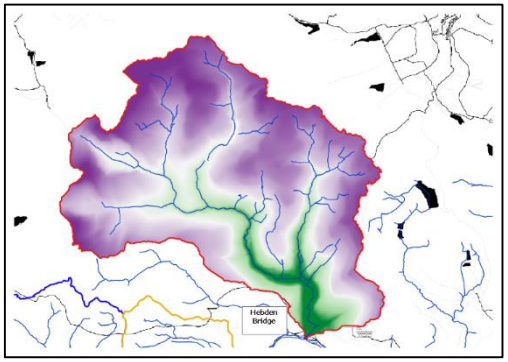


From Gao, Holden and Kirkby (2015): A distributed TOPMODEL for modelling impacts of landcover change on river flow in upland peatland catchments

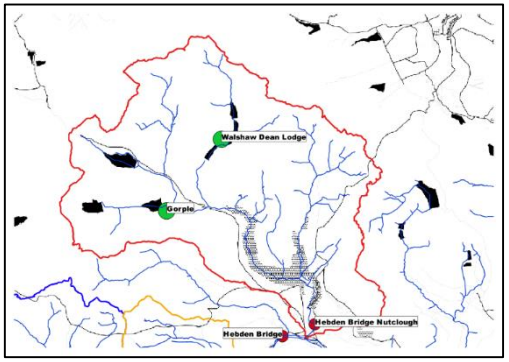
SD-TOPMODEL – Upper Calderdale



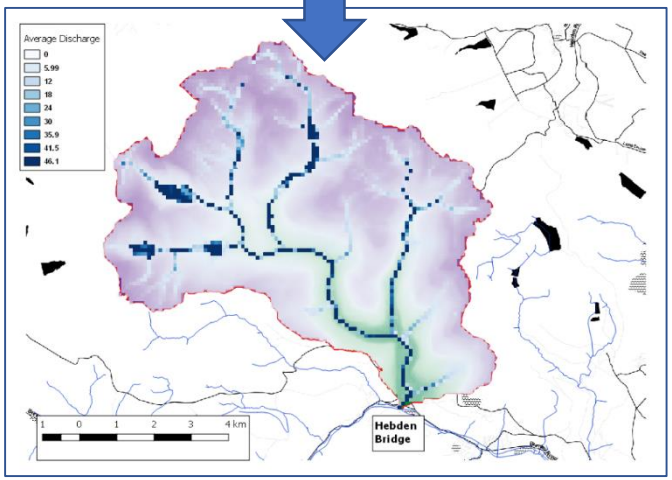
LandSAT derived landuse data



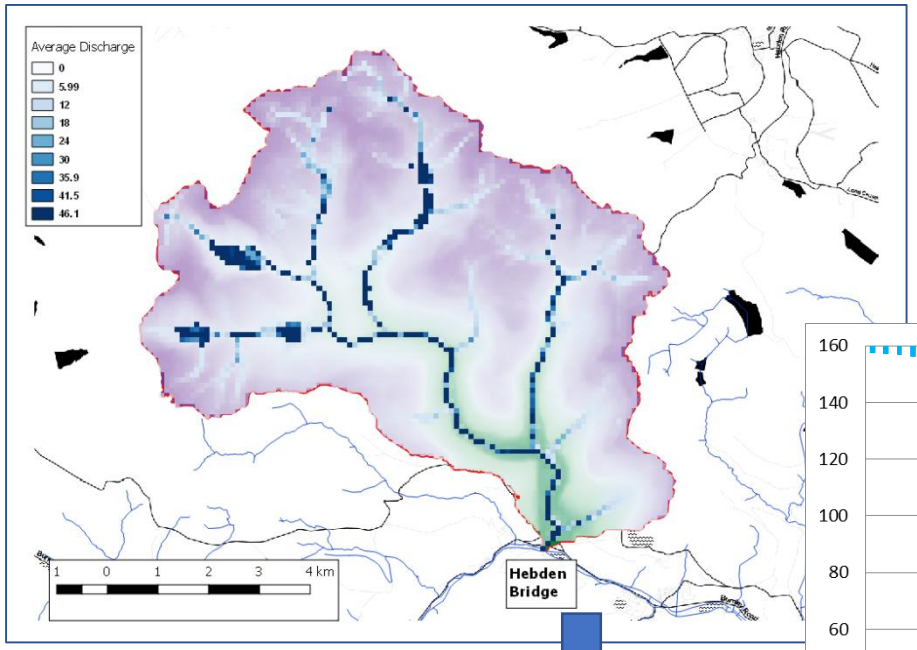
5m Terrain Data



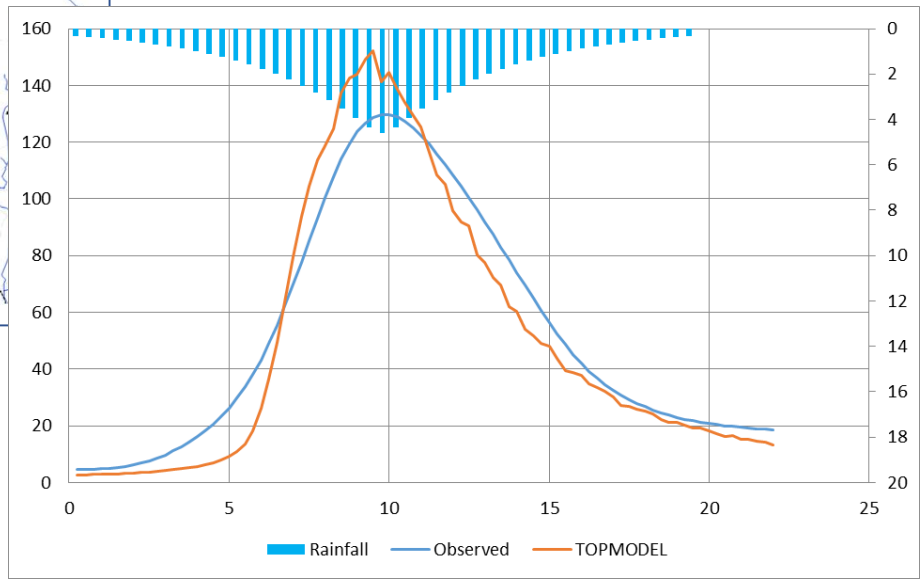
Rain and River gauge data



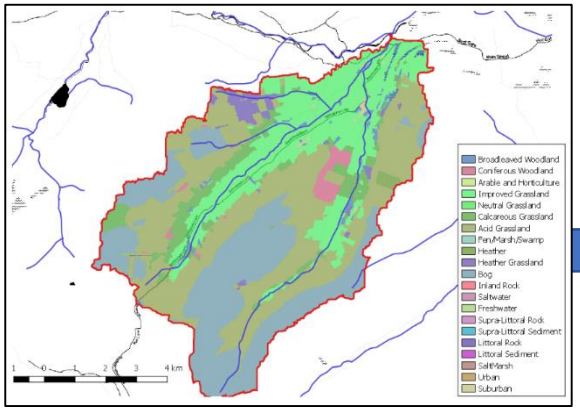
SD-TOPMODEL – Upper Calderdale

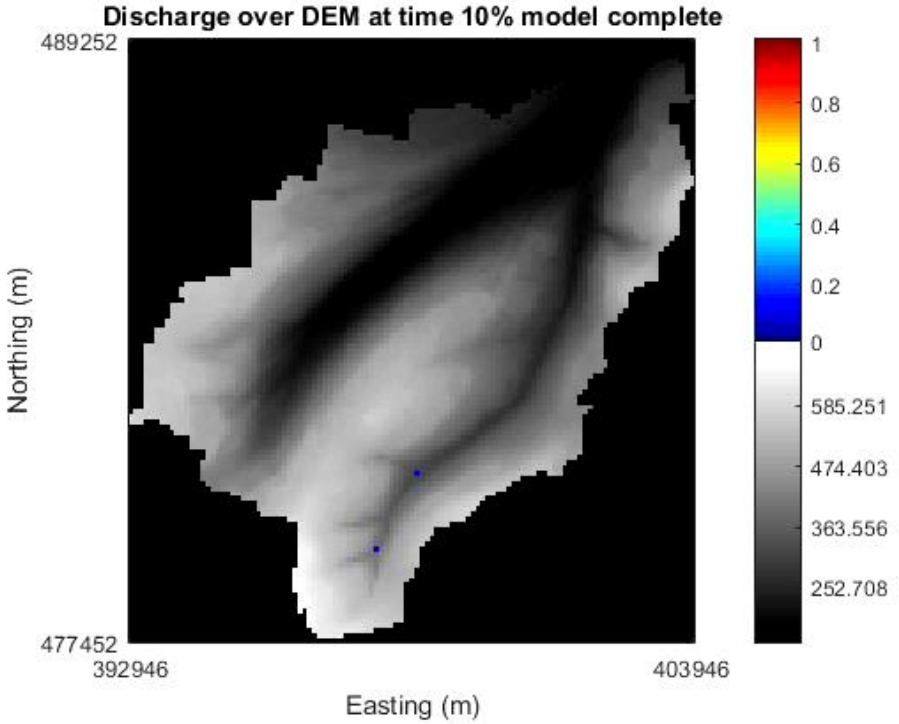


- 3 Baseline models developed for Upper Calderdale
- Model outputs compared to gauge records, detailed 1D-2D hydraulic models and ReFH calculated flows
- Good comparison between TOPMODEL and observed data (NSE ~ 0.88 for Hebden Bridge)



SD-TOPMODEL - Bishopdale





NFM - Modelling

- Using SD-TOPMODEL, LISFLOOD-FP, collected soil data, LANDSAT images, and rainfall and river gauge data provided by project partners, a modelling approach is being developed that will allow baseline models to be developed

- Baseline models for the Hebden Water Catchments, Jumble Hole Beck, Upper Calder (upstream of Todmorden), Bishopdale and Gorpley are currently being developed.

- The baseline models will be used to evaluate the impact of a number of different NFM approaches and the impact of land management practices on flooding

- Future work will look at refining these tools to produce a broad approach to modelling NFM schemes and improving the representation of NFM features in SD-TOPMODEL

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