







# **ROE CATCHMENT COMMUNITY WATER MANAGEMENT GROUP**







## *Community Group Roles*

**Chairman– David Black**

**Technical Management & Secretary – Jonathan Coulthard**

**Stakeholder Relations – Ian Irving**

**Community Relations – Sue Black**

**Treasurer - Georgina Ternent**

**Task Force Coordinators – Andy Jones and Andy Carr**

**Community Resilience Coordinator - Geoff Thomlinson**

**'Adopt a River Section' Volunteers - Joan, Jo, Judith**





## *Presentation Overview*

- Start with the End in Mind.....
- The Goals of our Community
- Understand the Issues of Runoff Flooding and why it is important to Communities
- Hear about what we have done so far - Outcomes and Impact Delivered by the Community Driven Ecosystem Approach
- Next Steps, Commitments and Action Plan
- Discussion



The background image shows a river scene with lush green trees and foliage. On the left, a person in a grey shirt and dark waders is standing in the water, possibly conducting a survey or cleanup. On the right, another person in a blue shirt is standing on the bank, looking towards the river. The circular frame is a dark grey outline that encloses the text blocks.

## *The Vision*

To Develop a Collaborative  
Relationship with the  
Environment Agency and other  
Stakeholders to Deliver  
Transformational Change in the  
Management of Rural River  
Catchments





# *The Goals of our Community Group*

- Ensure a sustainable and resilient community free from flooding where possible, capable of mobilising to counteract the consequences of break flash floods
- Provide insights and innovations on flood prevention in rural communities that are transferable throughout rural Britain
- Transform the existing practices by which communities work with public and private sector organisations to deliver flood prevention schemes in rural areas

- Develop river catchment and flood management plans that achieve greater working with natural processes
- Enhance agricultural productivity wherever possible through flood alleviation interventions throughout the River line and the River line catchments
- Enhance biodiversity to support the aims of Natural England and the Environment Agency wherever possible

## **ENABLING APPROACH**

- Create an ecosystem of stakeholders with the community taking the lead to maximise the costs and resources required to eradicate the threat of flooding in our communities





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- Develop river catchment and flood management plans that achieve greater working with natural processes
- Enhance agricultural productivity wherever possible through flood alleviation interventions throughout the River Ive and the River Roe catchments
- Enhance biodiversity to support the aims of Natural England and the Environment Agency wherever possible







## ENABLING APPROACH

- Create an ecosystem of stakeholders with the community taking the lead to minimise the costs and resources required to eradicate the threat of flooding in our community



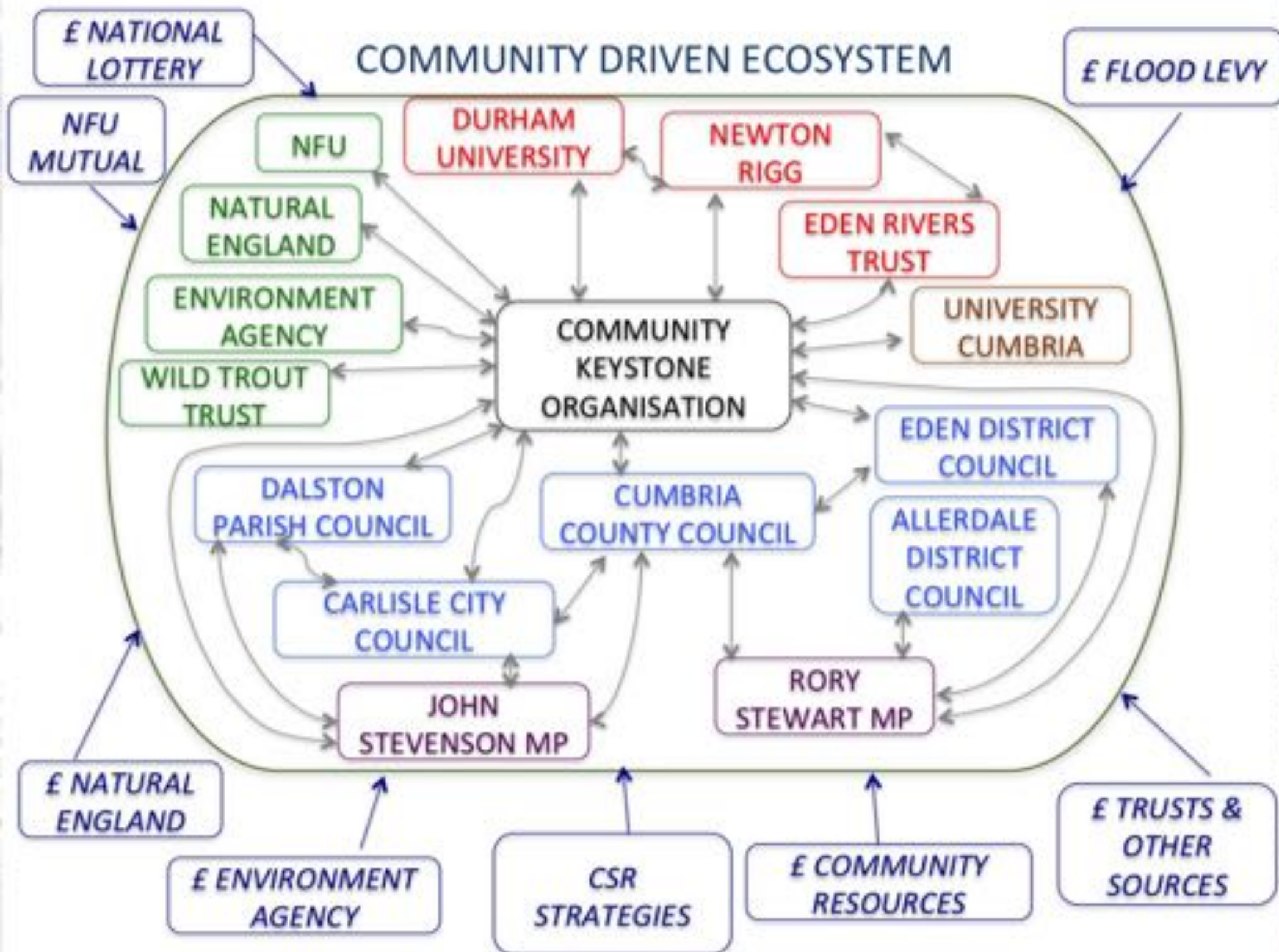


# The Ecosystem Concept





# COMMUNITY DRIVEN ECOSYSTEM





# *The Plan*

## Draft Flood Alleviation Activity Plan





# Draft Flood Alleviation Activity Plan





# *The Challenge*







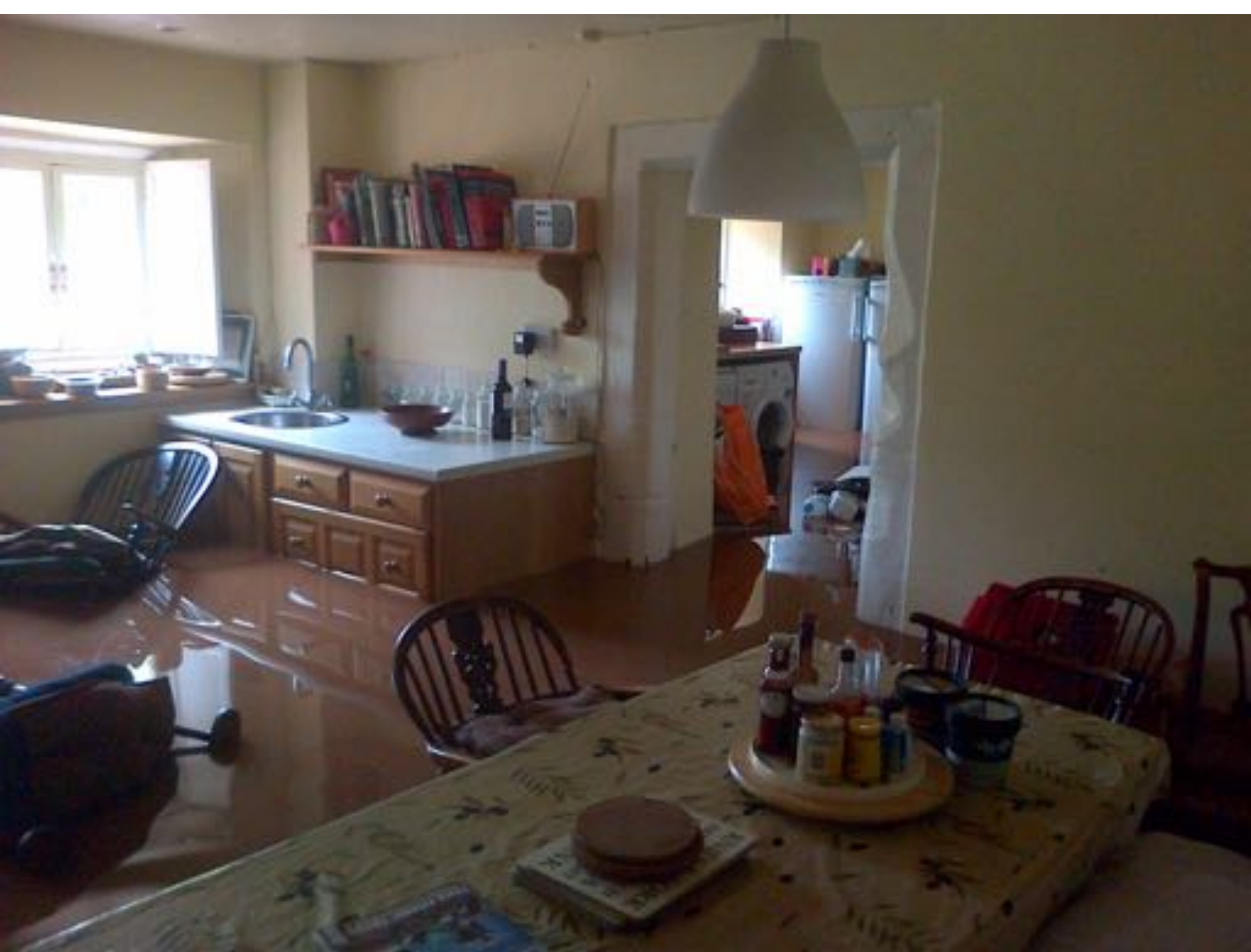














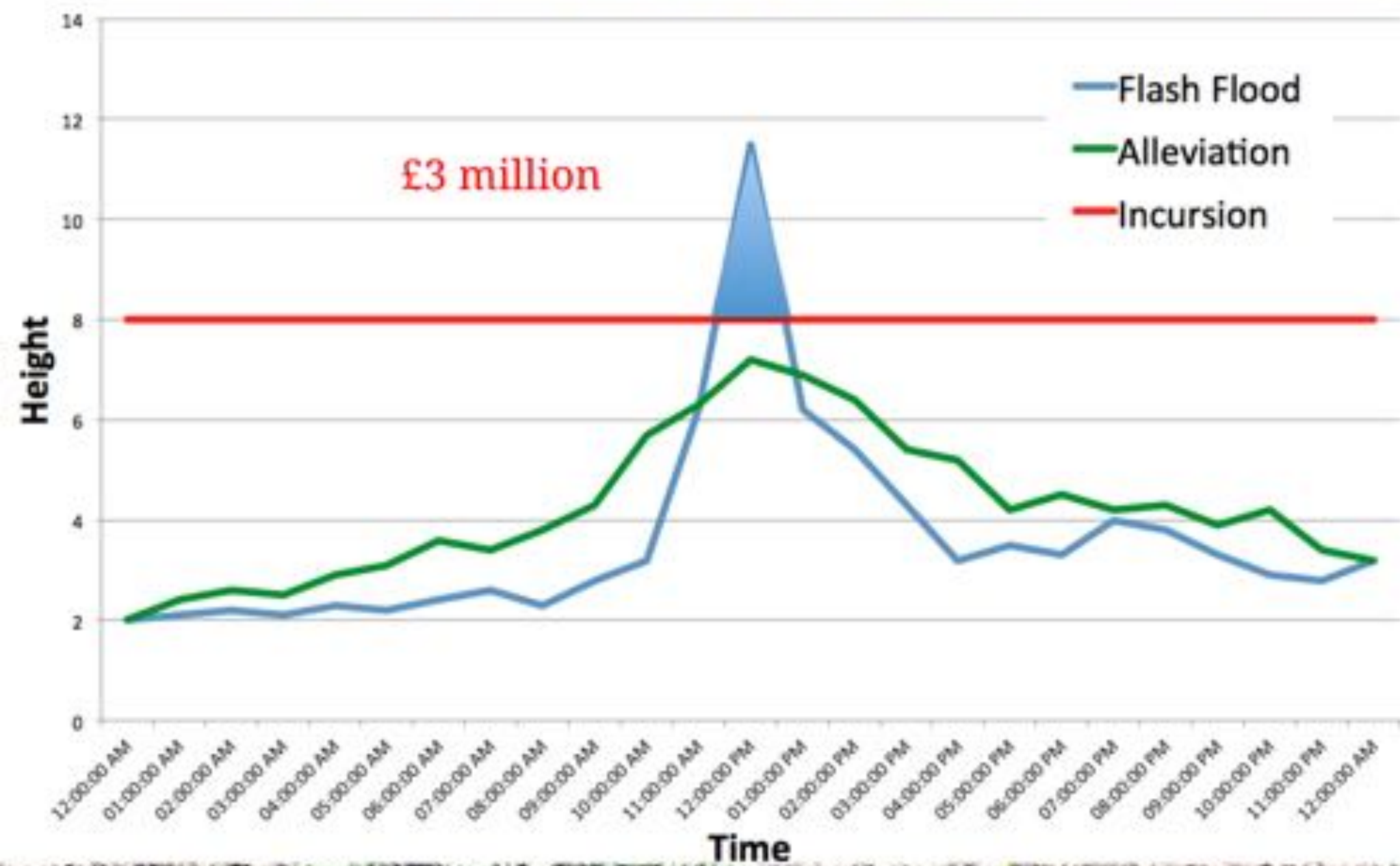




£££

+++







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£3 million

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# *Simultaneous Approaches*

- Clearance Downstream
- Mitigation Measures Upstream
  - Understand the Catchment
  - Engage Local Landowners
    - "Enlightened Self Interest"
    - 70% of UK soils are compacted
    - Loss of topsoil and nutrients - phosphates etc
    - Silage Yield can improve from 6t/Ha to 10t/Ha
    - Animal Health Issues - Parasites/Trace Nutrients/etc
- Improve Water Quality
- Enrich the Biodiversity and the Habitats



# *Initial Activities*





# Fact Finding

River walks and initial wrack  
mark assessment; involving the  
Environment Agency, Eden Rivers  
Trust and Newcastle University



Investigation of historic damming  
problems at High Wood Castle on the  
River Tyne: wooden beams found across  
the gorge could stem flood waters down,  
with a one acre (depth unknown)  
quarry occurred.



Monitoring/Messuring/Understanding



Reading and Researching

- Moulton
- Newcastle/Warper Adams/Durham
- Other Projects
- Eddleston/Dacre Beck/Belford



# *Fact F*

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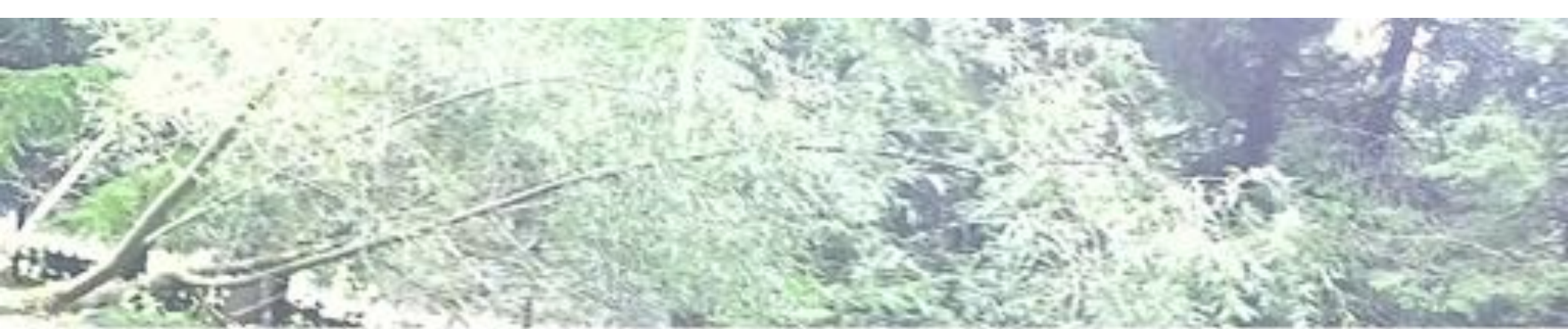




Investigation of historic damming positions at High Head Castle on the River Ive: wooden beams fixed across the gorge could slow flood water down, with a one acre (depth unknown) quarry connected.







## Reading and Researching

- Monbiot.....
- Newcastle/Harper Adams/Durham
- Other Projects;
  - Eddleston/Dacre Beck/Belford





# Monitoring/Measuring/Understanding



Environment  
Agency

River and sea levels

North West

North

East and East

## Roe Beck at Stockdalewath

Last updated 15:00 on 10/05/2015

### Summary

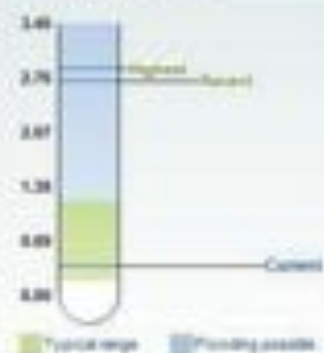
The river level at Stockdalewath is 0.35 metres.

This measurement was recorded at 15:00 on 10/05/2015.

The typical river level range for this location is between 0.18 metres and 1.20 metres.

The highest river level recorded at this location is 2.55 metres and the river level reached 2.72 metres on 18/05/2015.

Current level: 0.35m



Last 48 hours of available data



Flood warnings are currently in force in England & Wales



No severe flood warnings



No flood warnings



14 Flood alerts

View flood warnings in force

### Station data

- Station name: Stockdalewath
- Site id: 5135
- Watercourse: Roe Beck
- Site datum: T3.35 m AOD
- Site opened: Jan 1995

### Page tools

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# *Media Interest and local Political Engagement*





# We're happy to get muddy to ensure our homes remain dry

Residents hope beck clear-up will be followed by official action



10.000.000

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### NORTH CUMBRIA FLOOD VILLAGES GET £10,000 TO FIND SOLUTIONS

By James Johnson

First published: 27.03.14, Monday, 24 February 2014

A pioneering community group has secured a £10,000 grant as part of its efforts to protect villages from flood damage.



The flood in May 2012

The Blue Coast Community Water Management Group (BCCW) was set up in the wake of flash flooding in May last year, which swept through the villages of Houghton and Broughton, near Dalton, up to a point where flood water as to be high.

All but one of the residents have now returned home, but the community has united - and been backed by villagers in surrounding hamlets, such as Houghton Head - in their efforts to protect themselves of the future. River restoration action groups have changed and removed dozens of trees, and fallen vegetation from both within the river flow and along its banks.

The group recently registered as a charity, to help fund its work, and has also formed a committee which is working closely with the Environment Agency and the local council to help fund its work.

#### HAVE YOUR SAY

- 1. Report of flooding in the village (17 comments)
- 2. A lot of trees in the village (17 comments)
- 3. Report of flooding in the village (17 comments)
- 4. Report of flooding in the village (17 comments)
- 5. Report of flooding in the village (17 comments)

#### IN WEST CUMBRIA

- 1. Report of flooding in the village (17 comments)
- 2. Report of flooding in the village (17 comments)
- 3. Report of flooding in the village (17 comments)
- 4. Report of flooding in the village (17 comments)
- 5. Report of flooding in the village (17 comments)

#### VOTE

Should the local council be...











## *River Clearance Work Parties*

- Sixteen sessions have happened.....so far
  - With lots of Community Engagement!
  - Reports are sent out after each session
  - The Community Input has been valued at £97 per hour - so over £200,000 over 5 yrs
- With input from EA and Eden Rivers Trust and others we are learning about river bank management



## STOCKDALEWATH AND HIGHBRIDGE FLOOD ALLEVIATION MEETING REPORT 12

Sunday 8th December 2013 held along the River Roe

### ATTENDEES:

11 residents

### MEETING OBJECTIVES:

To clear the river of fallen trees and overhanging branches along the River Roe, thereby improving the flow down the river and prevent blockages at bridges.

### Report

A hardy core of volunteers braved a stormy Sunday to clear a vital section missed out the last time due to high river levels. David Black sported his new waders to great effect as the river has a very deep channel in this section. Only in the last minutes of the day did he lose his footing and experienced a full body soaking!

An assortment of overhanging branches, self sown samplings, weathered washed down timbers and tangled barbed wire was removed from the river bank on both sides, and then removed from the farmer's field. Many thanks to Andy Jones for taking over the organisation, and to all those who came and worked so hard. If anyone from the Environment Agency reading this is organising clearance work, we still have much to do and your help would be invaluable. Thank you.









































## Catchment Studies

EA funded Catchment Studies - with Durham University  
Stuart Marshfield and Callum Pearson





# Investigating the potential to reduce flood risk through catchment-based land management techniques and interventions in the River Roe catchment, Cumbria, UK.

Callum J. Pearson<sup>1</sup>, Sim M. Reaney<sup>1</sup>, Louise J. Bracken<sup>1</sup> and Lucy Butler<sup>2</sup>

<sup>1</sup>Department of Geography, Durham University, Durham, DH1 1TA, UK (c.pearson@durham.ac.uk)  
<sup>2</sup>Eden Rivers Trust, Darroch Building, Newton-Rigg College, Penrith, CA11 9NS, UK



## Overview

With no previous major flood events in recent community memory the Roe catchment has experienced two significant flash flood events since 2000. The River Roe has a normal flow of less than 5m<sup>3</sup>/sec<sup>3</sup> occurring 97 percent of the time however there have been two flash floods of 94.6m<sup>3</sup>/sec<sup>3</sup> in January 2001 and 66.9m<sup>3</sup>/sec<sup>3</sup> in May 2013. These two flood events resulted in the inundation of numerous properties within the catchment. The latter event prompted the creation of the Roe Catchment Community Water Management Group, a group aiming to deliver a sustainable approach to managing the flood risk in the Roe catchment. Due to the sparsely distributed rural population the community falls the cost-benefit analysis for a centrally funded flood risk mitigation scheme. Therefore the at-risk community have to look for cost-effective, sustainable techniques and interventions to reduce the potential negative impacts of future events; this has resulted in a focus on natural flood risk management.



The resulting project combines innovative catchment modelling techniques, both risk-based approaches (SCIMAP Flood) and spatially distributed hydrological simulation modelling (CRUM3), to investigate potential catchment-based land management techniques and interventions to reduce flood risk in the Roe catchment. The research will culminate in the creation of a method applicable to other rural catchments at risk in addition to providing a scientific base from which further action can be enacted within the Roe catchment.

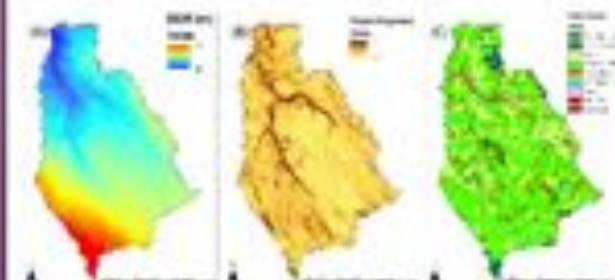


Figure 1: (a) DEM of the catchment, (b) Topography and (c) Land cover derived from CORONA 2001

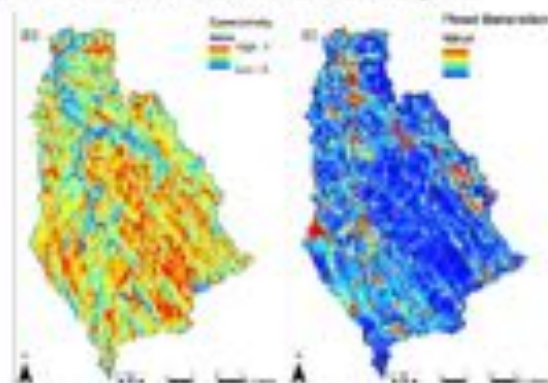
## River Roe Catchment

- Located in NE Cumbria 12km south of Carlisle
- Catchment area of 66km<sup>2</sup>
- Sub-catchment of the River Eden
- Land usage is predominantly agricultural

## The SCIMAP Approach

SCIMAP (Sensitive Catchment Integrated Modelling and Analysis Platform) is a software package that enables the user to quickly gain an understanding of hydrological connectivity and runoff behaviour at a catchment scale. It utilizes a minimal dataset to give detailed results: a detailed DEM (5m), land cover map (LCM 2001) and information on the spatial pattern of rainfall the required inputs. This allows for a systematic approach to identifying and prioritising areas of high risk at a catchment scale.

The flood risk assessment (SCIMAP Flood) identifies areas of high overland connectivity using a topographic network index combined with a land cover runoff indices. The runoff indices are values of runoff generated by each type of land cover within the catchment; the highest flood risk weight given to land covers with exposed soil and the lowest risk weight is given to woodland. The hydrological connectivity (Figure 2) describes the ease for which water connects with the river channel system.



Both hydrological connectivity and flood risk generation within the catchment are given on a zero to one scale. In Figure 2 the red areas connect first and more frequently whilst the blue areas connect last and least frequently. In Figure 3 the red areas generate the most overland flow whilst the blue areas generate the least overland and thus represent an area of lower flood risk generation.

## Connectivity of Runoff Model (CRUM3)

CRUM3 is a fully distributed, physically based hydrological model developed originally to investigate the impact of climate change and land management upon hydrological extremes. It is structured into four categories: a weather module, 1-D hydrological module, landscape module and river network module. Discharge within CRUM3 can be predicted at specific points throughout the channel network and thus the impact of a limited scenario can be assessed at a variety of spatial scales.

## Modelling catchment-based land management interventions to reduce flood risk

Comparison of the resultant flood hydrographs from both the 2005 and 2013 high flow events from the original land cover to the tested scenarios will give an indication of potential flood risk reduction. Cost-benefit analysis can then be applied detailing further suitability for the Roe catchment. The development of flood risk reduction scenarios to model using CRUM3 will be achieved using both stakeholder participation and the use of SCIMAP generated risk data. While initially focusing on natural flood management interventions and land use change the project will also assess issues surrounding soil compaction.

Figures 4 to 6 detail how the SCIMAP Flood risk generation (FRG) map is utilised to develop a potential scenario. The area within the catchment with a FRG value of over 0.3 is highlighted; using Ordnance Survey data all fields that contain >50 per cent coverage are selected. Overland a higher risk, the field is assigned a 25m buffer or the land cover is altered to one reducing hydrological connectivity (stable to deciduous woodland).

Other land management scenarios developed include riparian buffers, retention and detention basins, broads and soil aeration.

Future progress includes continued work with relevant stakeholders to ensure an array of modelled interventions at a variety of spatial scales have been analysed using CRUM3.

## Summary

The assessment of the developed scenarios will determine to most effective land management interventions for the Roe catchment. This process is vital for providing the the Roe Catchment Community Water Management Group with a guide to future catchment management decisions.



Figure 4: Land cover map with 0.3 Flood Risk Generation coverage in 2001, 2013 and 2014. The red circle illustrates the change from 2001 to 2013 and 2014.





## *Outcomes*

- Currently investigating areas of high overland flow
  - Focusing on land cover change
  - Field buffers
  - Field land use change
  - Riparian buffers
- Work still to do
  - Work on modelling soil aeration scenarios
  - Need to assess effectiveness and practicality.
  - Work on modelling retention/detention ponds
- Cost-benefit analysis of final outcomes.





## *Other Successes*

- Environment Agency Community Case Study
- Awarded Best in Class Community Resilience Plan
- Telephone/Warning Cascade
- Winner of Lloyds Bank Community Challenge Competition
- Flood Wardens in Place
- Project Board - Chaired by The Community
- Engaged with Wild Trout Trust
- Two Farmer Information Days planned - supported by Natural England/ERT - to look at Catchment Sensitive Farming
- Meeting with MPs and ABI



## *On-Going Activities*

- Identify Cost Effective Mitigations
- Utilise Experiences from other Communities
- Developing Community Toolkits for Utilisation throughout the UK ... and abroad?
- Collaborative Opportunities
- Leveraging Funding
- Further Community Engagement to Explain Plans
- Utilise Research to Inform Government Policy





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