Project: Understanding extreme events as catalysts for flood-risk management policy change: a case study of the impact of ‘Storm Desmond’ in Cumbria, UK.

Deliverable 2.1: An analysis of Storm Desmond, as a catalyst for institutional change in flood risk management

Hugh Deeming, BSc, PhD
HD Research

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Abstract

This report discusses the catalytic impact of Storm Desmond (December 2015) on the processes through which flood risk is managed in the county of Cumbria, UK. A description is outlined of how the storm acted to integrate the concepts of Integrated Catchment Management, Working with Natural Processes (WWNP) and Natural Flood Management (NFM) into the county’s flood-risk management discourse. The focus of the report is on the Cumbria Floods Partnership, which was an inclusive participatory process set up following the storm to deliberate future flood-risk management options. The importance of engaging and developing trusting relations with key stakeholders in deliberations is described and the report also contextualises the outcomes in Cumbria with parallel changes occurring in England more widely.

Keywords: Resilience, flood, risk, learning, resources, integrated catchment management

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1. Introduction

This report forms part of a set of four deliverables, which were commissioned by the DRMKC, following the impact of ‘Storm Desmond’ on the north-west of England over the weekend of 5th to 6th December 2015.

Deliverable 1.1 (Deeming, 2016) described the situation in Cumbria prior to the arrival of Storm Desmond. That report discussed the impact of Cumbria’s recent history of extreme floods on its population, in terms of its effect on the county’s resilience. The organisational, policy and financial structures of flood-risk management were outlined, as were the interventions that had been enacted across the county in response to two preceding major floods in 2005 and 2009.

Deliverable 1.2 then described the effects and impact of Storm Desmond in more detail, before discussing the activities of the county’s Community of Resilience Practice (CoRP) during the response phase of this event (Deeming, 2017a).

This deliverable will return to the concept of Flood Risk Management (FRM) and focus on how the impact of Storm Desmond influenced FRM policy and practice in the county and the country from the end of 2015.

2. The Evolution of Flood Risk Management in Cumbria

2.1 ‘Storm Desmond’ as a catalyst for change

Deliverable 1.1 (Deeming, 2016) discussed the broad changes in English FRM that had occurred from the 1940s to 2000s. The key changes described had been determined by Johnson et al. (2005), to have resulted in part, from the catalyzing effect of major flood incidents. However, “whilst Johnston et al. did identify key events (e.g. the east coast flood of 1953) as thresholds for policy change, their conclusions suggested a far more nuanced balance between on-going policy
ideas being *accelerated* by events, rather than their providing evidence of complete shifts in thinking. It is by monitoring these on-going processes, therefore, rather than the impacts of major hazard impacts alone, which may hold the key to understanding potential future changes.

“... our ability to predict future changes in policy as a result of major flood disasters is largely dependent on our knowledge of the issues, actors and ideas seen as important before the flood. By monitoring these incremental changes we should be able to anticipate, rather than react to, catalytic changes that may occur in the future. Key factors in this process appear to be a combination of environmental, behavioural and contextual drivers.” (Ibid., p.574)” (Deeming, 2016: p.9)

On 13th December 2015, just over a week after Storm Desmond and prior to the arrival of storms Eva and Frank later in the month, the Environment Secretary Liz Truss MP, announced that she had requested Rory Stewart OBE and Member of Parliament for Penrith and the Borders, to chair a Cumbria Floods Partnership group to:

“consider what improvements to flood defences in the region may be needed, [to] look at upstream options for slowing key rivers to reduce the intensity of water flows at peak times and [to] build stronger links between local residents, community groups and flood defence planning” (GOV.UK, 2015).

These terms of reference are interesting, because whilst Johnson et al. (2005) had suggested that the Government’s ‘Making Space for Water’ strategy had marked an identifiable shift, in England and Wales, toward whole-catchment flood risk management, and the need for this shift had been reemphasized by the Sir Michael Pitt in his review of the 2007 floods (Pitt, 2008), until Truss’ announcement, upstream-focussed FRM in Cumbria had remained largely the remit of exploratory projects carried out through a somewhat piecemeal approach. Small farm-scale successes had been achieved, notably through the EU-funded ALFA project (Stam et al., 2014), but at the county-scale FRM was still predominantly focused on traditional measures, such as flood defences. This can be evidenced by the fact that prior to December 2015, two key documents
relating to FRM in Cumbria paid only cursory attention to the potential of ‘upstream’ flood management.

In 2009 the River Derwent Catchment Flood Management Plan (CFMP) (Environment Agency, 2009b), referred to measures that could be implemented upstream of towns three times, but very generally and without any explicit detail. Whilst in March 2015 the Local Flood Risk Management strategy (Cumbria County Council, 2015), mentioned upstream management only once. It also discussed ‘working with natural processes’\(^1\) (WWNP) twice, but these mentions were clearly in the context of measures providing multiple-benefits (e.g. FRM and ecological), rather than as any sort of concerted move toward restoring natural features (i.e. WWNP) or enhancing natural processes’ flood management potential (i.e. Natural Flood management: NFM)\(^2\). NFM was only explicitly mentioned in this document in relation to the fact that projects utilizing NFM techniques might attract funding through the European Regional Development Fund (Ibid., p.36).

Furthermore, following the floods in 2009 the Environment Agency (2010) had prepared a scoping report to investigate the options for implementing FRM measures to protect the town of Keswick on the River Derwent catchment. That document included two conclusions that were specifically relevant to working with natural processes:

"**Habitat Modification:** […] There is little conclusive evidence that habitat has a significant impact on flood water levels, although research is ongoing in various places across England. The shapes of the valleys upstream of Keswick do not lend themselves to tree planting as the valley sides are very steeply sloping. Habitat measures would also take time to establish and become effective and it would be difficult to predict the effectiveness of the measures undertaken. However, habitat modification could be useful in the long-

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\(^1\) ‘Working with natural processes’ means taking action to manage fluvial and coastal flood and coastal erosion risk by protecting, restoring and emulating the natural regulating function of catchments, rivers, floodplains and coasts’ (Defra, 2014: p.2)

\(^2\) Natural flood management (NFM) is defined as the alteration, restoration or use of landscape features to reduce flood risk. Altering features often includes “soft-engineering”, which has been defined as engineering with natural materials, such as soil.
term in reducing bank and fell erosion, thereby reducing the rate of gravel build-up in the catchment’s rivers; and in future to reduce possible increases in river flows as a result of a changing climate." (Ibid., p.7)

"Introduce meanders on upstream tributaries: […] Our computer modelling has shown that this is unlikely to have a significant effect on water levels in Keswick during flood events. This is because the water in the tributaries would have overtopped into the floodplain, the water would then flow over the meanders rather than around them, and so the time taken for water to reach Keswick would be much the same as present" (Ibid., p.9)

Following the scoping report’s recommendations, it was decided that the most appropriate scheme to progress in Keswick in the short term was the construction of new flood walls (Plate 1 and 2) and the implementation of other structural and non-structural measures in the town (e.g. improved surface-water drainage and pumping capabilities).

However, in another part of Cumbria one project, which had been mentioned in the Eden River CFMP (Environment Agency, 2009a), was the on-going development of a flood-storage scheme situated at the Thacka Beck nature reserve, which was being designed to protect properties in Penrith. This collaborative Eden Rivers Trust and Environment Agency scheme is particularly relevant to the argument here, because it integrated techniques based on NFM processes, whilst also bearing the characteristics of more traditional engineering projects (i.e. an engineered bund capable of storing up to 76,000m³ of water during floods). Interestingly and perhaps reassuringly, the Thacka Beck scheme has been praised for operating successfully to prevent local flooding during Storm Desmond (Cumbria Wildlife Trust, 2015).

3 This flood-storage basin scheme was completed in 2011 at a then cost of £5.6m (~6.4m€): https://theriverstrust.maps.arcgis.com/apps/MapTour/index.html?appid=458f0fd0e99a437c9c0b900d4985e12c
Plate 1: Keswick flood defence wall soon after completion in 2012 (©Maureen Fordham)

Plate 2: Keswick flood defence wall on 6th December 2015, showing debris and damage resulting from overtopping (Note floodwater has not yet receded below glass level) (©Lynne Jones: KFAG)
Despite the reservations about WWNP’s short-term flow-reduction efficacy, which were expressed in the Keswick scoping report (above), significant tree planting had also taken place across the county since 2009. Charitable Rivers Trusts had also carried out a number of river restoration projects, to return historically-canalised rivers to more sinuous ‘natural’ paths⁴. However, both these activities could be said to have been conceived mainly to deliver multiple-benefits and were never clearly publicized as scientifically-underpinned options that included significant flood-risk reduction elements (see, for example: Confor and partners, 2013, West Cumbria Rivers Trust, 2014). In other words, unlike for Thacka Beck, FRM aspirations for these activities had always been something of an adjunct to their principal ecology, habitat, biodiversity and/or water-quality related aims.

2.2 Re-visiting the national perspective

As outlined in Deliverable 1.1, this is not to say that considerable effort had not been expended nationally, in respect to endeavors to work with natural processes, in order to ‘make space for water’, and to comply with Pitt (2008) and others’ recommendations (CIWEM, 2014, Defra, 2012) regarding the need to quantify the efficacy and benefit-cost ratios of upper-catchment WWNP and NFM measures (Defra, 2014). In fact, by 2015 data from several projects around the country had already illustrated that working with natural processes and using natural flood management techniques did have the potential to reduce downstream flood risks, if schemes were carefully designed. Perhaps most significant amongst these projects were the work carried out by:

⁴ The link to Whit Beck restoration is made here specifically, because even though FRM was not acknowledged as a desired outcome (Creighton, 2013), this restoration was still used as an example of a successful Cumbrian NFM project in the Environment Agency (2016) document First steps toward an integrated catchment plan for Cumbria. It is here proposed that this served as something of an indication of the Agency’s own confusion about the changing nature of FRM that was underway.
the Tweed Forum in Scotland (Tweed Forum, 2011); by a Defra/National Trust funded project at Holnicote in Devon (National Trust, 2015); by a community/university/Environment Agency collaboration at Pickering in N. Yorkshire (Lane et al., 2011); by a University/Environment Agency collaboration in Belford, Northumberland (Quinn et al., 2013); and by the Rural Sustainable Drainage System (RSuDs) project in Stroud, Gloucestershire (CCRI, 2016).

What should be noted in respect to these examples, however, is that they are all representative of relatively discrete small-catchment experiments in WWNP and NFM. Also, their successes are reflected in outcomes that have seen risks objectively reduced at larger than individual farm-scale, but still in relation to relatively small numbers of properties (e.g. ~51 properties in Pickering). This is not to belittle the achievements of these projects, which have all added to the growing evidence base that supports the efficacy of WWNP/NFM measures. Rather, it illustrates why the Environment Secretary’s announcement of the Flood Partnership approach in Cumbria presented significant challenges.

Effectively, for the first time, a collaborative partnership-based project was being launched to proactively investigate all options that might be available for mitigating flood risk in a county comprising three major river catchments, all of whose watersheds started in the mountains of the Lake District (i.e. the highest terrain in England) and where numerous traditional flood defence structures had been overwhelmed, despite their having only recently been constructed according clearly-defined scoping and cost-benefit requirements.

Storm Desmond had apparently acted as a catalyst, that had over the course of a few days re-orientated flood-risk management policy in England from its traditional focus on structural defences and familiar interventions (e.g. dredging), and the piecemeal experimentation with natural processes, to an arena wherein all options were being considered side-by-side to actively
pursue a fully integrated, communities-focused, multiple-catchment flood-risk management approach.

In other words, if residual flood risk is to be understood as the risk that is left once the effects of all mitigation measures have been accounted, then the manifestation of residual risk that was witnessed across Cumbria and other parts of the northern UK in December 2015 and January 2016 (i.e. as water overtopped engineered structures only 1 to 8 years after their construction), appears to have been a substantive driver of this change.

However, in a similar process to that outlined by Johnson et al. (2005), Storm Desmond did not act to bring WWNP, and NFM into the public’s deliberations from nowhere. It allowed these measures to shift from their previously somewhat experimental domain, fully into the public and political psyche, and with an ensuing expectation that these options should be more fully investigated, promoted and used.

Box 1 illustrates this point with quotes from two individuals who worked at the public/FRM interface before and after the winter storms.

5 The flooding experienced in the English county of Somerset during the winter 2013/14 did lead to a new local approach, with the creation of the Somerset Rivers Authority (http://www.somersetriversauthority.org.uk/) However, the model the SRA adopted still comprised a committee of formal agencies, rather than a participatory approach that included direct community representatives (other than elected members). The inclusive and participatory nature of the initial Cumbria Floods Partnership, the varied topography of the catchments (including the Lake District National Park), the sheer number of properties and communities that had already been subjected to devastating floods, and the range of mitigation measures under investigation, could be suggested to represent a much more complex undertaking. As stated by an interviewee for this project “You really can’t compare the SRA with what we’re doing here, the SRA’s really just a bureaucratic exercise.”
Box 1: Personal perceptions of Winter Storms 2015/16 role in changing public perceptions of FRM

"The storms in December 2015 were a real game changer in terms of Natural Flood Management. After the news coverage we were no longer needing to explain what NFM was, or why it was a good idea. Instead people were interested in finding out more about how it works and how it could be implemented" (Dixon, 2017)

“The winter floods of 2015-2016 in the north of England were devastating for many people and communities, as indeed the floods in almost every year since 2000 have been. In the wake of the most recent deluges, a number of inquiries were set up both nationally and locally, including the National Flood Resilience Review, Catchment Flood Partnerships in Cumbria and Yorkshire, and commissions in Calderdale and York. [...] There is a huge amount of work under way on the part of many organisations to improve flood risk management. Unlike previous years, there is a distinctly catchment-based approach, managing water from where rain falls all the way to the sea. There is also a growing interest in natural flood risk management, to delay and speed up flow through a catchment and reduce the peaks of water that often cause flooding." (Cobbing, 2017: Chief Executive Officer of The National Flood Forum - emphasis added)

2.3 Cumbria Flood Partnership (CFP) as a Community of Practice

Wenger’s (2002) concept of a Community of Practice (CoP) was introduced in Deliverable 1.1 and expanded into a Community of [Resilience] Practice in Deliverable 1.2.

A CoP has been defined as:

“…groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an on-going basis” (Ibid., p.4)

The Cumbria Floods Partnership could be viewed as a Community of Practice, most notably because it was obvious from its first meeting in January 2016 that all participants clearly held a stake and an interest in reducing the negative impacts of flooding in Cumbria (Table 1).

This is not to say, however, that it was clear at the outset how these different competing interests could be balanced in order that a unified flood-risk management strategy and approach would be developed within the partnership.
Perhaps inevitably for such an early-stage participatory meeting, a great deal of frustration was voiced about the flooding and about the fact that many communities, businesses, and households had now suffered two, four or even more, major flood events since 2005. However, through effective facilitation a series of key issues for investigation were agreed amongst participants (Appendix 1).

What transpired was an approach outlined by the Environment Agency, which laid out how they would seek, in partnership, to enhance integrated catchment management in Cumbria, through accordance with five key workstreams. These interlinked workstreams were laid out in the draft

<table>
<thead>
<tr>
<th>Table 1: Cumbria Floods Partnership – Initial Membership (January 2016)</th>
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<tbody>
<tr>
<td>Academics</td>
</tr>
<tr>
<td>Communities (representatives from villages, towns and Carlisle City)</td>
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<tr>
<td>Country Landowners Association</td>
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<td>Cumbria Community Foundation</td>
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<td>Consultants</td>
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<td>Defra</td>
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<tr>
<td>Department for Communities and Local Government (DCLG)</td>
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<tr>
<td>Elected Members (MP, Local Councils)</td>
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<td>Environment Agency</td>
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<tr>
<td>Federation of Cumbria Commoners</td>
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<tr>
<td>Forestry Commission</td>
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<tr>
<td>Lake District National Park Authority</td>
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<tr>
<td>Landowners and farmers</td>
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<tr>
<td>Local Authority Officers</td>
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<tr>
<td>Local Enterprise Partnership</td>
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<td>National Farmers Union</td>
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<tr>
<td>National Trust</td>
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<tr>
<td>Rivers and Wildlife Trust</td>
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<tr>
<td>Rural Farming Network</td>
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<tr>
<td>Rural Payments Agency</td>
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<tr>
<td>Utilities Companies</td>
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<tr>
<td>Voluntary Sector Organisations</td>
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</tbody>
</table>
Reducing flood risk from source to sea: First steps toward an integrated catchment plan for Cumbria (Environment Agency, 2016b) and comprised:

- Strengthening defences
- Upstream Management
- Maintenance
- Resilience
- Water Level Management Boards

Focussing on the principle of ‘Upstream Management’, the draft report outlined an aspiration to integrate a full range of WWNP and NFM measures into the county’s flood management approach (Box 2).

However, whilst this seemed like an action plan, in fact, many of these options had been, or were being planned, or were actually in place prior to December 2015. For example: the Whit Beck restoration that is mentioned, had actually been completed in 2014 (and had not originally been conceived as an FRM project: Creighton, 2013). Furthermore, difficult negotiations related to the use of Thirlmere reservoir for flood storage, had been ongoing between the Water Company, agencies and the local Flood Action Group since at least 2005 (Cook, 2016, Environment Agency, 2009b). What this suggests, therefore, is not that Storm Desmond changed the Environment Agency and its partners’ approach, but that it provided ‘a window of opportunity’ (Alexander, 2000) in which publics that had suddenly become aware of the need for wider thinking could be introduced to the fact that WWNP and NFM approaches actually were part of the FRM toolbox.
The full Floods Partnership went on to meet monthly a further 5 times, with each event attracting a varied mix of stakeholders interested in both achieving a better understanding of what was being done to manage and change FRM processes in the county, and in many cases to see where they and/or their organisations or groups could contribute to these deliberations and activities.

Parallel to these main meetings, the partnership arranged for a series of subject-specific public workshops (e.g. Forestry, Geomorphology) in which subject matter experts were able to share their knowledge, and ground their interpretations of local contexts against participant’s local knowledge.

Taking a participatory approach, the Floods Partnership also set up four pilot-community case studies within the county’s three main catchments (Table 2). These pilots were chosen:

“…to identify ways of managing and reducing flood risk, at the same time as delivering the wider benefits, to landscape, wildlife, water quality and local economy. Ensuring all elements of a ‘resilient community’ are taken into account and understood is key to managing expectations of what is achievable within the pilot. The purpose of the

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**Box 2: Extract from First steps toward an integrated catchment plan for Cumbria**

**Summary of Actions - Upstream Management**

“We are working with farmers, landowners, communities and organisations, such as United Utilities and The Rivers Trust to identify how to use and manage the landscape to slow the flow of water and reduce peak river levels. We will use land-management techniques such as soil aeration, bunds, leaky dams, woodland creation and river restoration to absorb water and slow the flow in locations across Cumbria including Whit Beck, Kentmere, River Gowan and Longsleddale.

We are restoring at least 350 hectares of high priority peatland to absorb water upstream of communities, and we are creating natural flood storage areas upstream of Gamblesby, Cumrew and Stockdalewath. Agri-environmental schemes will help support flood management, and we are exploring the opportunities for upstream engineered water storage. United Utilities is currently reviewing the operation of existing reservoirs such as Thirlmere and Birds Park to manage flood flows.

We are piloting this integrated approach to flood and land management in specific sub-catchments in Patterdale, Glenridding, Stockdalewath, Braithwaite and Staveley. We will share what we find out from these pilots with farmers, landowners and communities across Cumbria, and the lessons we learn will help us in our work in the rest of England.”

*Source: Environment Agency (2016: p.4)*
Pilot Community areas is to provide local examples of what is possible by combining the efforts of local people with member organisations of the Cumbria Floods Partnership.”

(Cumbria Floods Partnership, 2016)

<table>
<thead>
<tr>
<th>Table 2: Catchments and Pilot Communities</th>
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<tbody>
<tr>
<td>Main River Catchment</td>
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<tr>
<td>Eden</td>
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<td>Derwent</td>
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<tr>
<td>Kent and Levens</td>
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**Day-to-day management of the engagement activity in the three catchments and the pilot communities became the responsibility of three Environment-Agency employed Catchment Managers.**

2.4 The Lead Local Flood Authority and Section 19 Reports

Parallel to, and integrated with the CFP work, Cumbria County Council, was carrying out its duties both, as Lead Local Flood Authority (LLFA) and under Section 19 of the Flood and Water Management Act 2010, to investigate the effects of Storm Desmond in terms of how the flooding impacted different locations. Due to the overall magnitude and geographic spread of these impacts and the perceived importance of providing useful information to both, the Risk Management Authorities (RMA) and to the affected communities, it was decided that an intensive process of investigation should be undertaken. Ultimately, this led to the preparation of 53 separate ‘Section 19’ reports, which each went into considerable detail in relation to the sources, pathways and receptors of flood water in the different communities (Cumbria County Council, 2016). Drafts of these reports were prepared and published in a consultation process, wherein the respective

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6 In Cumbria the RMAs defined under the Flood and Water Management Act 2010 are: the Environment Agency; Cumbria County Council (LLFA); the six district councils; United Utilities and; the Highways Authority (County Highways)
communities could feed back on the report, question it and provide new evidence if appropriate. At the time of writing (Feb 2017), the process of delivering final reports back to their communities is still on-going.

2.5 Community Responses to Formal CFP Processes and Outputs

One issue that was repeatedly questioned by communities was the fact that neither the substantive S.19 reports nor the Partnership’s ‘First steps’ Action Plan outlined clear options in respect to how work on the local flood risks they identified could or would be prioritised and actioned in the future. Instead, each report listed a series of actions that effectively amounted to little more than reviews of existing arrangements, rather than the detailing of clear structural or non-structural FRM interventions that communities believed to be needed. This issue was illustrated clearly by one highly-engaged Parish Flood Management Group leader, who stated:

“I did look at their job list 6mths or so ago, but to be honest there was nothing of any consequence in there. You know, it was all too high-level sort of ‘Yeah, mother and apple pie stuff’ which was of no real consequence or value, when we had [in our parish plan] a very practical ‘Clear the gullies, up Kennel Road’ or ‘Sort out the drainage by Brooking Cottage in Patterdale’ You know that sort of micro granularity. Now obviously, they needed something and I know. I used to have this argument with [EA Officers] when [our MP] was trying to get this stuff and he wanted it all on a page type of thing. […] You know, the reality is that you can summarise it and our Noddy little [parish plan] toolkit picture summarises it [see footnote 7] but the devil is absolutely in the detail. And if you haven’t got that detail underpinning it then the summary stuff isn’t worth shit! And the problem with the Cumbria Floods Partnership stuff was that it was all fluff and nonsense and there was no serious detail underneath it.” Interviewee

Such perceptions presented an interesting challenge to the statutory Risk Management Authorities, because this was new ground for them and there was some difficulty in adjusting a traditional

7 http://www.parishfloodgroup.org/flood-plan.html#Flood-Risk-Mgt-Toolkit
strategic-overview approach into something that could deal dynamically and/or satisfactorily enough with these highly location-specific and detailed actions (Table 3).

<table>
<thead>
<tr>
<th>Patterdale and neighbouring valleys</th>
<th>S.19 report*</th>
</tr>
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<tbody>
<tr>
<td><strong>Theme</strong></td>
<td><strong>Action By</strong></td>
</tr>
<tr>
<td>Community Resilience</td>
<td>Cumbria Planning Group, Patterdale Parish Council, Eden District Council and Environment Agency</td>
</tr>
</tbody>
</table>

*https://www.cumbria.gov.uk/eLibrary/Content/Internet/536/6181/4255914553.pdf

**Patterdale Parish Flood Management Group**

<table>
<thead>
<tr>
<th><strong>Area</strong></th>
<th><strong>Responsibility</strong></th>
<th><strong>Issue</strong></th>
<th><strong>Current Status</strong></th>
<th><strong>Due date</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Patterdale Highways</td>
<td>Blocked drain at Patterdale School</td>
<td>Highways working to clear blockage - update to be provided</td>
<td>Feb 2017</td>
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</tbody>
</table>

**http://www.parishfloodgroup.org/action-plan.html

Interestingly, following repeats of earlier confrontations about a lack of communication between the authorities and the communities at the sixth and final CFP meeting in July 2016, the Environment Agency did start to share information about its FRM asset-maintenance schedule across a broad range of social media. According to a senior officer in the Environment Agency, this immediately resulted in a lowering of animosity toward his team. That it had taken 6 months for the Agency to realise that sharing this type of information would be helpful in both building trust with communities and in reducing pressure on the Agency, could only be described by this individual as “a lesson painfully learned”.

The sense of frustration felt in some communities also led to the production of additional independent technical reports, by individuals and local Flood Action Groups. These reports ranged from detailed analyses of the role of the Thirlmere reservoir (Cook, 2016), and concerns about the integrity of bridge infrastructure in presenting “catastrophic” local flood risks (Jones, 2017: Plate 3), to analyses of historical floods and proposals for FRM interventions in Carlisle and Appleby-in-Westmorland (Kelsall, 2016, Rogers, 2016). Whilst these documents had not been formally peer-reviewed they were recognised as representing additional perspectives and evidence for deliberation and negotiation and were, therefore, obviously integrated into the CFP evidence base.

Plate 3: Forge Bridge near Keswick, showing damage from Storm Desmond. The town’s Flood Action Group argues that had this and other bridges downstream failed, this would have released a significant additional pulse of water into the town and put additional lives at risk.
Community representatives also presented evidence to the UK Government’s Environment Food and Rural Affairs committee (EFRA) in January 2016 and February 2017, as well as liaising with local MPs (as a matter of course), and the Floods Minister Therese Coffey MP (who replaced Rory Stewart in the role in 2016). Such engagement clearly illustrated the degree of citizen expertise in flood matters that had been accumulated, in some cases since 2005, by involved individuals (Tesh, 1999). To attract such participatory engagement had certainly been one of the original aims of the Cumbria Floods Partnership. However, the intensity and often highly location- and desired-outcome specific nature of some of this engagement clearly added to the often-challenging nature of the relationships between these communities and the formal agencies. This was felt by those involved as an illustration of the importance of RMA staff needing to adhere to principles of being ‘fair for all’, rather than only to those who ‘shouted loudest’ (e.g. Environment Agency, 2007); a point that was underpinned by their parallel need to act in accordance with strict legislative, environmental and economic constraints.

2.6 Farmers and landowners: understanding a key gatekeeper

A key point of contention that has always influenced the implementation of Integrated Catchment Management in Cumbria (and elsewhere), has been the crucial importance of engaging farmers and landowners. This is because once flood management measures start to encroach onto farmland, commons or fells, it is possible that farmers’ business models and practices could be directly impacted.

Mansfield (2011) has pointed out that in Cumbria, farming, and hill farming especially, underpins much of the Lake District tradition and culture that make the National Park so popular. However, the challenges presented to the sector by persistently reducing profit margins, low
expectations in relation to farm succession (i.e. retiring farmers not being replaced by a younger generation), reduced financial incentives to farm sheep and to use the high fell for grazing, along with the sheer physical challenges of this type of farming, mean that without targeted interventions traditional hill-farming livelihoods were already under threat, even before flood risk was added to the equation.

Within the Cumbria Floods Partnership, landowners, farmers, and several rural and farming interest groups were included in the deliberations from the initial meeting (Table 1). From this first meeting these stakeholders expressed concerns that whilst they understood – better than most – the role of the uplands and of some land management practices in influencing flood risk, they were not prepared to accept undue blame for what had happened. They were, however, keen to negotiate and engage with catchment flood management options, providing their contributions were suitably valued (e.g. both financially and in terms of their knowledge of the local landscape and natural processes) and did not threaten their businesses disproportionately from other stakeholders (See also: Pitt, 2008: p.129).

From this perspective, it is interesting that in April 2016, the Federation of Cumbria Commoners (FCC) developed a 12-point Charter (Box 2), which it offered to CFP members to sign as an indication of commitment to partnership working; specifically in the context of any proposals to increase the implementation of Natural Flood Management measures in the fells (FCC, 2016)\(^8\).

\(^8\) The National Trust were later accused by the FCC of reneging on this charter commitment: http://www.cumbriacommoners.org.uk/federation-reponds-national-trust-letter-us-and-other-farming-organisations
This is a compelling development, which reinforces the catalytic effect of the Winter Storms of 2015/16 in changing public perceptions of WWNP and NFM measures.

Many of the early NFM projects mentioned above (e.g. Pickering, Belford) had needed to go through a process of negotiation with farmers and landowners responsible for the land where the projects were due to be installed. This usually required “numerous conversations” (Quinn, 2016) and/or intensive facilitation (Lane et al., 2011) in order to develop trust between the researchers/advocates and the land’s ‘gatekeepers’. However, through a process of negotiation, each of these projects had reached a point where the farmers/landowners had realised personal and/or business benefits from the schemes’ successes.9

From a national perspective, however, this piecemeal implementation of projects had never been able to create either a level of understanding, or straightforward, coherent options for funding

that the farming sector, particularly, could engage with in order to accelerate the diffusion of such
multi-beneficial schemes around the country, However, following the winter 2015/16 storms
sufficient impetus developed such that the National Farmers’ Union, a key stakeholder in and
advocate for farming in the UK and a member of the Cumbria Floods Partnership, proactively
prepared a Flood Manifesto. Perhaps somewhat belatedly this manifesto clearly laid out its
aspirations for future UK FRM on behalf of its members (NFU, 2017):

The NFU’s preferred approach is for government to establish a long-term, strategic
plan for flood and coastal risk management. This plan must be designed to cope with extreme events and take a whole catchment approach to management decisions and intervention. Consideration should also be given to the impacts of infrastructure and development on agricultural land. […] We recognise that farming has a key role to play in flood management. Where farmers provide a service in mitigating flood risk to help protect others this must be a coherent, planned component of total catchment management, for which farmers must be fairly compensated. In short, the government’s strategy to manage future flood risk must be to Plan, Protect and Pay (Ibid. p.3 – Table 4).

| Plan | Long-term planning for flood and coastal risk management
| Local decision making
| Increased catchment – based decisions |
| Protect | Improved modelling for flood risk:
| Proper assessment of the value of agriculture:
| Better communications on flood risk: |
| Pay | Sufficient and transparent funding:
| Appropriate resourcing during maintenance withdrawal:
| Natural Flood Management establishment: planned, agreed and paid for |

This report does not have the scope to fully investigate the role of farm subsidies and the
effect of the Common Agricultural Policy on farming and land management in Cumbria, or their
relationships with increasing or reducing flood risks over past decades (see: Monbiot, 2013 for one
polemical perspective on this issue, and: Meanwell, 2015 for a response). However, in acting as a stimulus to the NFU for it to provide a list of clear expectations, which can act as a start-point for negotiations in future catchment-scale FRM planning, Storm Desmond and the other winter storms of 2015/16\(^\text{10}\) have revealed the key importance of developing agricultural policies and incentives through which land managers can assist flood-exposed communities (which they are generally keen to do), whilst simultaneously enabling them to support their own businesses’ sustainability.

3. **National Responses to the Winter Storms 2015/16**

Following the implementation of the CFP approach in Cumbria a similar process was initiated in Calderdale valley, West Yorkshire. This partnership delivered its own action plan in Oct 2016 (Environment Agency, 2016a), which was again based on the five key working principles (see section 2.3). Accordingly, the impression given was that the flood-partnership approach is something that is now being pursued as national policy: a perception that is clearly supported by other government responses.

The scale of the impacts of Storm Desmond, and the succeeding storms of winter of 2015/16, not only affected Cumbria, but had effects at both regional level, across the north of the UK, and nationally. These impacts were of such concern that damage to critical infrastructure (e.g. the bridge at Tadcaster in North Yorkshire\(^\text{11}\)) and critical-local infrastructure (e.g. the A591 in Cumbria), prompted a Government review of National Critical Infrastructure [10]

\(^{10}\) Not to forget the accumulated impacts of other storms on the farming sector (e.g. Winter 2013/14)  
\(^{11}\) Tadcaster Bridge failed during Storm Eva (29th Dec 2015), resulting in the temporary disruption of critical services, including utilities, the UK emergency services ‘Airwave’ communications system, and other high-sensitivity IT functions.
Resilience. This review reaffirmed the Government commitment to spend £2.3Bn (~2.7€Bn) on strengthening flood and coastal defences.

The review also oversaw the provision of a recovery package of financial measures\textsuperscript{12}, which that would “help get communities back on their feet”, as well as providing frameworks for the delivery of other non-structural options, including: increased national demountable flood defence capability, better flood warnings and processes to facilitate the greater uptake of Property-Level Resilience measures (PLR) (HMG, 2016). This review also, however, reiterated the importance of taking a catchment-based approach to flood risk management:

“One important area for improvement is better management of rainfall in the natural environment. Water is a precious resource that at many times and in many places is in increasingly short supply. There are obvious benefits to managing water in a way that reduces both flood risk and water stress, and that delivers wider environmental benefits, by slowing the flow of water from the land into our rivers and smoothing the flow of the rivers themselves.” HMG (2016: p.2)

In order to achieve this reorientation, the review awarded Cumbria the status of “pioneer pilot”, under which sophisticated modelling techniques would be developed and tested in order to “demonstrate the power of the ‘slowing the flow’ approach across the different river catchments there”.

This initiative was quickly progressed in Cumbria through the running of a competition which invited consortia to develop integrated catchment-based modelling approaches for the Eden Catchment. The competition was won by the JBA consultancy in association with Lancaster University and they rapidly developed a method to model surface-water flows in a way that allowed the exploration of NFM and WWNP opportunities at various scales (e.g. ≥2m

\textsuperscript{12} For example: a £5,000 (~5,845€) Property Level Resilience (PLR) grant for flooded residential properties to assist householders to better defend them against future flooding
resolution) (JBA Consulting, 2016a). The model was used in the Eden catchment, with the approach quickly re-applied to investigate opportunities in other catchments (JBA Consulting, 2016b).

In parallel with the Resilience Review the House of Commons’ Environment and Rural Affairs Committee (EFRA), carried out its own review focused on ‘Future Flood Prevention’ (EFRA, 2016). The committee made a series of recommendations which included several focused directly at integrated-catchment management, WWNP and NFM. These recommendations provided additional support for the ‘storms as catalysts for change’ hypothesis, because in its review of flooding in 2013 the same committee had not discussed such measures at all (EFRA, 2013). Defra’s response to the committee’s findings clearly supported the proposed move toward integrated-catchment management and included a reiteration of its own commitment to invest £15M (~17.6€M) specifically for NFM measures and to support a £4.6M (~5.2€M) Natural and Environmental Research Council (NERC) fund focused on exploring the potential of these whole-catchment measures (EFRA, 2017).

4. Conclusions

This report has discussed the influence of Storm Desmond’s impact on Cumbria (5th – 6th December 2015), as a driver of local and national Flood Risk Management (FRM) policy and practice. Conceptualising Storm Desmond and the other storms of that winter as catalysts for change, the report has explored how the development of the Cumbria Floods Partnership, in January 2016, acted as one element that has underpinned a substantive move in Cumbria and more widely, toward the integration of ‘Working with Natural Processes’ (WWNP) and Natural Flood Management (NFM), into a new national approach to whole-catchment Flood Risk Management.

In accordance with Johnson et al.’s (2005) observation about previous shifts in FRM policy, it has also been illustrated that efforts to develop and implement WWNP and NFM had been
ongoing, and in some cases, were relatively mature, in Cumbria and the rest of the country prior to the storms. However, the manifestation of residual risks, which occurred as flood waters so-extensively overtopped newly built structural defences across the county, provided an impetus for change, which amplified public perceptions of the potential efficacy of WWNP and NFM; in some cases, beyond a level of expectation that was scientifically justified at that time.

The report has gone on to discuss the inherent difficulties involved in developing an integrated catchment management approach in a location, such as Cumbria, which bears a long history of, and an accumulated local knowledge and expertise in relation to, flood hazards and effects. Such factors inevitably impact on policy approaches even when those policies have been built on principles of fairness. This is particularly so, when the underpinning bureaucracies are focussed at outcome-measurement at a national scale, but where impacts are felt at the local scale, where lived experiences reveal them as demonstrably unfair (Johnson et al., 2007).

Notwithstanding these challenges, Cumbria Floods Partnership, and the other institutional responses to the winter storms, provided forums for agencies and stakeholders to progress a conversation about the county and the country’s flood risks and how they should be managed in the future. Outputs from these deliberations in Cumbria included a ‘First Steps’ document (Environment Agency, 2016b), and a suite of flood investigation reports. A resilience review and a reorientation of politicians’ perspectives on what FRM should be, further amplified the events’ catalytic effect to the national scale. These outputs and outcomes undoubtedly generated public debate and empowered risk-affected and exposed individuals and communities into reciprocal efforts that in some cases directly challenged the agencies’ findings and suggested (or demanded) alternative approaches be taken.
At the time of writing, this process of deliberation is ongoing. However, what is already clear is that a shift toward both physically-integrated and socially-inclusive and participatory flood risk management is occurring. However, this is presenting challenges for individuals and institutional structures that are unused to, and in many cases, which are insufficiently-resourced for, such an aspired co-development of outcomes. This is not to say that such challenges are unnecessary and should not be confronted. Far from it. The point that is underpinned by the Floods Partnership approach is much more, that learning and the implementation of whatever lessons can be gained from such partnerships should be considered as fundamental in driving the social and organisational change that needs to occur if future projections of accumulating flood risks are to be reckoned.

As a concluding comment, it is worthwhile reflecting on the successful proposal document, which was submitted by JBA Consulting and Lancaster University for the project to model WWNP and NFM potential in Cumbria’s river catchments (JBA Consulting, 2016). Crucially, the consultants outlined one specific working assumption in their proposal:

Design storms: We will model the 1 in 10-year and 1 in 30-year return period rainfall events, as for larger storms, we consider that WWNP are unlikely to be effective (Ibid., p.2: emphasis added).

This assumption clearly illustrates the consultants’ professional skepticism of the capacity of NFM and WWNP measures in reducing moderate to extreme flood events. It also underlines the importance of understanding that any successful catchment-scale risk reduction outcomes will be dependent on the full range of risk reduction measures, with no one measure offering a panacea, i.e. these WWNP analyses may contribute new knowledge to FRM science, but they will not solve the issues alone.
Recommendations for policy and practice that have emerged from this research are presented in Deeming (2017b), this project’s final Deliverable 3.1.
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D2.1 STORM DESMOND AS A CATALYST FOR FRM CHANGE


Appendix 1: Cumbria Floods Partnership: First meeting

Date: 4th January 2016,

Venue: Environment Agency offices Penrith

1. Introduction from Rory Stewart MP

Highlighted the need to take a view of catchments as a whole, from the uplands to the need for resilience measures in homes. Also to draw on range of good practice across Cumbria, for example at Stockdale W. Conversation would have to be taken forward through smaller, more focused groups.

2. EA introduction

Andy Brown from the EA set out the impact of Storm Desmond in Cumbria, rainfall totals for December and the scale of the EA response.

3. Key issues raised in discussion

- Impact of floods in Cumbria demonstrates the impact of policy in relation to residual risk
- Consideration needs to be given to the management of reservoirs and the ‘trigger levels’ that would allow discharge. Thirlmere was cited as an example.
- Household resilience measures haven’t protected homes in Cockermouth.
- Extent to which bridges are acting as dams needs to be considered.
- Important to understand the science, and what it’s telling us, but also where the gaps are. The benefits of many mitigation measures aren’t properly understood. Example of flood storage above Penrith (managed by Cumbria Wildlife Trust) cited as example of effective local mitigation measure.
- Need to place as much focus on monitoring, to really understand impacts, as on modelling and research.
- Also need to understand existing work and partnerships: the Eden Rivers Trust EU project on ‘Adaptive Land Use for Flood Alleviation’ was cited. RFCC already has a theme on natural flood risk management with ten projects across the North-West, including two in Cumbria. Cumbria Catchment Alliance was also mentioned, as well as the wider partnerships around the River Basin Management Plans.
- If farmers are to have a role in flood defence for example through flood storage then need longer-term arrangements for countryside stewardship e.g. 20-30 year funding arrangements.
To what extent is a plan needed for Cumbria, or for specific sites? Solutions in Glenridding will be very different to solutions in Appleby, for example. And should the focus just be on priority areas (linked to EA’s ‘Communities at Risk’ analysis, for example).

Coherent catchment planning is key, as is effective partnership working. Catchments haven’t been focused on flood risk, but more on water quality or biodiversity benefits. Need to place water management at heart of catchment management.

Should farmers be paid for the benefit they provide, rather than the income foregone?

Soil stabilisation is in the interests of everyone – farmers and communities alike. This is an important area of common interest.

Tree planting needs to be part of holistic catchment management schemes, but we also need to ensure that it is targeted and focused on areas where we can confident of benefits. In areas where more trees may need to be planted on farmland important to understand the cultural shift this would represent for many farmers.

Extent to which communities – both local communities and farming communities – will feel threatened by this debate should not be underestimated.

Role of insurance companies – and the extent to which they will pay for resilience measures – needs to be clarified.

Need to be clear about concrete next steps. This is not a new problem – so what are we going to do differently?

Need to involve Highways Authorities. There is an issue about the management of drains / assets. Highways Authority doesn’t have a comprehensive asset register.

Should be considering options for adapting the existing building stock as well as just building more defences.

Taking a catchment approach should aim to deliver holistic solutions to flatter the hydrograph, by ‘clearing the way’ downstream (dredging one option, but not the only one) and slowing the flow upstream (again tree planting one option, but not the only one. Blanket bog etc. also needs to be considered).

Understanding how to mitigate the risk of landslides is important – mining legacy could exacerbate.

Where tree planting is the best option need to consider timeframes; won’t necessarily secure soil, or provide retention benefits, for a number of decades.

Presenting options and benefits to all the communities involved will require strong communication and facilitation skills.
• The community voice needs to be represented at all stages. The experience of people who’ve been affected directly helps to ‘ground’ the work and remain focused on purpose. Is there scope for communities to directly control some investment choices, on the West Sussex model?

• Surface water risk – and importance of integrated drainage (fluvial and pluvial risk) – needs to be considered.

• Local Enterprise Partnership happy to support schemes where integrated solutions are developed and there are clear wider economic benefits.

4. Next steps

• A follow up meeting to be held in February in Cockermouth, with more representatives of the community Cockermouth present. There will be a programme of meetings going forward in Keswick, Kendal, Cockermouth, Appleby, Carlisle and Glenridding.

• A ‘phased approach’ to the action plan was suggested, undertaking scoping work and consolidating the evidence base across the different workstreams in a first phase, and then seeking to apply the lessons at catchment level in the second phase. The EA will need to provide leadership and coordinate the work at catchment-level. More detailed arrangements for forward working will be developed in advance of the next meeting.

• In advance of this meeting EA / Defra to develop:
  
  o a ‘toolbox’ of mitigation measures, with an indication of the strength of the evidence supporting
  
  o a brief and accessible synthesis of existing evidence on effective strategies for flood risk management in Cumbria (e.g. research based on experience of 2005 and 2009)
  
  o a ‘map’ setting out the existing partnership structures in Cumbria and how this partnership fits in

• All participants to send […] copied to […]:
  
  o Information about existing partnerships
  
  o Information about evidence to be factored into the synthesis
  
  o Details of other individuals or organisations that need to be included in future

• Natural England / Defra / EA to consider how best to take forward workstream on upland management, setting out workplan in advance of next meeting.