

## RESEARCH ARTICLE



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# Community action on natural flood management and the governance of a catchment-based approach in the UK

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## Abstract

There is increasing interest in natural flood management (NFM) and the delivery of public environmental goods. Yet the implementation of NFM can be ad-hoc and is regionally diverse. Communities often play a role in NFM and thus we assess NFM governance in the UK and communities' position within it. We develop a theoretical framework using the concepts of public goods, social capital, collective action and polycentrism and use it to examine the governance of the design and implementation of NFM in Pickering and Calderdale in Yorkshire, to contribute to a debate on how NFM should be managed, by whom, and under what governance arrangements. Drawing on stakeholder interviews, we find that the participation of community flood groups (CFGs) in NFM improved community access to strategic conversations on flood risk management (FRM). In turn CFGs raised the public profile of NFM, enabled the deployment of NFM measures, and helped to generate the evidence base on them. We conclude that there is a need for a polycentric community *and* catchment-based approach to better coordinate NFM governance across and between scales, to support community access and contribution to flood risk strategy, and to foster sustainable flood risk management.

## KEYWORDS

catchment-based approach, collective action, flood risk management, governance, natural flood management, polycentrism

## 1 | INTRODUCTION

*Natural flood management* (NFM) involves the implementation of ecosystem-based measures such as afforestation, conversion of arable land to grazing, re-meandering streams, or building leaky dams or ponds to reduce flood risk (Dadson et al., 2017; Paavola & Primmer, 2019). NFM is an example of nature based solutions (NBS) as an 'umbrella concept' for 'a range of ecosystem-related approaches for addressing societal challenges' (Paavola & Primmer, 2019). NFM 'seeks to restore or enhance catchment processes that have been affected by human intervention' in order to mitigate flood risk (Dadson et al., 2017, p. 2), by

'slowing the flow' of water from the upper catchment to downstream settlements where flood risk may be high. Although the effectiveness of NFM is yet to be fully established, what evidence exists suggests that it may be effective in some catchments, depending on scale (Lane, 2017).

In conventional flood management based on grey flood defences in the UK, the Department for Environment, Food and Rural Affairs (Defra), the Environment Agency and Local Authorities have key responsibilities and the governance arrangements for flood risk management are primarily hierarchical and top down. In contrast, NFM involves a wider range of actors in key activities through bottom-up processes. There is also a growing 'expectation' that communities

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participate in flood risk management (FRM) (Mees et al., 2018). Community flood groups (CFGs), land owners and non-governmental organisations indeed increasingly work alongside the public authorities that have traditionally dominated flood risk management in what is known as a catchment based approach (CaBA), so-called for collaboration occurring at the catchment scale.

CFGs can be defined as local actors self-organising to create a coordinated response to present or future flood risk. NFM does not always involve CFGs, and CFGs do not always work on NFM, but there is increasingly cross-over between NFM and local actors (see Figure 1). Similarly, a CaBA may or may not involve CFGs or NFM, but increasingly does so. CFGs can be groups actively involved in NFM, in roles that are physical (volunteers siting measures), informational or advocacy (educating around NFM or acting as a 'pressure group'), or strategic (representing community views). There are questions of how informal NFM implementation by these groups fits within broader catchment planning, and whether communities should be responsible for providing their own flood risk reduction (FRR) via NFM. We examine how and to what degree the existing governance arrangements for NFM are suitable given the range of actors involved, and how they can be developed to support community roles.

In the UK, NFM is receiving ever greater political, media and public attention, particularly reflected in the 2017 announcement of £15 million Defra funding for 34 'community' and 24 'landscape' level NFM projects (Defra et al., 2017) giving a more formal role to NFM, and the recent 25 Year Environment Plan integrating NFM into FRM policy (Defra, 2018a). The growing interest in NFM relates to broader changes in the policy landscape on FRM. The direct and indirect economic impacts of the 2007 floods cost the Yorkshire and Humber region 4% of gross-value added (Mendoza-Tinoco et al., 2017). The flood event contributed to a sea change regarding FRM strategies, together with the fallout from the Pitt Review (Pitt, 2008). NFM is part of a broader shift towards sustainable flood management (Werritty, 2006), and 'catchment-based approaches', which '[aim] to alter flood risk by

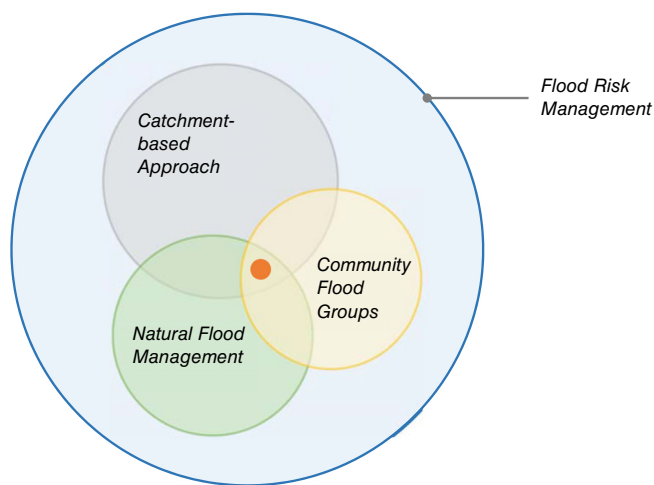
making changes within the wider catchment rather than managing flood hazard locally at the point where flooding occurs' (Dadson et al., 2017, p. 6). The 'Partnership Funding' model introduced in 2011 which involves local or community co-funding of flood risk reduction measures, and the European Union (EU) emphasis on public participation in FRM under the floods directive, have also increased interest in NFM (Defra, 2011; Penning-Rowsell & Johnson, 2015; Thaler & Priest, 2014).

NFM is thus emerging as a community-sensitive flood defence strategy that offers multiple co-benefits. But the growth in NFM is generating a governance gap in terms of uncertainties over the roles of actors, and questions around their accountability and responsibility. Although formal partnerships between public bodies such as the Environment Agency and local communities are emerging, in some regions CFGs have implemented NFM independently as will be discussed in our case study analysis. This raises questions regarding who should be responsible for example for the maintenance of NFM measures and the coordination of individual interventions as part of a wider catchment-based approach. Piecemeal implementation of NFM measures is not conducive to coherent catchment-wide flood strategy. Although informal implementation by CFGs can accelerate the often slow process of FRM planning, it remains a question whether NFM measures can be effective as part of catchment-wide flood action without regulatory oversight.

Whilst there is an ever expanding body of social scientific literature on community action through flood groups (Dittrich et al., 2016; Geaves & Penning-Rowsell, 2015; Landström et al., 2019; McEwen et al., 2018), there is limited available evidence at the intersection of community flood groups and NFM. We focus on the Yorkshire communities of Pickering and Calderdale as examples of CFG formation and inclusion into NFM partnerships. We conducted 20 semi-structured stakeholder interviews, anonymous discussions with four NFM experts and participant observation at a stakeholder conference on catchment management. A combination of purposive and referral ('snowball') sampling techniques helped us recruit stakeholder representatives for interviews and to identify links between groups. The stakeholders included members of the public involved in CFGs, representatives of the public sector (Environment Agency, Natural England, district and parish councils), academics, private sector (FRM consultants), and third sector (National Flood Forum, National Park Authorities). Interviews were carried out until theoretical saturation was reached, and interpreted using thematic analysis.

We address the ongoing debate on how NFM should be managed, by whom, and what governance mechanisms should be in place to achieve this. By building a theoretical framework around core governance concepts drawn particularly from the work of Elinor Ostrom, we determine the main challenges of employing a community-based approach in NFM, with implications for the practice of FRM more broadly in the UK and elsewhere. Our core contribution is a social scientific approach to the assessment of NFM deployment. Another contribution is the identification of the emergence of polycentric governance around NFM which is both decentralised and coordinated.

Our aim is to evaluate the structural role of CFGs within NFM projects, and what implications this has for FRR provision at the



**FIGURE 1** Schematic of the research design. The orange circle indicates the conceptual unit of analysis in this study [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

catchment level. As such our key research objectives to achieve this are as follows:

- What are the characteristics of CFGs' roles within NFM projects?
- How do CFGs engage with external stakeholders?
- What are the governance implications of CFG action towards NFM?

By employing a theoretical framework based on concepts from the governance theory literature, we examine what the case studies imply for the broader governance of NFM in the UK. In what follows, we will first review the social science literature on CFGs and NFM, and outline how concepts of social capital, public goods, collective action, and polycentrism help provide a theoretical framework with which to examine NFM governance and the role of CFGs. Section 3 introduces the case studies and our material collection and analysis solutions. In Section 4 we analyse and interpret empirical evidence from the two case studies in accordance with the research objectives outlined above. We conclude by reflecting on the implications of the findings for future governance of NFM with reference to the theoretical framework outlined in the literature review.

## 2 | GOVERNING NFM

The literature addressing social scientific aspects of NFM is limited and tends to focus on 'partnership working' models (Norbury et al., 2019; Thaler & Priest, 2014; Wingfield et al., 2019) and ecosystem service (ES) initiatives (Costanza et al., 1998; Gilvear et al., 2013; Kull et al., 2015; Schröter et al., 2014; Stürck et al., 2014). Wells et al. (2020) usefully examine governance dimensions of NFM at the catchment-level, considering it as a social-ecological system.

Research on communities and NFM is only about a decade old (Howgate & Kenyon, 2009; Lane et al., 2010). Howgate and Kenyon's (2009) pioneering study of community cooperation with an NFM project in the Scottish Borders found that the community was receptive to the scheme—it was preferred over hard engineered defences and spill-over benefits were acknowledged. Howgate and Kenyon (*ibid*) draw attention to the potential for participatory working in the implementation of NFM since '[r]espondents indicated trust in local organisations over more distant organisations' (*ibid*, p. 339). But in their case study, the decision to implement NFM was already made, and the authors examine *ex post facto* how the community were consulted and how they cooperated.

Much of the evidence on communities and NFM in the UK was generated in a project that tested a 'competency group' methodology in which local residents were invited to collaborate with researchers from the University of Oxford and Durham University (see Lane et al., 2010, p. 15; Whatmore & Landström, 2011; Lane et al., 2013; Donaldson et al., 2013). The project was designed as a challenge to the normative knowledge creation process around FRM which can result in simplistic decision-making and 'knowledge controversies' (Lane et al., 2010). The project identified context-sensitive NFM measures and fostered their implementation through inclusion in a

national demonstration project (*ibid*). The research highlighted the potential for nuanced, local knowledge of flood risk by working closely with communities, and the value of this for establishing locally appropriate flood defences (Lane et al., 2010; Whatmore & Landström, 2011). The research resulted in the co-produced 'Making Space for People' report as a response to Defra and the Environment Agency's 'Making Space for Water' approach (The Ryedale Flood Research Group, 2008). But in this project the implementation of NFM was rather a result of the research than an aim in its own right. Thus the existing literature does not explicitly address how communities can actively be integrated into NFM governance from the beginning. The above studies both assume a level of external facilitation of NFM projects, whereas many communities have started to independently initiate and implement NFM projects. Community Flood Groups (CFGs) have been examined in recent research and are of increasing interest in the literature (Dittrich et al., 2016; Geaves & Penning-Rowell, 2015; Landström et al., 2019; McEwen et al., 2016, 2018; McEwen & Jones, 2012; Short et al., 2018).

We now outline the central concepts we identified as critical to the discussion of the governance of NFM, through extensive literature review. These concepts constitute our 'theoretical framework' and the basis of the discussion in Section 5.

### 2.1 | Public goods

The configuration of actors involved in resource management is a central concern of environmental governance. Environmental governance arrangements emerge to address interdependencies between actors which are importantly shaped by the physical attributes of involved goods and services (Paavola & Adger, 2006, p. 356). Attributes such as rival or joint consumption and excludability influence the transaction costs of dealing with environmental resources such as land and water but also the transaction costs of dealing with risks such as that of flooding (Paavola, 2007). An important question here is: what is the nature of flood risk reduction (FRR) as a good and who should be responsible for securing its provision?

The notion of FRR as a good has remained somewhat ambiguous in the literature. Geaves and Penning-Rowell (2016) consider it an example of 'public priority goods' that are necessary for human 'wellbeing', akin to merit goods in the market failure literature (Paavola, 2009). We suggest that whilst FRR may be necessary for human wellbeing, it is more appropriately considered a pure public good. Pure public goods are 'jointly consumed goods, which have high exclusion costs, such as public safety and defence' (Paavola, 2009, p. 96). Joint consumption and high exclusion costs lead to too low provision of a public good and the provision cannot be based on markets. Public provision and self-provision through collective action remain alternatives. This is seldom explicitly recognised in the FRR literature although it helps to rationalise the role of community groups in the provision of flood risk reduction.

Geaves and Penning-Rowell (2016) also consider community flood defence projects as 'club goods'. But club goods are non-rival but excludable, which suggests that FRR benefit from community

interventions could be restricted to those proximate to defences or to those who helped create them. However, community flood defences involving NFM generate diffuse FRR benefits across the catchment. It is not possible to exclude anybody from within or even outside of the community from the benefits of NFM provision. So the FRR benefits of NFM should be considered pure public goods (Table 1).

The confusion arises because the provision of FRR and other NFM benefits can rest on the role of communities as a providing ‘club’. But this is entirely consistent with the pure public good nature of FRR. The provision of pure public goods requires collective action due to the high exclusion costs just like the provision of common pool resources requires (Ostrom, 1990), and this may take place through self-organisation and collective action at the community level. The benefits to the community from FRR may outweigh the costs of its provision, and as a result it provides a public good for itself and other beneficiaries outside the community (see also Olson, 1965). A parallel to this is the development of grassroots climate change movements, where action at the local level aims to provide benefit on the global scale.

The key to the self-provision of FRR is enabling institutional arrangements that can emerge bottom-up or be created top-down. Ostrom's (1994, p. 529) concept of ‘crafting institutions’ involves designing ‘sets of rules that will be used to allocate the benefits derived from a physical facility and to assign responsibility for paying the costs of the facility’. This is requisite for stimulating collective action for protection, by providing incentive structures to fill gaps where the immediate need for ‘protection’ is not clear or not a sufficient incentive. Examples of such institutional arrangements are provided by agri-environment schemes such as the Countryside Stewardship (CS) scheme (Forestry Commission et al., 2018).

The recent 25 Year Environment Plan (25 YEP) frames agri-environment payments as instruments to deliver public goods (Defra, 2018a). The Common Agricultural Policy (CAP) framework has underpinned UK agricultural policy since joining the EU, but the prospective exit of the UK calls for revision to the payment schemes central to the UK's agricultural sector under CAP. The 25 YEP provides a framework for a new ‘environmental land management’ system, notably using a ‘public goods’ framing as rationale for funding allocation: payments are to be awarded on the basis of goods delivered (Defra, 2018a). The Plan is also significant for its commitment to greater deployment of NFM measures (ibid).

## 2.2 | Collective action

Collective action is one frequently suggested solution for the provision of public goods. Geaves and Penning-Rowsell (2015, p. 440) suggest that while there may be a general ‘contractual’ obligation for public provision of FRM, hard engineered (HE) flood defences remain unavailable in many places due to financial or other reasons. NFM can emerge to address a situation like this, as in Pickering (RFRG, 2008). Irrespective of the perceived ‘right’ to flood protection provided by the public sector, under austerity the financial and organisational capacity of local and central governments to coordinate FRM has come under pressure. Therefore, a devolved responsibility for FRM has emerged (Thaler & Priest, 2014), and policy rhetoric has started to emphasise ‘community resilience’ (Wright, 2016, p. 154). The trend towards community-based action on flood risk fills a governance niche by embodying both self-provision of a public good and filling a resource deficit for the local authorities to which greater FRR powers have been delegated. In Mees et al.'s (2018, p. 332) ‘typology of citizen co-production’ this is a form of citizen involvement which is ‘complementary or substitutive of government action’. Community action also aligns with the normative shift to greater public participation in FRM, as promoted in high-level EU policy, as in the Water Framework Directive (Joint Nature Conservation Committee, 2010).

## 2.3 | Social capital

Whilst there is a normative emphasis on increasing public participation in resource governance, Thaler and Priest (2014, p. 418) suggest that there is a ‘gap between the downscaling of responsibility and the transfer of resources’ in FRM. This raises questions about the fairness of localism in FRM contexts, and the ways in which it is contingent on existing social capital. Ostrom (1995, p. 131) draws a distinction between social and human capital, arguing that the former ‘is the arrangement of human resources to improve flows of future income’, whilst ‘[h]uman capital is the knowledge and skills that individuals bring to the solution of any problem’. Social capital is thus manifested in the actions taken by a group to reduce future flood risk and its economic and other costs, whilst human capital is the professional skills, expertise, and knowledge in a community. Both may contribute to CFG working, but may also be products of an area's socio-economic

		Rivalry		
		Perfect non-rivalry	Low	High
Excludability	Perfect non-excludability	Pure public good <sup>a</sup> NFM		
	Low	Public FRM	Common pool	
	High	Club <sup>b</sup>	Private	

**TABLE 1** Typology of goods adapted from Ostrom (2005, p. 24), with indication of where NFM versus conventional FRM sit in the goods framework

<sup>a</sup>Pure public goods also known as collective consumption goods.

<sup>b</sup>Club goods also known as toll goods.

status. Low social capital thus may constrain community action, adding to the context-dependency of NFM.

Social capital can be a key condition of collective action for adaptation, and may act as a ‘necessary “glue” for adaptive capacity, particularly in dealing with unforeseen and periodic hazardous events’ (Adger, 2003, p. 392; Paavola & Adger, 2005). Thaler and Priest (2014) observe that more vocal groups are located in ‘wealthy rural’ areas and that they have ‘homogeneous’ membership. Devolved and decentralised responsibility for flood risk is problematic when capacities of communities to self-organise differ. McEwen et al. (2018) suggest in their Community Pathfinder funded project (Defra, 2012) that ‘facilitated development’ may support CFGs and that where there is limited social capital several processes need to be introduced, including the ‘scaffolding’ of groups to other organisations (McEwen et al., 2018). Facilitated approaches mirror the ‘partnership working’ approach of the NFM pilots implemented so far. In partnerships, CFGs are linked to institutional actors in wider networks (Rouillard et al., 2015). Norbury et al. (2019) attest to the value of the partnership model, reflecting increasing prominence of the ‘whole catchment’ approach to FRM by incorporating a range of regional actors (Stürck et al., 2014).

## 2.4 | Polycentrism

Partnership working can be thought of as a form of ‘polycentrism’, in bridging the local and regional, and in uniting diverse actor groups. Indeed, ‘polycentrism’ has emerged as an alternative to both centrism and localism. Andersson and Ostrom (2008, p. 73) define polycentrism as ‘a governance system that manages to distribute capabilities and duties’, noting that it ‘will achieve better outcomes than either a highly centralised or fully decentralised system’. Vincent Ostrom and his collaborators (Ostrom et al., 1961), originally described polycentric order as ‘the relationships among multiple authorities with overlapping jurisdictions’ (Andersson & Ostrom, 2008, p. 71). Polycentrism is often discussed in relation to climate change (Bulkeley, 2005; Gillard et al., 2017), but polycentric order may also emerge or be needed in the management of flood risk. A polycentric framing is appropriate for NFM given the diffuse siting of measures across the catchment, and the arrangement of actors within NFM partnerships. Polycentrism with its incorporation of multiple scales, actors, and levels, accords with a catchment-based working approach and helps in understanding the role of community action within the broader governance ‘regime’ (Paavola, 2009).

Our theoretical framework combines the above discussed concepts of social capital, public goods, collective action and polycentrism. The concepts were selected on the basis of their relevance to CFG action within NFM, and identified through a literature review. Figure 2 outlines how the concepts intersect, and their relevance to the CFG involvement in NFM. The framework draws from the work of Elinor Ostrom, and we use it to examine the empirical insights we generate, to evaluate the more general governance implications of the case studies (Andersson & Ostrom, 2008; Ostrom, 1990, 1994, 1995, 2010; Ostrom & Cox, 2010).

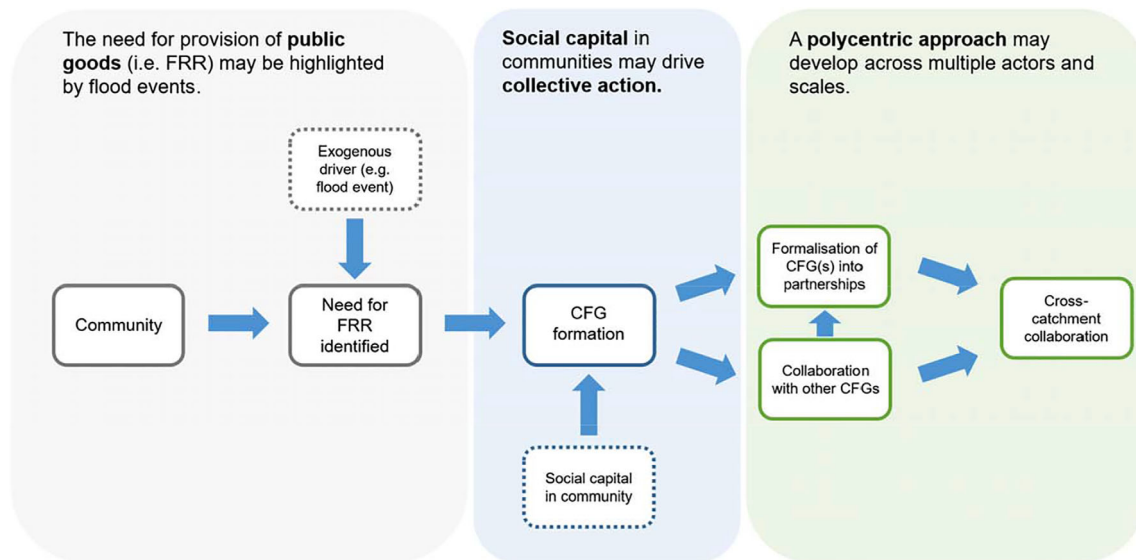
## 3 | RESEARCH DESIGN: CASE STUDIES OF NORTH AND WEST YORKSHIRE

We chose the Yorkshire communities of Pickering and Calderdale as case studies, since in them CFGs have been integrated into successful NFM partnerships (Figure 3). The choice of case study partnerships in the same broad region allowed for more effective comparative analysis. Slow the Flow Calderdale (STFC) is a community flood group working on ‘community led’ NFM interventions in response to the 2015 floods in Calder Valley (STFC, 2018). It works with the National Trust and a large volunteer base and has sited ‘between 170 and 190 leaky dams... over 18 months’ (Calderdale CFG member). STFC is part of the SOURCE partnership encompassing grassroots, public, and third sector organisations involved in NFM within the catchment (Eye on Calderdale, 2018). The partnership has tasks within the formal Calderdale Flood Action Plan (Environment Agency and Calderdale Flood Partnership, 2017), and it also takes part in the Calderdale Flood Recovery and Resilience Programme (Calderdale Council, 2018). The existence of a dedicated NFM sub-group within the Programme indicates the importance given to it by regional FRM strategy, despite pressures on Local Authority (LA) funding (Howarth & Brooks, 2017). The Calderdale NFM group was developed with support and advice from a Pickering NFM group member.

In Pickering, the Ryedale Flood Research Group (RFRG) and Pickering Flood Defence Group were on the delivery group of the Slowing the Flow Partnership (STFP; Marrington, 2011). The project was showcased in DEFRA’s Multi-Objective Demonstration Projects report as one it had funded (Nisbet et al., 2011; Nisbet et al., 2015) and also in the ‘Working with Natural Processes Evidence Directory’ (WWNP; Defra, 2018b). Figure 4 indicates how STFC and RFRG have fed into wider partnerships and played a critical role both in local strategy and national policy.

The stakeholders were approached using a combination of purposive and referral sampling strategies. The former ensured that all important actor groups such as CFG members, the public, private, third, and academic sectors were involved, and the latter helped determine what ‘networks’ existed within and between stakeholder groups (Bryman, 2012). Stakeholders were selected on the basis of their expertise and experience in either NFM and/or CFGs more broadly. A semi-structured interview guide was developed and adapted iteratively, to ensure its relevance for all stakeholders. The guide followed an ‘hourglass’ topical structure. Questions were informed by the research objectives, and those posed to all interviewees included:

- How do the community NFM groups function in contrast to authorities or other stakeholders?
- How effectively did the community engage with external stakeholders and vice versa?
- Did regional or community characteristics shape or undermine project success?
- Would the same NFM project work as well in other communities?



**FIGURE 2** Summary of the concepts used in the analysis of case studies of CFG involvement and NFM, and where the points of intersection are [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1002/etp.1955)]

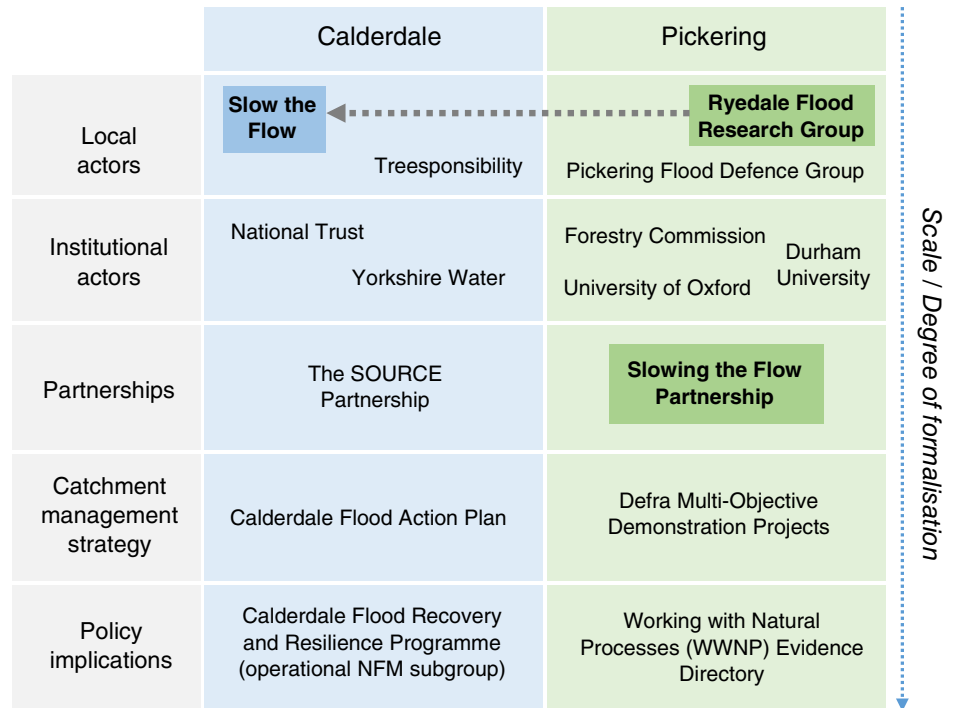


**FIGURE 3** Map of the case study regions. From left to right key towns include: Todmorden, Hebden Bridge, Mytholmroyd, and Pickering [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1002/etp.1955)]

Interviews ended with a question about recommendations for future NFM activities and whether CFG work needed support. The interviews were carried out between June and August 2018. The interviews were continued until ‘theoretical saturation’, that is, until no or little new insights emerged and areas of consensus began to

emerge. Twenty in-depth interviews were completed (see Table 2). Discussions were also conducted with four key informants to develop contextual knowledge about the case study communities, NFM projects and involved partnerships. Participant observation was also undertaken at a local NFM stakeholder conference (iCASP, 2018).

**FIGURE 4** Relationships between community flood groups (CFGs), natural flood management (NFM) partnerships and flood risk management (FRM) strategy and policy. The groups of interest are highlighted in bold. The grey line indicates knowledge exchange and cross-catchment working, and the blue line an increasing scale and degree of formalisation [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**TABLE 2** Stakeholders interviewed across locations and by sector

Stakeholder sectors	Case study region			
	Calderdale	Pickering	Both	Other
CFG	2	1	1	-
Academic	-	2	-	-
Third	1	-	1	2
Private	-	-	3	-
Public	2	4	-	1
Total	5	7	5	3

Note: ‘Both’ refers to those who had experience at both Calderdale and Pickering, and ‘other’ indicates involvement in other national Natural Flood Management projects (CFG: Community Flood Groups).

Our research adopted social constructionist and inductive approach (Bryman, 2012). Data analysis employed Computer Aided Qualitative Data Analysis Software (NVivo 11). We used a bottom-up coding to identify emergent trends in the interview data around the three core research objectives previously discussed. This allowed organic development of themes from the interview data; text and coding queries were run to develop the evidence base on key issues. The theoretical framework, consisting of the four core governance concepts outlined in the literature review, was then referenced in order to draw out the implications of the empirical material for governance in general. We do not aim to conduct theory testing, but to use our theoretical framework as a ‘touchstone’ for the consideration of our empirical data, to support explanation of the insights from stakeholders and identify their broader implications.

Our use of an inductive, interview-based approach with thematic analysis is consistent with that adopted by Geaves and Penning-Rowell (2015) and McEwen et al. (2018). Snowballing as a participant recruitment methodology is similarly used in McEwen et al. (2016). There are limitations to the research design, including the absence of landowning stakeholders in the sample. This could be an area for further research given their important role in NFM projects. Other future research include how NFM is framed as a climate change adaptation tool (or not), use of NFM in urban settings, and linkages to PES schemes. The examination of social capital could be strengthened by a mixed methods approach and gathering survey data on socio-economic factors relating to flood risk and CFG participation. Another limitation is that our case studies involve specific circumstances possibly not representative of wider experience. Yet as successful cases for integration of CFGs they offer useful lessons.

## 4 | STAKEHOLDER EXPERIENCES OF NFM AND COMMUNITY ACTION IN YORKSHIRE

In what follows, we report our results by first considering the role of CFGs within NFM, the interactions between CFGs and other stakeholders, and what the CFG case studies mean for the broader governance of NFM.

### 4.1 | The role of CFGs within NFM

We first focus on the roles and characteristics of CFGs which were seen to create value in community participation in NFM (Irvin &



Stansbury, 2004). CFGs were valued most for their motivation to pursue the delivery of the NFM schemes, and for the professional skills they contributed. Many interviewees referred to the work background of CFG members: 'we've all got a different range of skillsets and experiences' (Calderdale CFG member). Another participant also highlighted the community expertise as a resource: 'I often say, "Einstein lived somewhere". Every professor lives somewhere [...] they're part of a community' (Pickering CFG member). Core or initiating CFG members often had experience in engineering, architecture, or hydrology, which were considered important resources for the group. One public sector participant recalled their surprise at 'how many retired hydrologists there are around', noting 'they all come out of the woodwork'. However, this also highlights the context and social capital dependency of CFGs in that, although NFM is an FRM technique which may be implemented informally, technical or 'expert' knowledge is still advantageous and its availability is linked to socio-economic factors.

Interviewees recognised the homogeneity of CFGs membership, as 'middle-class' (third sector) and largely retired membership. This was considered an issue for CFGs more generally. As a National Flood Forum (NFF) representative said: 'there's a focus on better-off areas, basically because the community are more articulate, they may be more able to push their point [...] but when it comes to the practicalities of NFM and joining in, there's no difference between those communities and the more socially deprived communities' (third sector). That is, social capital (lack thereof) was considered a barrier to participation in NFM by some respondents, although the case study communities did not view it an obstacle for them specifically.

A key observation was that CFG members were often those who were 'already engaged' in the community. A third sector participant even said 'it's sort of preaching to the converted'. Interviewees acknowledged the tendency of CFGs to recruit those who were already interested in and knowledgeable of FRM. Some participants argued that this generated greater group coherence and motivation: 'this is not about engaging the entire local community over a period of forever. But it's like engage [...] the people who are already in flood groups [...] because they will be interested in learning more' (academic). But although this simplified the CFG functioning, a private sector interviewee commented that 'you can sometimes think you've got the whole community represented and you really haven't'. Although CFGs attracted those already engaged in FRM, one interviewee highlighted the role of CFG members in communicating NFM concepts to the wider community: 'if it's somebody you start building a relationship with to a certain extent, or if it's family or a friend, it has a much bigger impact' (public sector). CFGs and their members were seen (particularly by public sector stakeholders) as efficient solutions for engagement and outreach, capitalising on existing interpersonal connections. Therefore, although CFGs are not representative of the community, and attracted the 'already engaged', the informal networks between members and the wider community were important for disseminating knowledge.

Although the community is often seen as the driver of NFM projects by the participants, interviewees also frequently mentioned successive flood events and particularly the major 2015 floods as catalysts for CFGs and NFM projects in Pickering and Calderdale. This

suggests a reactive, not proactive, stance on future flood risk (Cologna et al., 2017). However, this does not mean that a CFG formed to cope with a flood event may not then become proactive regarding future floods.

## 4.2 | Community engagement with external stakeholders

We now examine how the communities worked with other stakeholders, how respondents viewed partnership working and what factors were linked to the success of the schemes in the two areas.

Landowners were considered key to project success as their permission to site NFM was essential. Public sector landowners were considered more receptive to NFM schemes: 'we've been quite fortunate that we've had places where we can work which are owned by friendly parties' (public sector). Implementing NFM on land crossing multiple jurisdictions was problematic; speaking of a CFG working with the National Trust in Calderdale, one interviewee commented that 'they haven't had the challenge of multiple landowners in the same way that other places have' (private sector).

University involvement was also considered important for NFM project success, although this could have been overemphasised because of the exceptional role played by researchers in Pickering. Universities were seen to give CFGs support and 'credibility'. One CFG member said that 'it gives you that kudos [...] there's the sort of impetus where people can't ignore you'. Relatedly, many interviewees considered the need for authority and expertise as a barrier to CFG participation in NFM. CFGs were considered a key part of the governance 'jigsaw' (public sector) across stakeholder groups, and by engaging in partnership working with academic or public actors, the community actors could gain recognition and authority. As well as giving access to higher-level discussions around local FRM, these partnerships helped CFGs to gain access to knowledge and resources as well as sharing their own. This suggests that CFGs can better advocate for NFM projects when they are affiliated with actors from other sectors. Facilitated groups (e.g., those by the NFF) have more direct access to institutional stakeholders and potential project partners.

Communication was key for NFM projects, a role that CFGs performed by resorting to 'word-of-mouth', 'social media' and 'alternative media'. These informal communication methods were strongly endorsed, a public sector representative noting that 'it's interesting how grapevines often are effectively the best way of communicating things'. Innovative examples include the creation of an award-winning opera (BBC News, 2018), and new technologies such as river-level apps (third sector), and Raspberry Pi monitoring networks (Calderdale CFG member). Experiences of community-based NFM projects were also made into a film (High Water Film, 2016). The new technologies were an important way for engaging different age groups. Many respondents noted the strengths of the creative, bottom-up approach, which had a key role in disseminating knowledge throughout the communities: 'it's so much quicker to take people to a place, via film' (third sector). 'ICT-enabled' involvement in monitoring allows citizens the opportunity to actively engage in



developing the evidence base on areas of concern as well as broadening the demography of those interested in flood action, as has already been observed in recent activity at Calderdale.

To conclude, although the case study regions worked with public sector landowners, landowner engagement was viewed by stakeholders as a precondition for effective community NFM projects. Academics were seen as useful facilitators for the projects. Communities played an important role in networking between the stakeholder groups and as a driving force behind the initiation of the projects.

### 4.3 | Governance implications of CFG action on NFM

Evaluation of the successes and barriers in the case studies led to a discussion of the governance implications of CFG involvement in NFM implementation, specifically what could constitute 'best practice'. Interviewees focused on research and evidence gaps, raising the public profile of NFM and collaboration with research institutions to improve the evidence base. They also highlighted the success of networks and cross-catchment coordination through CFGs in the schemes: '[the CFG's] little catchment will be part of a bigger catchment, there could actually be an existing quite active network of assistance and engagement, sharing of knowledge, information, possibly even resources' (private sector). This calls for a community and catchment-based approach in NFM implementation. It is notable that the recommendation for better governance of NFM draws on a key strength of CFGs, that of networking, collaboration and communication.

Landowners were seen to need more support; one interviewee suggested 'the hand-holding of land owners, land managers, to guide them through the processes of accessing the grants' (public sector). Although interviewees considered the current NFM policy environment positively ('I think the policy hooks are fine', private sector), mentioning the endorsement of NFM in the recent 25 YEP (Defra, 2018a), some saw a need for further action and many identified the potential for policy reform after the UK exit from the EU ('this is the ideal time to change things', Pickering CFG member). Moving on from the EU Common Agricultural Policy (CAP) and CS was seen as an opportunity for restructuring incentives and grants systems for the promotion of NFM to landowners. Other interviewees saw potential for more joined-up policymaking on land management, agriculture and FRM: 'with the Common Agricultural Policy, that's being reviewed [...] there's going to be more incentives, more linkages made with use of the land, and impact on flood risk management' (public sector).

## 5 | COMMUNITY-BASED NFM AND ITS IMPLICATIONS FOR GOVERNANCE

### 5.1 | CFGs and social capital

Although social capital, demographic diversity and representation were not barriers in our case studies, our findings indicate that they

may pose challenges to NFM elsewhere. Thaler and Priest (2014) draw attention to the differential ability of communities to self-organise. The case studies indicate that when CFGs became formal groups this better enabled their integration into NFM partnerships. This was because they had an organisational structure which allowed better representation in FRM. This privileges those communities that have the resources and capacity to self-organise. Thaler and Priest (ibid, p. 423) associate these issues with the localist Partnership Funding model: 'communities with higher socio-economic status are more likely to guarantee their interests in the new scalar arrangements'. This is problematic when community groups are considered prospective funders of NFM projects, as in coastal WWNP measures (Defra, 2018b, p. 218). Calderdale CFG members contributed professional skills, whilst in Pickering university facilitation gave the group access to knowledge and institutional credentials. Where professional skills are limited, or where external input does not materialise, group formation and access to expertise may be impeded.

Flood events were regarded a main catalyst for CFG formation and NFM project development. Social capital was not enough to trigger local action without an exogenous driver. This suggests 'punctuated equilibrium' model of flood action (Jones & Baumgartner, 2012) discussed in the literature (for criticism, see Lane et al., 2013). Nye et al. (2011) also raise the question about the timing of community action, that is, when CFGs may best advocate NFM following Kingdon's notion of 'windows of policy opportunity' (Cairney & Jones, 2015). Paradoxically, communities are least well placed to take advantage of policy opportunities post-flood due to recovery priorities, which constrains their capacity and policy influence. Thus, social capital can be considered something which is not only spatially, but temporally variable.

In conventional collective action theory, there is need for an 'external authority' to enforce action; Ostrom (2010) argued that this is not always the case, suggesting that 'when individuals are well informed about the problem they face and about who else is involved [...] costly and positive actions are frequently taken without waiting for an external authority'. Whilst an external authority did not impose action on the communities in the case studies, flood events and facilitators (e.g., universities) functioned as external 'agents' fostering flood group formation by highlighting the value of proactive collective efforts to reduce flood risk. In Calderdale, voluntary action to reduce flood risk stemmed from shared experience of a significant flood event. In Pickering, action was prompted by university involvement. In both cases, whilst the communities possessed relatively high social capital, external factors, that is, flood events and facilitation drove action. That is, whilst the level of social capital may predetermine the amount of community action on flood risk, other factors can compensate for low social capital. Without counterfactuals, we cannot draw conclusions over whether the communities would have acted independently and proactively on flood risk without these external agents. This suggests direction for future support for CFGs: facilitation should be directed to areas of low social capital (see also McEwen et al., 2018).



## 5.2 | Collective natural flood action

CFGs are an important object of analysis in NFM and partnership working and they operate within a complex mesh of actors, institutions and politics. Paavola et al. (2009, p. 156) refer to this broader institutional setting as a 'governance regime'. Andersson and Ostrom (2008, p. 73) similarly draw attention to the complexity of institutional working, including the 'nestedness of political actors within larger political systems'. Since landowner permission is key for NFM feasibility, there is need to consider the interaction of CFGs within this broader institutional framework. We suggest that bottom-up actors perform a governance role in FRM, and explore below how this integrates with and complements the mainstream top-down governance frameworks.

Vertical and horizontal networking in Pickering and Calderdale provided access to strategic conversations on FRM. The relationship between Slow the Flow Calderdale and Slowing the Flow Pickering indicates the role of networking between catchments, as a member of the Pickering CFG supported development of its namesake in Calderdale through frequent talks and consultations. This illustrates Benson et al.'s (2016, p. 328) theory of 'community interaction learning'. Similarly, Bulkeley's (2005, p. 880) conception of 'advocacy networks' refers to situations where networking across scales is used as an authority-building process. Authority is developed through institutional credentials (e.g., through university involvement) and through wider networks (the grassroots organisations in Calderdale). A 'snowballing' of power, legitimacy and authority can be seen in membership of polycentric institutions and partnerships (see Figure 4). Both case studies evidence a gradual formalisation of CFGs and their integration into more conventional FRM arrangements at the local and regional government levels. Therefore, knowledge exchange and learning between groups is a powerful political process for gaining authority to engage with NFM at a high-level, as well as local capacity-building. Therefore, forming CFGs and NFM partnerships can provide ways of accessing FRM decision-making, and achieving vertical integration, whilst adapting to local governance needs.

## 5.3 | Private action for the public good

In both case studies public land was used for siting NFM measures, and a challenge remains how to incentivise action on private land. For example, in Calderdale the National Trust was a key landowner, whilst in Pickering a major landowner was the National Park Authority. Limited evidence of the effectiveness of NFM measures and the need for landowner consent for their implementation mean that NFM is often confined to publicly owned land of 'friendly parties'. A public sector interviewee said that 'a high level of public ownership within the catchment was vital, because we had a responsibility [...] to manage that land for the good of people'. Narratives of collective good and contractual responsibility thus feed into public sector rationales for NFM.

Calderdale is somewhat of an exception, as there a collaboration with Yorkshire Water, a private water company, underpins future

NFM expansion (Calderdale CFG member; Yorkshire Water, 2017). Convincing smaller or agricultural landowners remains a challenge. One interviewee noted that it might take 'a landowner who's said [...] there's part of my holding which I'm prepared to give up for the sake of the wider good in terms of the catchment that I live in [...] that my family lives in' (private sector). Altruistic motivations for NFM projects could align with the idea of 'greater good'. But elsewhere, the multiple benefits framing or a grants or payments systems may incentivise provision, which is true of public good provision more generally. For example, Biesbroek and Lesnikowski (2018) suggest that in climate adaptation, private financing of the public good of adaptation is exceptional. Benson et al. (2016) also identify funding as key for community engagement and institutional innovation. Given centralised and top-heavy grant allocations, there is the question of how CFGs and grassroots actors can negotiate landowner permission and NFM incentives.

While multi-group membership and community networks made our case CFGs successful, they could also work to motivate private landowners. Bulkeley's (2005, p. 879) 'horizontal governance structures' are important here. As one interviewee suggested, 'it's the landowners really that are the most important [...] it is being able to talk their language' (private sector). Neutrality was seen as a key issue: 'rather than the council or the Environment Agency going to talk to someone, that they might see as having a vested interest' (ibid). Thus, the coordinating role that flood groups already have could be extended, reducing transaction costs, through a funding process increasing their authority, and reach to landowners.

## 5.4 | Polycentric NFM: Linking the spatial and social

Interviewees identified that communication and networking within and across catchments is important, endorsing a community and catchment-based approach for NFM delivery. Just as the literature is biased towards natural scientific assessments of NFM effectiveness, there is similar under-exploration of social dynamics across catchments, and how they could be used to support NFM implementation. Bark and Sutherland (2019, pp. 8–9) note that a CaBA is 'dependent on the strength of communities to co-deliver it and support from authorities to develop local communities' capability'. The partnership working in the case studies reflect this.

Calderdale exemplifies FRM as a polycentric issue. The catchment is a 'patchwork' of landownership, FRM jurisdiction and actors. A 'polycentric' governance response emerged in the form of a Flood Action Plan, involving a complex array of actors across scales (EA and Calderdale Flood Partnership, 2017). In Ostrom's (2010, p. 552) terms, key attributes of a polycentric order are the ability of 'each unit [...] to make norms and rules within a specific domain', and 'the advantage of using local knowledge and learning from others who are also engaged in trial-and-error learning processes'. This is occurring in Calderdale on NFM: multiple actors are instigating different projects, but collectively shaping knowledge on appropriate interventions in the

catchment. Emphasis on experimentation and agile governance is a noted feature of polycentric systems (Morrison et al., 2019).

The experimental edge of polycentrism allows it to create learning opportunities, both for the development of technical knowledge and to shape governance arrangements. This resonates with Pahl-Wostl et al.'s (2013) concept of 'triple-loop learning', where projects developing the evidence base allow for transformational change to accepted norms around FRM practice. This experimentation is also involving greater local input, through the arguably experimental inclusion of local actors such as community groups. This may also be applicable to NFM at the national scale, where multiple units of experimentation are collectively advancing the evidence base. As one interviewee noted, it was 'catch-22': 'where do you get the evidence that it works? You've got to do it—but you can't get the funding to do it, but to get the funding you've got to prove that it works' (Pickering CFG member). Cleaver and de Koning (2015, p. 13) suggest that 'institutional bricolage' can be a response to 'administrative misfits within resource boundaries': thus CFGs and partnerships are governance mechanisms which have adapted to the cross-jurisdictional and distributed responsibility for FRM, and are reforming governance practices to better deliver FRR outcomes.

Andersson and Ostrom (2008) suggest that polycentrism is a reaction against the late 20<sup>th</sup> century 'localism' movement. Ostrom (2010, p. 556) viewed that collective action is best promoted through 'small- to medium-scale units that are linked together through diverse information networks'. This highlights the role of information dissemination and the role of CFGs in the development of polycentric governance systems. A key future need for NFM was identified at the Integrated Catchment Solutions Programme conference, where an attendee suggested an online repository of NFM resources, accessible by all parties (iCASP, 2018). Following Evers et al. (2016), it would be among the 'socio-technical tools' for social learning. Nye et al. (2011) also emphasise the importance of 'sharing data and information' for successful FRM collaboration. Technical and informational tools increasingly help link units of governance and establish new actors through open learning.

### 5.5 | Community-based NFM as 'panacea'?

Short (2015) argues that there is no model of 'institutional design' for catchment-based management. This relates to Ostrom and Cox's (2010, p. 452; p. 451) criticism of the 'panacea problem', a 'blueprint approach to governance, leading to a lack of fit between programmes and their supposed social-ecological targets'. Although NFM is a technique, not a governance approach, there was concern that community-based NFM is considered a 'silver bullet' (public sector), calling for the need to 'manage expectations' (ibid). There was also concern that NFM must only be practiced when 'locally appropriate', and that in many cases a 'hybrid' or 'integrated' FRM approach may be most effective. Although community-based NFM is undoubtedly a force for the public good, the need for and value of the involvement of a diverse mix of actors in NFM delivery cannot be ignored. As

Villamayor-Tomas et al. (2019) argue, community action is by no means an 'alternative' to action on the part of institutions and government actors, but should be conceived as effective complementary action.

Responsibility and liability are also prominent issues in community-based NFM. There is uncertainty and unease about the role and responsibility of citizens in NFM, resonating with Nye et al.'s (2011, p. 292) point that community-led initiatives have 'institutional-level implications'. In other words, community action can remake institutional structures by challenging norms. As one interviewee and participant in collaborative research noted: 'we've only achieved partially unlocking this tight grip' (academic). This highlights the potential of communities in prompting institutional innovation and entrepreneurship, and of 'action-research mechanisms' to aid structural change in FRM for the greater public good (O'Donnell et al., 2018). But community-based NFM is likely most valuable as part of a larger polycentric whole. As Biesbroek and Lesnikowski (2018, p. 311) note, 'polycentric governance emphasises the inadequacies of one-size-fits-all approaches', thereby becoming a kind of 'anti-panacea' in acknowledging there are no simplistic governance solutions.

## 6 | CONCLUSION

We conclude that CFGs can be a valuable part of the NFM governance 'jigsaw' in light of our case study evidence. However, the case studies also demonstrate that design and performance of CFGs are highly context dependent. The Pickering project was initiated by university involvement, whilst the Calderdale scheme emerged from collaboration with the Pickering CFG. The Pickering project involved planned siting of NFM measures, whilst the Calderdale scheme remains more ad-hoc and informal. Yet both achieved a degree of formalisation and inclusion into regional catchment strategies. The functioning of CFGs depends on social capital and the representativeness of CFGs raises questions about differential risk, vulnerability and environmental justice, which provide direction for future research. There are also questions around how communities can interact with FRM when funding structures (Benson et al., 2016) and landownership fundamentally shape this involvement. Existing incentives structures, such as CS (Forestry Commission et al., 2018), facilitate community engagement in NFM, but their access could be enhanced further with the introduction of the Agriculture Act and policy reforms after the UK exit from the EU. Ideal governance arrangements would involve better support structures for landowners to incentivise their involvement, as well as creation of space for CFG input as an efficient mechanism for NFM delivery. This analysis has responded to and expanded on the ongoing debate and literature on NFM delivery, by contributing novel empirical material on the community role within NFM, examined through a lens of governance theory.

As a polycentric phenomenon, NFM presents opportunity for Pahl-Wostl et al.'s (2013) 'triple-loop learning' to transform approaches to FRM and create space for greater local input. The first obstacle to this was the evidence base as funding is dependent on



proven effectiveness but funding is also required to prove that effectiveness through demonstration projects. By supporting the CFGs to implement more informal NFM, the institutional transaction costs of carrying out a comparable project are reduced, reflexively developing an evidence base to support further funding. CFGs therefore present a means of intervening into the dependence on this precautionary approach to FRM investment.

Our case studies may be exceptional, so the best practice insights need evaluation in other contexts as well. There is also a need for further research into changing policy support for NFM and public participation as part of it, due to prospective revisions to EU-originating policy instruments in the near future. Nevertheless, we hope that the potential for community-based NFM has been highlighted, as a means of avoiding 'catchment 22' situations on FRR in the UK, and promoting physically and socially sustainable solutions to flood risk management.

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