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Communities at risk of flooding and their attitudes towards natural flood management

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CBA	Cost Benefit Analysis
FRM	Flood Risk Management
FRMS	Flood Risk Management Strategies
LFRMP	Local Flood Risk Management Plan
NFM	Natural Flood Management
Pop.	Population
PVA	Potentially Vulnerable Area
SEPA	Scottish Environment Protection Agency
SFF	Scottish Flood Forum

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Executive Summary

Research questions

This project seeks to explores factors that affect community support for Natural Flood Management (NFM) and to understand the extent to which flood risk communities support NFM. The outputs are of interest to those who enable and implement NFM to help achieve sustainable Flood Risk Management (FRM).

Key findings

We discussed NFM in focus groups in four Scottish communities. Whilst we found some differences between the focus groups, and between individuals within the groups, there were common themes in how NFM is understood and regarded:

- Awareness that flood risk can be influenced by the actions of upstream land-managers.
- Some awareness and support for NFM, particularly where NFM measures had already been discussed or implemented locally. However, individuals were often only aware of specific aspects or examples rather than what a full scheme might involve.
- Limited awareness of the complexity associated with planning and implementing NFM, and the uncertainties associated with its effects on flows.
- Recognition of the potential multiple benefits of NFM, even if these are not included in standard cost-benefit analysis.
- Provision of information about NFM can affect attitudes towards it: in the focus groups carried out for this project, we saw people's views warm to NFM in response to information provided by others during the discussion.
- Evidence of the efficacy of NFM would be welcome. e.g. from pilot studies.
- Scepticism about NFM can derive from lack of trust in the processes for planning and delivery of FRM schemes in general, rather than reservations specific to NFM. Such reservations tended to be expressed by those who had been directly affected by flooding and found organisational responses to be inadequate.
- Although not specific to NFM there was a common perception, based on experience, that responsible agencies could work together and communicate more effectively and consistently with communities on FRM.

Background

NFM is a key component of the move to more sustainable FRM, a concept which has received strong support at the policy level in Scotland (Cook, 2016). As part of the implementation of the Floods Directive (European Commission, 2007), Flood Risk Management Strategies (FRMS) and Local Flood Risk Management Plans (LFRMPs) are being created, which often incorporate NFM. However, little is known about the attitudes of flood risk communities in Scotland to NFM or the extent to which they would welcome any proposals to implement NFM as part of FRM. Delivery of NFM measures will require buy-in and coordination between multiple stakeholders, including public bodies, local authorities, consultants, land managers and communities at risk.

A better understanding of the views of the people living within a flood risk area will help in developing appropriate approaches for planning and implementing NFM measures.

Research undertaken

A review of literature on public attitudes to NFM and related aspects of FRM provided indications of how communities may view NFM, and the potential factors shaping their views. However, most pre-existing insights come from the wider literature on what affects attitudes towards flooding, and associated responses to risk.

We discussed attitudes to NFM with people from four communities across Scotland. The locations of the communities were chosen to reflect differing causes, severity and frequency of flooding. The communities also varied in the degree to which they had pre-existing experience of FRM works, and the extent to which they were targeted for NFM work in local FRMPs.

Over the period December 2018 to March 2019 we held one focus group in each of four of the communities. A semi-structured topic-guide was developed with input from the project team and steering group. This enabled discussions of up to two hours which allowed participants to talk about their lived experience, flooding related knowledge, opinions of NFM and community links to flood risk authorities.

Recommendations (see Section 4 for detail)

Based on the literature, recommendations made by focus groups, and our observations of their views and doubts, ideas for encouraging further community support for NFM include:

- **Provide information about NFM.** Effectively communicate the multiple benefits of NFM (e.g. improved water quality, reducing soil erosion,

biodiversity gains, amenity value), even if these might not be included in a standard Cost Benefit Analysis (CBA). Identify and communicate how different NFM measures may be used as part of local FRM schemes to mitigate flood risk.

- **Promote community engagement around NFM.** Find opportunities for continuous and constructive engagement with communities. Provide relatable evidence of the efficacy of NFM schemes e.g. establishing local pilot studies, describing existing NFM projects or facilitating fact-finding visits to these. Consider involving communities in river monitoring or other aspects of scheme planning and implementation.
- **Build and maintain trust around FRM processes.** Agencies and authorities need to engage effectively and consistently in order to build and maintain trust with communities. Provide clearer cross-links between parts of the process i.e. so those seeking information due to specific flood events can also see information on Local Flood Risk Planning processes, Potentially Vulnerable Areas (PVAs), etc.

Conclusions

Communities may often have interest in learning about NFM. This includes learning more about different NFM measures, uncertainties, trade-offs, as well as the overall process and timings of FRM planning and delivery. Therefore, it will be useful to share more information about NFM, ideally backed up by examples, and framed in terms of how it fits with overall FRM. Many of the outcomes of this research relate to good practice in community engagement on FRM. This reinforces the need to maintain and build good relationships with communities, and to engage with them about all aspects of FRM.

1 Introduction

1.1 Background and scope

Working with natural processes to manage flood risk, or natural flood management (NFM) is integrated into Scottish flood risk management (FRM) planning through the Flood Risk Management (Scotland) Act 2009 (Scottish Government, 2009). Currently around 100 actions containing an element of NFM (predominantly studies rather than projects) have been identified in the FRM Strategies and Local FRM Plans. Any delivery of NFM will require buy in and coordination between multiple individuals and organisations, including public bodies, local authorities, consultants, land managers, and importantly, those communities at risk. Currently, little is known of the attitudes of flood risk communities to natural flood management. While there is much conjecture that such communities favour hard defences, projects such as the Stroud Valley in the South-west[1] and Pickering[2] and Belford[3] in the North of England have demonstrated community support for NFM when delivered as part of a suite of FRM measures.

This project seeks to explore factors that affect community support for NFM, rather than those of land managers who might be involved in implementing measures (Spray, 2015). Depending on the catchment and community these factors might include:

- the type of NFM measures proposed;
- the extent to which benefits of implementing NFM can be quantified;
- the timescales associated with delivery of benefits;
- the suite of flood risk management measures proposed;
- the wider benefits delivered;
- familiarity with NFM approaches;
- extent of community engagement;
- trust held in the delivery bodies.

Project outputs will provide information to help responsible authorities engage positively with communities in relation to NFM.

1.2 Project objectives

This study seeks to understand the extent to which flood risk communities support NFM and the factors that influence this support. The key tasks were:

1. *Undertake a literature review of existing information on individual and community support for NFM and any influencing factors, drawing on academic and grey literature from the UK and internationally.*
2. *Identify (in collaboration with the project steering group) up to five communities at risk for engagement. These should include communities at risk of river flooding, and ideally areas where NFM has been identified as an action for delivery in the FRM Strategies and Plans. The communities should cover a range of geographical areas across Scotland.*

[1] https://www.theflowpartnership.org/stroud

[2] https://www.theguardian.com/environment/2016/apr/13/500000-tree-planting-project-helped-yorkshire-town-miss-winter-floods

[3] https://research.ncl.ac.uk/proactive/belford/

3. *Develop and implement a research methodology for engaging with the case study communities and develop a sampling strategy that is inclusive of as many views within the community as possible.*

1.3 Outline of the report

This report summarises recent literature to provide an overview of the promotion of NFM and insights into public attitudes towards it. It then describes the focus group planning, data collection and subsequent findings. Results are discussed and recommendations addressing the objectives of the research are made. For the purposes of this project NFM was defined as techniques that work with natural processes to reduce and/or delay flood peaks for downstream communities and can include restoration, enhancement or alteration of landscape features (SEPA, 2015). These can be stand-alone or where appropriate, designed in conjunction with engineered flood defences.

2.0 Research undertaken

2.1 Literature review

A review of relevant literature was undertaken to establish what is known about community attitudes to NFM in the context of recent changes in approaches to flood risk management - other related terms include Working with Natural Processes, Nature Based Solutions and Room for the River (Lane, 2017). This included research on community engagement around flood risk management, touched upon the attitudes of land-managers upstream of at-risk communities (a distinct but related issue), lessons from existing NFM planning, and uncertainties around NFM as a flood mitigation tool. Findings were drawn mainly from the UK but included relevant international work. Existing studies indicate that while there is some understanding of the factors that affect acceptance of NFM by flood risk communities, this depends on the context of the cases and the framing of the research.

Valuable context for this work is provided by Waylen (2018) and Wingfield (2019) who looked in detail at the barriers to implementing NFM from the perspectives of those authorities and agencies responsible. These stem from multiple differences in the work and approaches required to enable NFM versus established techniques that tend to focus on hard engineering works such as concrete embankments. For example, quantifying the benefit of NFM requires complex surveying and modelling with associated uncertainties around the outcomes and a need for catchment scale partnership working, multiple budget lines and a different range of stakeholders. This implies the need for longer term funding rather than single project budgets for capital spends, and the use of more comprehensive CBAs. These studies suggest that community resistance to NFM may be expected since it is less familiar than the predominant approach which, driven by engineering specialists and short-term budgetary constraints, is unable to accommodate the changes required for NFM to be considered integral to FRM. They emphasise that a cultural shift, away from controlling flood events to managing flooding in the wider catchment, is required if NFM is to become an accepted tool in the FRM box.

Research by Cook (2016) and Holstead (2017) looks at factors that influence uptake of NFM measures by land managers. These include availability of advice and support, public perceptions, costs, policy alignment, catchment planning and land-use traditions. While land managers do not necessarily hold the same view as communities at risk, this indicates a breadth of issues that may need to need to be accommodated when promoting and implementing NFM (Broomby, 2017).

Table 1: What do we already know about people's attitudes to NFM?		
	Key messages from previous research.	**Sources (FRM, or NFM specific)**
1.	Local context, experiences and impacts should be recognised and incorporated in planning processes. Specific engagement tools may be difficult to share because of local differences, however common good-practice principles apply.	(Rouillard, 2015) NFM (Mehring, 2018) FRM (Myatt, 2003) NFM
2.	Communities may wish to understand the potential flood mitigation mechanisms, costs, risks, and uncertainties prior to supporting NFM actions.	(Kenyon, 2007) NFM/FRM (Myatt, 2003) NFM (Shah, 2018) NFM
3.	Communities often want to be fully informed of the FRM options and to combine this with their local knowledge, and sometimes have an aspiration to engage in the decision-making process.	(Nye, 2011) NFM/FRM
4.	Individuals in a community will vary in their world views, defined as e.g. hierarchical (trust in the system), fatalistic (risk is unavoidable), egalitarian (suspicious of authority) or individualist (risk can be an opportunity). Ideally, engagement processes need to be able to work with these different perspectives.	(Birkholz, 2014) FRM
5.	Prior informal consultation around local concerns can improve community engagement and help mitigate objections to flood risk management schemes. However, using consultants to act on behalf of local authorities can have the effect of isolating communities from the process.	(Werritty, 2007) FRM
6.	Flood management experts have their own perspectives on techniques, often grounded in engineering solutions, which are currently being challenged by the shift towards more integrated or natural approaches. Evidence of the efficacy of catchment scale NFM would facilitate this.	(Cook, 2016, Waylen, 2018, Wingfield, 2019) NFM
7.	Individuals with direct experience of flooding are more likely to prefer hard engineered defences.	(Werritty, 2007) FRM
8.	Deliberative approaches (i.e. appropriate and iterative community engagement) where information can be absorbed, considered and discussed allows concerns to be addressed and opinions to change (vis-à-vis 6, above). A variety of tools can be used to help realise the benefits of knowledge sharing and community engagement.	(Kenyon, 2007, Wilkinson, 2015) NFM/FRM

Towards Integrated Flood Management

Shah (2018) states that sustainable flood management plans should encompass the whole life cycle of a flood risk management programme and need to incorporate the combination of natural and engineered solutions most appropriate for a given catchment. The uncertainties around planning NFM are comprehensively described in Lane (2017) who discusses flood attenuation and the issues with scaling models up from small, simple catchments to larger or more complex ones. This prompts consideration of how best to communicate the uncertainties around costs, timings and the complexity of solutions to communities, and how to gather and accommodate their views.

Mehring (2018) describes the shifts in the conception of flood risk management since the 1980s from hard defences to integrated flood management, and from technocratic approaches to more democratic, community focussed responses to flood risk. In a study exploring the reasons for this shift towards integrated FRM and NRM in the UK, Nye (2011) identifies climate change adaptation, the sustainable development agenda, and wider moves towards societal engagement in environmental policy-making and delivery (e.g. the Aarhus Convention[4]). This is reflected in UK guidance (Defra & Environment Agency, 2006) to flood management agencies recommending that they should implement appropriate changes in communication, information sharing and planning processes. However Nye (2011) reports that communities at risk of flooding still perceive themselves as low in a knowledge hierarchy whereas local authorities, statutory agencies and consultancies remain the sources of information and the primary decision-makers. This is relevant because it appears that Defra's recommendations were interpreted by agencies as needing to listen, understand and consider community concerns and priorities, rather than including or collaborating with them more substantially. Meanwhile, Nye's study showed that communities felt that listening to and understanding their lived experience of flooding was key to building trust and finding solutions. While the authors are critical of agencies' use of engagement processes merely to establish trust in their final decision, rather than co-developing solutions with flood communities, they note that agencies have yet to develop an understanding

[4] https://ec.europa.eu/environment/aarhus/

or experience of effective engagement methods. In the meantime, they recommended that communities persist with constructive efforts to be involved in decision-making in relation to flood management. Nye (2011) also shows that communities often shift in their attitude towards FRM processes: from wanting to put trust in others to make decisions, to becoming increasingly aware and involved in planning processes that allow them to develop an understanding of integrated FRM, including NFM.

When does community engagement work in relation to NFM or FRM?

The need to communicate and engage on FRM in Scotland predates the Flood Risk (Scotland) Act (2009) (Scottish Government, 2009). A study by Kenyon (2007) found that deliberative approaches (i.e. appropriate and iterative community engagement) that allow for information to be absorbed, considered and discussed mean that opinions can change as a result. The simple act of discussion between participants allowed the conversation to cover negative and positive aspects of each flood mitigation option and contrasts with assumptions that results from a single survey will be relevant in the future. In related work Birkholz (2014) identifies the different attitudes that people might hold in relation to flood risk and indicates the variety of world-views that engagement processes might need to accommodate, from hierarchical (trust in the system), fatalistic (risk is unavoidable), egalitarian (suspicious of authority) to individualist (risk can be an opportunity).

Kenyon (2007) notes the aforementioned shift from a policy of structural responses towards more integrated approaches to flood management, with reference to the National Technical Advisory Group on Flooding Issues (2004) report, and associated implications of this for communications. General recommendations in relation to communication strategy around flood risk[5] are also relevant in terms of NFM planning and processes. They include using jargon-free language around risk, identification of clear lines of communication and responsibility and coordination of awareness-raising campaigns.

Community engagement involving informal consultation to raise and address local concerns can mitigate many of the objections that might otherwise delay or derail planning and implementation of a flood risk management scheme (Werritty, 2007, Wilkinson, 2014). Werritty (2007) found that lived experience of flooding affects individual's views of flood management options, with 'at flood risk' respondents favouring structural flood defences. The same study also revealed that in situations where consultants plan FRM on behalf of local authorities, this can cause community members to feel a further step removed from the planning process.

Insights on Local Policy Implementation

Rouillard (2015) and Cook (2016) demonstrate how policy implementation in relation to flood risk management is dependent on governance structures, local policy frameworks, implementation agencies, and the attitude of land managers and those of the affected communities and any local catchment groups. Rouillard (2016) reviewed adaptive governance across different catchment scales and emphasise the value of identifying trusted intermediaries to link communities, and public and private and third sector partners when trying to plan and implement measures.

The importance of framing any NFM plans is highlighted by research by Buijs (2009) in the Netherlands. This work demonstrated the need for understanding a community's views of the catchment, its management, and nature more broadly, in a country with a history of active management of water resources. Wilkinson (2015) found that locals, landowners and FRM practitioners are unlikely to have a shared understanding of FRM objectives, therefor there is a need to acknowledge and incorporate different perceptions of problems and solutions to facilitate integrated flood management planning.

This literature review contributed to decisions about how we selected and framed the topics to be explored in the focus groups.

2.2 Methods

Focus groups were chosen for data collection. Focus groups offer a way of exploring a subject in depth via guided discussion (Krueger, 2009, Guest, 2017) where the researcher asks relevant, probing, questions of the voluntary participants. The resulting discussion provokes revealing responses and can highlight points both of consensus and contention.

We used the project research questions and literature review findings (Table 1) to draft a topic guide which was designed to explore people's understanding of and attitudes to NFM, and potential factors shaping their support. This was finalised following feedback from the project steering group and is available in Appendix (i). The topic guide enabled a one-two hour discussion about participant's lived experience, flood related knowledge and opinions.

Key members of each community were identified either via local authority or Scottish Environment Protection Agency (SEPA) contacts, or with the help of the Scottish Flood Forum (SFF). The project was explained to them and participant information sheets (see Appendix ii) provided to help them recruit community members for focus groups. It took between one and five months to arrange the focus groups, at convenient locations and timings appropriate to

[4] http://knowledgescotland.webarchive.sefari.scot/briefings/briefings1ec3.html?id=259

each group. Attendees numbered between three and seven individuals, with most accepting the invitation prior to the meeting. Upon arrival they were asked to sign a research consent form and were provided with an introductory flyer outlining different NFM tools which they had time to read prior to the discussion starting[6]. Notes were made during the discussions, with support from Paul Laidlaw from the SFF at three events (Menstrie, Aviemore and Peterculter). Voice recordings were transcribed for Aviemore, Peterculter and Hawick to capture further detail. The project was approved by the Research Ethics Committee of the James Hutton Institute, and the personal data from focus group members was collected, managed and processed in compliance with GDPR. Individual contributions are anonymised in this and any other project outputs.

Following the focus groups, we emailed the participants to thank them for their contribution and provided them with further information on NFM, including the Environment Agency's Evidence Directory[7].

2.2.1 Case study selection

Focus groups were carried out in four different flood risk communities across Scotland. Communities of different sizes were selected in catchments that varied by scale, level or type of defences, funding mechanisms and risks and impacts related to flooding.

A long list of potential case study communities was drawn up based on a diversity of river and community types, and initially from places within PVAs i.e. places identified as being at risk of flooding and where the impact of flooding justifies further assessment and appraisal. A ranking of this list was discussed with the project steering group and four case study communities were selected. Links to the associated PVAs are provided in footnotes.

Hawick is a large rural town (pop. 14,000) at the convergence of two main tributaries of the Tweed (Teviot and Slitrig). The catchment upstream is approximately 270km^2 and is a mix of forestry, rough grazing, moorland and pasture. The town has a history of flooding and recent events (in 2005, 2009 & 2015) prompted plans for hard engineering works in the town. These plans have been approved and the final version was on public display on the day the focus group was carried out. The Flood Protection contractor helped to recruit several individuals however only three were able to attend on the day. The PVA can be found at [8].

Menstrie (pop. 2,870) is one of the Hillfoot villages that sit between the River Devon and the Ochil Hills. The Ochils are steep with short 'flashy' burns causing flooding, sometimes in combination with inundation of the Devon and Forth Estuary floodplains. Menstrie shares a similar set of problems as Tillicoultry to the east and both have flood resilience groups. The SFF facilitated access to the Menstrie community group for the project and they helped to recruit the six attendees, two of which came from Tillicoultry. A plantation has recently been established higher up in the catchment and this is being monitored for NFM potential by an ongoing study[9]. The PVA can be found at [10].

Aviemore (pop. 3,240) is a rural town sitting about halfway down the River Spey in the Highlands. Properties east of the railway-line are at risk of flooding from the Spey and there are no plans for engineered infrastructure to prevent this. Eight participants, including the convener of the Community Council and the Spey Catchment Operations Manager were recruited with the help of the local authority Flood Manager and an employee of the Cairngorms National Park Authority. The PVA can be found at [11] .

Peterculter (pop. 4,500) is a village connected by ribbon development to the city of Aberdeen, sitting on steep banks above the Dee at the confluence of the Culter Burn. The lower reaches of the Culter Burn, that used to house two mills, occasionally floods the two housing developments built there in the past four decades. Six individuals including the Community Council chair were recruited by an active member of their flood resilience sub-group. They were introduced to the SFF via their involvement. The PVA can be found at [12].

3.0 Results

3.1 Focus Group findings

Findings are presented as an overview from all four focus groups to give an indication of attitudes towards NFM that might be commonly held. Where views were held strongly by a sub-set of the case study groups these are included to either emphasise or contrast with the more generally expressed understanding. In this report the word community is more directly associated with the group of individuals

[6] https://www.deepartnership.org/userfiles/file/leaflets/nfm-leaflet.pdf
[7] https://www.gov.uk/government/publications/working-with-natural-processes-to-reduce-flood-risk
[8] http://apps.sepa.org.uk/FRMStrategies/pdf/pva/PVA_13_12_Full.pdf
[9] https://meetingorganizer.copernicus.org/EGU2019/EGU2019-19065.pdf
[10] http://apps.sepa.org.uk/FRMStrategies/pdf/pva/PVA_09_04_Full.pdf
[11] http://apps.sepa.org.uk/FRMStrategies/pdf/pva/PVA_05_11_Full.pdf
[12] http://apps.sepa.org.uk/FRMStrategies/pdf/pva/PVA_06_19_Full.pdf

experiencing flood risk or involved in community resilience groups, rather than the wider community per se. However, those involved in planning and developing FRM should be aware of potential impacts on the wider community.

Community support for NFM may depend on factors such as:

1. Familiarity with the approach and the type of NFM measures proposed

People tended to associate NFM with specific types of measures such as planting trees, creating run-off buffers, re-connecting rivers to their floodplains or re-meandering rivers. Even if not previously aware, they tended to readily support the use of well-planned and managed NFM to provide two benefits: reduce (although not eliminate) the impact of any flooding; and more importantly for many, delay the flood peak thereby allowing more time to take precautions. Individuals readily understood that any single intervention would be insufficient to protect downstream communities, or that certain approaches might not suit their catchment:

"It's too small scale, the rivers around here are too small scale for major storage, but that's what you could do with major rivers." (Hawick)

However, participants recognised that, depending on the nature of the catchment, a coordinated suite of NFM actions (e.g. targeted tree planting, blocking certain moorland drains, and re-connecting floodplains on the Spey) had potential to reduce flood risk.

2. The wider benefits delivered by NFM

There was an appreciation of the wider benefits of NFM. Depending on the individual, these included: opportunities for education (geography, river function, ecology, climate change, etc); terrestrial habitat improvement; improvements to water flow; and instream habitat that would benefit fish populations.

"…and so there are huge multiple benefits and that's the thing that ticks the boxes within natural flood management, isn't it? It's not just alleviating flooding. It's actually improving the environment and the ecology." (Peterculter)

These benefits were also mentioned in relation to river restoration more generally.

3. The timescales associated with delivery of NFM and FRM benefits

The timescales in relation to tree planting and other NFM instruments relying on growth were generally acknowledged, and otherwise they were viewed as no different to the planning and implementation for any other intervention. Communities felt that NFM should be considered and consulted on from the outset of flood risk management planning in order to ensure a consistent message about aligning flood risk management measures between protection (engineering) and mitigation (NFM).

"if they'd done a study for the natural flood management at the same time as they started costing the engineering works, would you have been happier with that?

Respondent: I would have definitely been, irrespective of the outcome, yeah, I would have been happy with it." (Hawick)

4. Upstream considerations

Participants were aware of a key constraint in that landowners upstream would be unwilling to alter their management or lose options on productive ground. Given that policies exist to allow payments to farmers and others to provide public goods, groups felt that such funding would also be appropriate for NFM measures.

"If you see what's already been done to induce farmers throughout the country to do different things with the land than they have done traditionally, like wildflower areas and they'd be fallow for a year etc. and they're given financial compensation for all these things. What's the difference?" (Hawick)

The notion of upstream landowners refusing to collaborate was raised as a potential obstacle to implementing NFM in the absence of enforcement powers in Scotland.

"He owns some of the land up there, aye."

"If not all. [Laughter]."

"Well, when I heard that there might be objections in the last few years I always wondered if it must have been him." (Hawick)

However, focus group participants were not aware of any actual instances of landowners obstructing NFM related activities. The experience of Menstrie and the other Hillfoot villages indicates that there can be strong feelings of solidarity between nearby communities. In this case, knowing that benefits from flood management activities will accrue to neighbouring places is seen as positive, and something that can be learned from, rather than a source of envy.

5. Information sources and use

Members of one group felt that SEPA's PVAs were not detailed enough (too high level) to be useful to communities and lacked ground-truthing:

"The problem with this is that none of it's been ground-truthed. It's all done on the computer by statisticians that don't know where the flood banks are. They only identified 10km of flood-banks on the Spey, I added it up and it came to 70…" (Aviemore)

Furthermore, some residents reported that they did not know that LFRMPs existed:

"So, there is a plan in action?" (Aviemore, in response to being told about PVAs and LFRMPs).

This suggests a low level of awareness and understanding of the general processes of FRM, not only the specific concepts of NFM. There was interest in knowing more about FRM approaches, including a suggestion that this knowledge would be useful to communicate to younger generations via school.

6. The wider suite of flood risk management measures proposed

Strong views existed in all groups that NFM should be included, where possible, alongside engineered flood protection for communities as part of integrated LFRMPs. Some made the point, and all understood, that there were complexities and trade-offs that would be difficult to manage.

"I think that is the point that there are these trade-offs and you will get diminishing returns in any one measure, but actually a mix of measures might give you a better overall outcome." (Peterculter)

This willingness to accept complexity indicates that flood planning authorities could afford to be open with communities about the uncertainties and trade-offs associated with FRM planning.

7. The extent to which the costs and benefits of NFM can be quantified when planning FRM

Individuals in the Peterculter group had reason, based on experience, to question the assumptions made and data used in standard CBAs as part of FRM decision-making. They emphasised that potential wider benefits (e.g. biodiversity, amenity, fisheries) were not acknowledged, while acknowledging the complexities inherent in incorporating the full costs and the wider benefits of NFM into FRM plans.

"Who benefits and who pays and the internalising of those external costs or benefits? That's the challenge in all of this." (Peterculter)

The discussion also referred to how these wider associated costs and benefits might be appropriately identified and attributed.

8. The extent to which the community is informed and engaged in relation to flood risk management decisions, processes and delivery

The Menstrie group identified opportunities for increasing community cohesion via elements of NFM works, e.g. include areas that could be used for recreation (e.g. footpaths through new woodland and around offline ponds) or engaging people in monitoring of flow to learn about their river's behaviour (RiverTrack) or contributing to tree-planting.

"There's other things that we've heard of communities doing that have worked with the local authority, which is creating ponds that become a natural feature that people can walk round to the point where it becomes a community resource" (Menstrie)

Views of relationships with flood risk planners and engineers varied between communities, however those who had been involved in ongoing activities were more positive after several years of engaging with planning processes as engineering works were developed:

"I think they're quite approachable - definitely prepared to listen to what you've got to say. And as I say, there's a few groups that have sprung up and I think they're engaging with his team and other people in the council, I think to do with things like having community scrutiny you know… to try and democratise things up a bit." (Hawick)

9. The trust held in the delivery body and strategic processes

The process of engagement with local authorities and SEPA around flood risk management was a common concern. The perception in most cases was that individuals with whom the community had contact, or indeed built up a relationship, were sincere and committed to helping the community. However, the degree to which these individuals were able to work directly with communities in order to share information and collaborate constructively was doubted. This was based on several types of experience including lack of authority of the flood risk officer (seen by communities as a flooding expert) and community engagement officer to influence strategic planning decisions;

"I think ultimately the council should be listening to their experts on flooding and that should be prioritised within planning." (Menstrie)

It was felt that there were silos within and between authorities that preclude any individual having overall responsibility, particularly in the complex case of catchment management and FRM.

Referring to specific individual in such a position, one Peterculter participant explained that this person *"is not authorised, and this is a big issue because if you end up communicating and promising something and you're not authorised to do that, it's worthless, and I'm afraid whenever you talk to the council now about spending money, you're going to talk through a lawyer or an accountant. And that's just the way it is. So, these types of things are often handled better through the Community Council because we've got a lot of examples and we've also got a lot of contacts."* (Peterculter)

Other issues included a high turnover of agency staff which disrupts relationships with communities and lack of funding

and support for dedicated community engagement officers.

"I mean, we have this permanent problem within the council employees, that someone you were talking to last week has moved on and you don't know where they've gone and they had things at their fingertips, and so you've got somebody new." (Peterculter)

However, it was widely accepted that local authorities and agency staff are already overburdened and unlikely to be able to satisfy the engagement needs of all communities at risk of flooding.

The Aviemore group included an individual closely involved in managing the River Spey. The group trusted him as a source of information in relation to NFM and wider catchment management matters. They agreed that someone local, with relatable experience, and able to represent community needs, would be best placed to advocate flood risk management, including NFM in a catchment like theirs. Those present tended to trust SEPA experts, local authority flood engineers and their contractors. However, the conversation revealed that other statutory bodies, (the example in this case being the Cairngorms National Park Authority), can be perceived by communities to simply add bureaucracy to processes while lacking the necessary expertise to facilitate action.

10. Other risks and concerns

While agreeing with the use of NFM to mitigate flood risk those directly affected by flooding pointed out how the fear of rising water leads to the desire for tangible action, as one Peterculter participant explained:

"And once that fear, you've had that fear - it doesn't go away, it doesn't go away. So that's why I think people wanted to see something in concrete rather than say well, we've built… we're growing some willow up the stream."

Participants were not generally aware of risks relating to NFM (e.g. causing flood-peaks of tributaries to coincide, or leaky dams breaking and adding to flooding debris) however some people did recognise the need for regular maintenance of NFM measures to ensure that they were reliable. It was also noted that, in a non-regulatory system, decisions about NFM measures will often be trade-offs or compromises between competing needs in a catchment.

"I'm pretty much convinced that the mitigating measures that are mentioned on the leaflet, if planned in a way which there's clearly some optimal arrangement that will minimise the impact on the land users but maximise the public benefit and it's that trade-off and getting it right. And that is a lot to do with the measurement of risk but it's also a much wider policy issue, and policies compete." (Peterculter)

4.0 Summary

Our findings reinforce existing advice about effective communications around wider FRM that relevant local authority and agency staff may already be aware of e.g. Defra & Environment Agency (2006), see [13] and [14] . While our focus groups reiterated some of the key messages from the literature (see Table 1), in relation to NFM they were more supportive of the concept, demonstrated a willingness to learn more about the tools and wanted to engage with NFM/FRM development processes where relevant to their community (Table 2).

[13] http://knowledgescotland.webarchive.sefari.scot/briefings/briefings1ec3.html?id=259

[14] https://www.ciria.org/Resources/Free_publications/c751.aspx

[15] https://www.sepa.org.uk/data-visualisation/nfra2018/

Table 2: Focus group topics and summary of related findings	
Topic	**Key points**
1) Familiarity with the approach and the type of NFM measures proposed	Despite varying knowledge both of NFM measures and the complexity of applying them at a catchment scale, people were generally supportive.
2) The wider benefits delivered by NFM	Communities welcomed the potential additional benefits of NFM measures (e.g. biodiversity, amenity)
3) The timescales associated with delivery of NFM and FRM benefits	Further information on the timescales for different measures would aid NFM understanding. While communities appreciate the long timescale for any FRM scheme, it is important to start these processes with communities.
4) Catchment-wide considerations	Landowners upstream may or may not be part of the community at risk, but people understood the need for them to agree to participate in delivering NFM measures (e.g. management agreements, subsidies).
5) Information sources and use	Raising awareness of online information in relation to flood risk and flood management planning would be useful. E.g. National flood risk assessment webtool[15]
6) The wider suite of flood risk management measures proposed	Communities felt that NFM should be an integral part of FRM planning so that complexities and trade-offs could be considered.
7) The extent to which the costs and benefits of NFM can be quantified when planning an FRM programme	Groups readily recognised the wider benefits of NFM, but worried that these were easily discounted in CBAs, resulting in NFM being unfairly ruled out.
8) The extent to which the community is engaged in relation to FRM decisions, processes, and delivery	Communities at risk appreciate their flood related concerns being acknowledged and considered seriously. Engagement in flood related activities (e.g. RiverTrack) would raise awareness and facilitate meaningful engagement.
9) The trust held in the delivery body and strategic processes	Relationships between communities and SEPA or local authority individuals were usually good, but there were concerns about transparency around how decisions were made and who was responsible for making them.
10) Other risks and concerns	People recognised that flood risk management involved difficult trade-offs. A particularly poignant point was that reducing the fear of flooding in communities was a key underlying rationale for FRM.

4.1 Recommendations

Recommendations are based primarily on the focus group findings and are underpinned by the literature review. While the relationship between communities and respective agency employees was positive, several broader, strategic considerations emerged, which build on general principles of good practice for community engagement. They are grouped by information provision, community engagement, and FRM processes.

Provide information about NFM

- NFM measures should be considered and communicated as part of overall plans for community FRM measures. Where NFM type measures are used to achieve outcomes other than flood mitigation (e.g. improving fish habitat, reducing soil runoff) within a catchment, this needs to be clearly communicated so as not to raise expectations of reduced flood risk to communities downstream.
- Raising awareness of the potential wider benefits of NFM, such as increasing the naturalness of the river (e.g. enabling biodiversity and habitat creation, groundwater replenishment, soil retention) would be appreciated by flood risk communities rather than justification purely in terms of cost savings. Be open and honest about the challenges of designing and implementing NFM.

Promote community engagement around NFM

- Early and constructive community engagement is key. NFM proposals should identify wider benefits (e.g. tangible assets such as ponds) that would help with this.
- Where possible provide opportunities for communities to experience local, relevant NFM measures or pilot studies as part of the learning and engagement process. In the absence of such opportunities, various engagement tools have already been used to demonstrate how NFM measures can work[16].
- Assisting communities to learn about and understand how their river flow responds to rainfall by involving them in monitoring schemes (e.g. RiverTrack as installed at Menstrie [17] and [18]).

Build and maintain trust around FRM processes

- Where communities perceive a lack of joined-up working both within and between agencies responsible

[16] https://catchmentbasedapproach.org/learn/engagement-tools-for-natural-flood-management/

[17] http://media.sepa.org.uk/media-releases/2018/smart-tech-solution-helps-scots-fight-flooding.aspx e.g by using tools such as RiverTrack

[18] https://www.oxfordsmartcity.uk/oxblog/the-oxford-flood-network-a-citizen-based-initiative/

for FRM this might be addressed by involving the communities concerned more directly in the planning process.

- The provision of links to information on PVAs and local FRMP information on SEPA's flood warning pages (which are actively viewed by flood risk communities) would have direct benefits in terms of keeping communities informed.
- Where communities have constructive, ongoing, relationships with SEPA and local authority employees this will tend to foster trust and willingness to engage with NFM and FRM planning. In some cases (e.g. communities in larger catchments or local authority areas with limited staff coverage) identifying an appropriate intermediary, to liaise with agencies on behalf of communities, might facilitate buy-in.
- A process that was only mentioned once, but might bear consideration, was that of a national community focussed panel to monitor and advise on how best to involve communities in FRM processes.

4.2 Research gaps

In the process of doing this research some unanswered questions were raised that might be answered by some areas which benefit from eliciting support for integrated flood management.

- How do views on NFM change over time, especially in response to flood events, flood risk designations, engagement and information provision around NFM and FRM schemes?
- Does community support vary according to the type or timescale of the NFM approach taken?
- Is identification, quantification and monetisation of the multiple benefits associated with NFM worthwhile for strengthening community support?
- How might agencies best communicate uncertainties around costs, timescales and flood risk mitigation afforded by NFM schemes, and how might this affect community support for NFM?
- Does changing the wider suite of flood risk management measures affect support NFM?
- What additional benefits might NFM specific engagement provide (e.g. social learning and increased community resilience to flooding).
- Do community attributes and experiences unrelated to flooding affect community attitudes and responses to NFM?
- How do communities within large urban areas view NFM as part of FRM schemes - is there a rural/urban divide?
- What has shaped the views of those with negative attitudes to NFM, and might any approaches or factors make them more willing to contemplate NFM as part of FRM?

Different methods would be needed to tackle all these questions. Some of these questions could perhaps be explored by extended discussions with one or more groups, and/or in-depth interviews with individuals: other questions would benefit from tracking and appraising accumulating experience of NFM implementation.

5.0 Conclusions

While many of the outcomes of this research also relate more generally to good practice in community engagement, we found that flood-risk communities have an interest in learning about NFM and that it was generally seen as a positive and acceptable tool for FRM.

Flood-risk communities contain engaged people who want to be informed of FRM plans and processes and to have their concerns and questions heard and addressed. This includes learning more about different NFM measures, uncertainties, and trade-offs, as well as the overall process and timings of FRM planning and delivery. Therefore, it will be useful for FRM authorities to share more information about NFM, ideally backed up by examples, and framed in terms of how it fits with overall FRM. Our findings reinforce the need to maintain and build good relationships with communities and engage with them about all aspects of FRM.

The process of implementing NFM in future FRM plans will provide ample opportunities to address some of the research gaps identified here, particularly around expectations of FRM projects and the precise contribution of NFM to reducing flood risk to communities. More experience of applying NFM approaches will provide evidence on which to base future planning decisions and address concerns which communities might have. This study provides evidence to show that there is now an opportunity to engage sensitively with flood-risk communities around FRM, and to develop plans that incorporate appropriate NFM measures to mitigate flooding in those communities.

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6.0 Appendices

Appendix (i) Topic guide

Focus group discussion guide (generic)

(Flag if NFM not actually planned locally/ensure you are not raising expectations – they are there to feed into general learning by SEPA and L.A.s, not to inform a specific local scheme).

1: Community background and concerns around flooding (10 mins)

ROUND TABLE INTRO - What motivated you to take part this evening? *(flood experience, local group membership, community responsibility?)*

What has been your experience of flooding and how did it affect you (*e.g. surface water or fluvial/river flooding emotional stress, financial costs, new responsibilities*)?

2: Awareness of any existing local flood management schemes (engineered, NFM, household) (10 mins)

Can you tell me about any flood risk management that is being planned or already in place and how you know about it?

Do you trust these works to protect your community better in the future?

To what extent was the community involved in discussions or plans about these actions? (*Prompt: who, in what manner?*)

3: General NFM awareness including in combination with FRM schemes (15+ mins)

Have you heard of the term "Natural Flood Management" (NFM) before (other than the info sheet provided)?

(prompt: can you tell me how you know about it (e.g. local project)? How confident do you feel in describing it? Have you actively looked for information about this?

If a local project, to what extent was the community involved in this project? In what ways?]

Which of the types of NFM that you are aware of *(see also flyer/pop-up display*) would you feel most favourable towards being used? **What shapes these views?**

In what situation, and why? (*prompt: if the benefits can be quantified? if the costs are reasonable, flood risk reduction, multiple benefits, timescale*)?

Would knowing that NFM (**of what type?**) was being considered as an integrated part of wider flood risk management (e.g. *modelling, engineering options etc*), influence your view on NFM? **(*why / how?*)**

4: Information, communication and trust (45 mins)

How important is it that information about potential NFM is shared with you during FRM planning? **(*why / how?*)**

What, in particular, would you be wanting to know?

(Prompt: benefits, costs, timescale (e.g. tree growth), uncertainties)

Who from? **(e.g. *specialists, other communities with experiences of NFM)***

How might the community best be involved in information sharing, planning processes, decision-making about flood risk management involving NFM? **(*why / how?*)**

(prompt: who? E.g. SEPA/LA/intermediary e.g. SFF, National Park) depending on stage of process)

What specific communication and engagement approaches might be appropriate when discussing, planning or implementing NFM as part of a local flood risk management scheme? **(*why / how?*)**

Some NFM projects have been actively contributed to by communities (e.g. tree planting, checking dams, monitoring?). What do you think the pros and cons of such an approach might be? **(*why / how?*)**

How would you like to be involved in any future NFM delivery (e.g. planting)? **(*why / how?*)**

Do future changes (e.g. building developments, climate change) influence how you think about FRM options and their suitability? (*timescales, costs, other considerations they have?*) **(*why / how?*)**

Are there any other issues or factors that you think might affect support (+ve or -ve) for installing NFM? **(*why / how?*)**

5 (if not arising during conversation): Other interactions with local authority, contractors and agencies (e.g. SEPA, SNH, FCS) (15+ mins)

Government agencies have various responsibilities in relation to flood risk management. How does the community view their communications and relationship, in general, with

the local council and government agencies such as SEPA, SNH and Forestry Commission Scotland, and relevant contractors?

Does this influence how you might view proposals or approaches to FRM?

FINAL CHECK to tick off:

Views on NFM as a tool

Community information needs around NFM

Process of engagement (who in the community, when, how?)

Level of engagement (info/consultation/participation/ collaboration/partnership)

6: Are there any questions that you'd like to ask me?

Thanks, and close.

Appendix (ii) Participant information sheet

Overleaf



crew
Scotland's centre of expertise for waters

"Understanding the attitudes of communities to natural flood management"

Project information sheet

An invitation to participate

Many thanks for coming along to this focus group where we'll be exploring attitudes towards natural flood management (NFM). We'll now meet, tea and coffee provided, until no later than 4pm.

What is the project about?

We are seeking to understand attitudes towards NFM in communities across Scotland that are at risk of flooding, to help deliver more effective and beneficial flood management schemes in the future.

What will the focus group involve?

The focus group will be an open discussion guided by questions around topics such as:

- Your involvement in and priorities for flood management in your area
- Sharing people's understanding of what NFM might involve
- How you feel about NFM as a component of flood risk management
- Your experience of engaging with organisations involved in flood management
- Your knowledge or experience of the flood risk management planning process

What is NFM?

Natural flood management has been advocated as a sustainable alternative or supplement to traditional engineered flood management. It works with natural processes (e.g. restoration of wetlands, rehabilitation of river channels, enhanced floodplains) to reduce the need for, or extent of, hard flood defences to protect downstream settlements.

Research is carried out by an interdisciplinary team from:
The James Hutton Institute, Craigiebuckler, Aberdeen AB15 8QH, Scotland UK

Contact Keith Marshall at keith.marshall@hutton.ac.uk

The James Hutton Institute



Is my involvement voluntary?
The focus group is entirely voluntary. You will be asked to sign a consent form beforehand to show that you understand your rights as a participant and why you have been invited.

Is it anonymous?
We will ask for your name and contact details which will only be used for our own research records, and so that we can contact you to share research outputs. Findings will not be attributable to any particular individual and you will remain anonymous in any project reports.

What will happen after the focus group?
We will analyse the focus group outputs and produce a publicly available report in the summer of 2019, and you will be able to stay updated about the research if you wish. The report will communicate the overall findings to those involved in planning and implementing flood risk management across Scotland, including Local Authorities and the Scottish Environment Protection Agency (SEPA).

Who else is involved?
We have a steering group made up of practitioners and researchers to support the project's progress.

Who is running this project?
The research has been commissioned by Scottish Environment Protection Agency (SEPA). It is being delivered through Scotland's Centre of Expertise for Waters (CREW) by a team of researchers from the James Hutton Institute (JHI).

Your key contact is myself, Keith Marshall, and I'd be happy to answer any questions or queries that you might have (keith.marshall@hutton.ac.uk tel. 01224 395406) .

For further information please visit the project webpage:
https://www.crew.ac.uk/project/community-attitudes-NFM .

Research is carried out by an interdisciplinary team from:
The James Hutton Institute, Craigiebuckler, Aberdeen AB15 8QH, Scotland UK

Contact Keith Marshall at keith.marshall@hutton.ac.uk

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