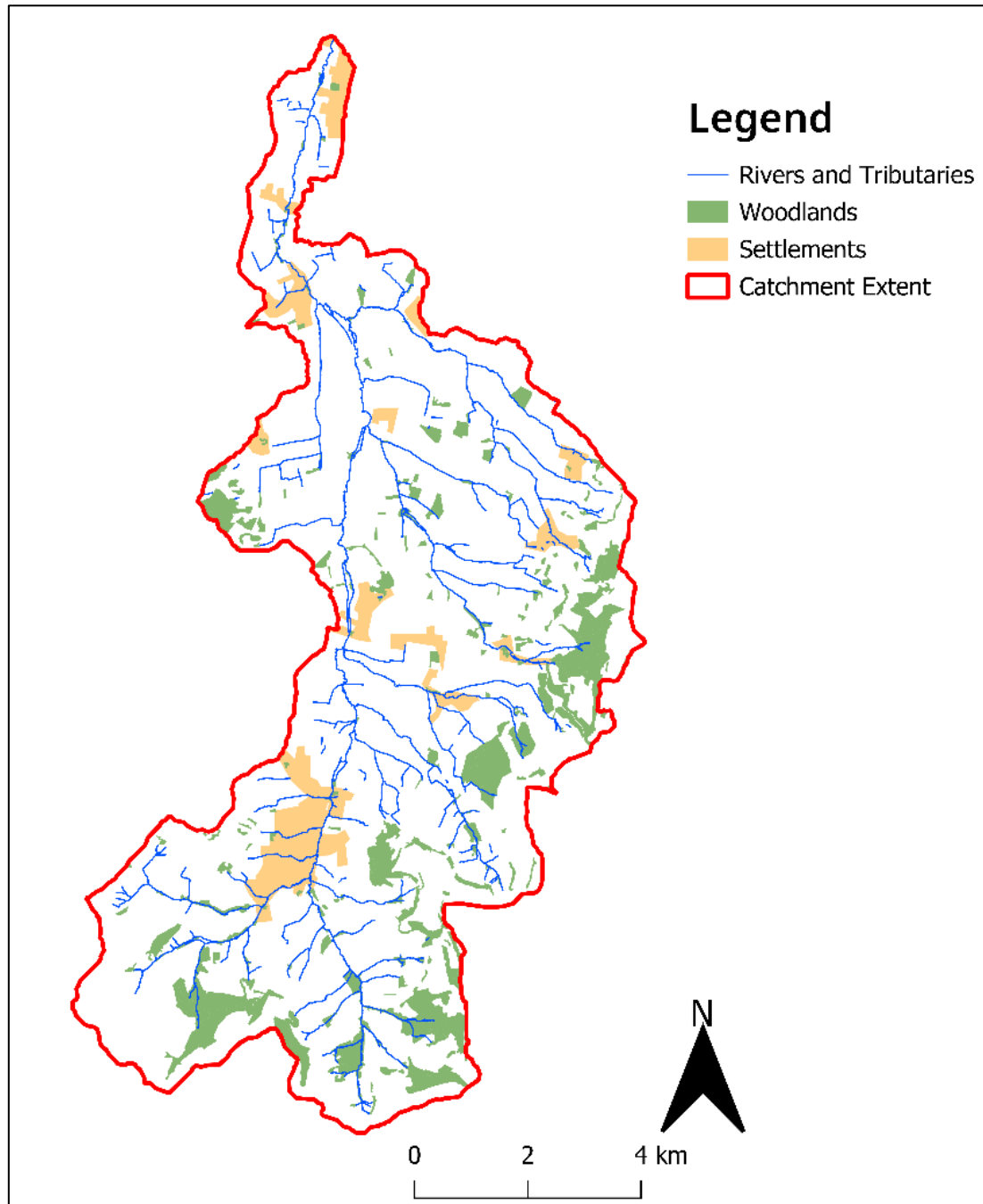


Exploring experiences of a Natural Flood Management project on the River Isbourne from stakeholder perspectives



Andrew Arkle

BA Geography Dissertation

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Declaration

This dissertation is the product of my own work and does not infringe the ethical principles set out in the University's Handbook for Research Ethics. I agree that it may be made available for reference via any and all media by any and all means now known or developed in the future at the discretion of the university.

A handwritten signature in black ink, appearing to read 'A Arkle', written in a cursive style.

Andrew Arkle

12/04/2026

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Abstract

Against a background of an increase in flooding incidence within the UK, which is being accelerated by climate change, natural flood management has emerged as an example of a nature-based solution that aims to reduce flood risk to communities, by imitating natural river processes to slow the flow of water and increase attenuation upstream. This comes as part of a wider policy shift from flood defence to flood risk management, in which responsibilities have been distributed, with communities playing a more active role in flood management. The aim of this research is to develop understanding of experiences and challenges of natural flood management projects as perceived by stakeholders, using a project on the River Isbourne catchment as a case study. This study has used semi-structured interviews with a range of stakeholders involved in the project to explore the development and implementation of natural flood management and how effective it has been. It contributes to wider understanding of social aspects of NFM, considering the project in its entirety, identifying key aspects of its development and implementation. Findings suggest that implementing natural flood management has been generally straightforward and the interventions have had beneficial impacts in reducing flooding, however the extent to which stakeholders are certain of this varies. Community action and the establishment of a catchment flood group were fundamental in driving NFM and initiating the collaboration between stakeholders. The project has successfully integrated collective action, bringing together the knowledge of multiple stakeholders and involving local practitioners to implement natural flood management at a catchment-wide scale. Engagement from a range of stakeholders has been crucial to achieving this, with evidence presented indicating an increase in natural flood management uptake by landowners over the project's duration thus far. Furthermore, the natural flood management has produced lower costs and maintenance requirements than other forms of flood management. The research concludes that experiences of the project have largely been positive and natural flood management has contributed to a reduction in flooding within the catchment.

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1. Introduction

1.1 Background to flooding

Globally, flooding is the most frequent, widespread and experienced natural hazard and has caused greater economic damage and loss of life than any other natural disaster (Hill *et al.*, 2023; Wells *et al.*, 2020). Flooding is one of the UK's most prevalent natural hazards, often occurring at a fast pace with the potential to cause significant disruption, posing a risk to life during extreme events. Climate change is bringing about changes in rainfall and evapotranspiration patterns, leading to changes to river flow regimes, with potential for flooding events to occur at larger scales (Watts *et al.*, 2015). Flooding incidence across the UK has increased, accelerated by climate change and will continue to increase with temperature rise (Hannaford *et al.*, 2021). Future projections indicate an increase in the severity of fluvial flooding under warming scenarios, highlighting the need for effective flood management (Climate Change Committee, 2017).

Meanwhile, nature-based solutions are increasingly being adopted to address environmental challenges, offering dual societal and ecological benefits (Iacob *et al.*, 2014; Nesshöver *et al.*, 2017). An example that has emerged over recent decades, is natural flood management (NFM), which manages flood risk by implementing physical interventions with the aim of slowing the flow of water, using natural materials to imitate natural processes and control the sources and pathways of flood water, particularly processes that have been affected by human intervention (Dadson *et al.*, 2017; Lane, 2017). NFM has the primary objective of optimising the natural water retention processes within a river catchment to reduce the impact of surface runoff and reduce the flood peak (Kingsbury-Smith *et al.*, 2023). It is advocated for as a more sustainable option than traditional hard engineering approaches and builds on the principle that river flow can be managed at a catchment-scale, reducing flood inundation downstream (Lane, 2017). NFM interventions can take a range of forms, examples of which are outlined by Clarke and Short (2016). Although it is a growing form of management, NFM is not yet nationally extensive (Bark, Martin-Ortega and Waylen, 2021).

1.2 Flood defence to Flood risk management

NFM comes as part of the UK flood policy shift in the 1990s and 2000s from ‘flood defence’ towards ‘flood risk management’, which has also seen the distribution of management responsibilities (McEwen *et al.*, 2012). Emerging from this is a greater acknowledgement of soft engineering approaches, including NFM, with benefits including the lack of intrusion, biodiversity gains and lower costs (Short *et al.*, 2018). A seminal report in this shift was the Pitt Review of 2008, which highlighted the need to work with nature and emphasised the value of community-level emergency planning in response to major UK flooding during 2007 (Department for the Environment, Food and Rural Affairs, 2008).

The transition between the two approaches requires a paradigm shift from primarily technical solutions that move water as quickly as possible towards working with nature with greater stakeholder involvement (Bark, Martin-Ortega and Waylen, 2021). It is difficult to achieve such shifts, which need pre-existing practices of working and governance to change and implementing NFM involves collaborative working with multiple stakeholders (Ferreira *et al.*, 2020; Waylen, Blackstock and Holstead, 2015). Flood management during the 21st century has seen an increased recognition of the value of local knowledge and community-led adaptation (McEwen and Jones, 2012). Largely in response to severe flooding events, community action groups have formed and have been seen to raise the public profile of NFM (Garvey and Paavola, 2021).

This research will use a river catchment-based NFM project as a case study to contribute to understanding of social experiences of NFM implementation and identify the main challenges associated with such projects, focusing on social aspects, rather than the science of the interventions. A focus of this study is to explore the role of a community group, whilst also considering perspectives from a range of stakeholders who have been involved.

1.3 Aim

The aim of this research is to develop understanding of experiences and challenges of natural flood management projects as perceived by stakeholders, using a project on the River Isbourne catchment as a case study.

1.4 Objectives

1. Identify prominent themes and understanding within the current literature on NFM projects and stakeholder perspectives.
2. Conduct, record and analyse interviews with a range of stakeholders involved with the Isbourne NFM project.
3. Identify the key experiences and themes that emerge from the interviews and their significance amongst wider literature.

1.5 Structure of the Dissertation

This dissertation is divided into five chapters. The following chapter reviews the literature on social aspects of natural flood management projects and stakeholder perceptions. Chapter 3 outlines the data collection process, used to collect the findings which are presented and discussed in chapter 4. Key conclusions from the research are presented in chapter 5 to conclude the dissertation.

2. Literature Review

This literature review delves into social aspects and experiences of natural flood management (NFM) projects, with a focus on community-led initiatives and perspectives amongst different stakeholder groups. It addresses the first objective of the study, which is to identify prominent themes in the current literature on NFM projects. The main themes covered in this chapter are community involvement and the governance of natural flood management projects; experiences, attitudes and understanding of NFM, and differences in perception between different stakeholder groups.

2.1 NFM Governance and Community involvement

Garvey and Paavola (2021) define community flood groups (CFGs) as self-organising local actors that create a coordinated response to current or future flood risk. Whilst not always focused on NFM specifically, communities have been the driving force behind several flood management projects. Research on NFM and communities has been taking place for over 15 years, beginning with a study on community involvement in a Scottish Borders project (Howgate and Kenyon, 2009).

Mees *et al.*, (2018) have highlighted that policymakers are increasingly encouraging citizens to become part of natural flood management projects, including through involvement in community groups. CFGs have been seen to be part of the contribution to the paradigm shift outlined in chapter 1 towards the emergence of nature-based solutions (King *et al.*, 2023). Part of the transition from flood prevention to flood risk management, is an increasing focus on taking a catchment-based approach that involves collaboration between all stakeholders. These include both the communities and professionals within an area, and targeting a whole catchment has been identified as beneficial for engagement and coordinating NFM governance (Garvey and Paavola, 2021).

NFM governance is conceptualised by Wells *et al.* (2020) as operating as a social-ecological system, within which biological and social components interact. NFM is complex, requiring contributions from a range of stakeholders and requires coordination and governance, operating more flexibly in ways that are not necessary for engineered solutions, which require input from government agencies and local

authorities. Historically, UK water management has been divided between specific organisations who have taken responsibility for individual components, whereas NFM governance is significantly more complex, requiring a larger number of professionals and organisations to work together (Wingfield *et al.*, 2019). Mees *et al.* (2018, p.330) refer to citizen co-production in flood risk governance, as being “complementary or substitutive to government action”, reflecting the enhanced importance that community action is considered to have. In practice this means that CFGs take on responsibilities that either replace or complement existing governance, such as implementation actions or financial decisions. Despite the downscaling of some flood risk management responsibility towards communities, this may not always be matched by a suitable transfer of resources (Thaler and Priest, 2014).

One community-driven NFM initiative is a project on the Stroud River Frome in Gloucestershire, in which the community was instrumental in the decision-making to adopt nature-based solutions and have maintained active involvement. The project took on a ‘co-management approach’ that used the expertise of multiple stakeholders to bring about benefits to social and natural capital, benefitting from community engagement and a place-based approach to management. Substantial social benefits have been achieved, including the inclusion of local knowledge and an increased awareness of the methods amongst stakeholders, which is considered key to the implementation of nature-based solutions, with the increase in knowledge seen as key to resilience (Carnelli, 2018; Short *et al.*, 2018).

An example of a project that gained funding from the Department for Environment, Food, and Rural Affairs (DEFRA) in response to the Pitt Review of 2008, is located in the Vale of Pickering (Nisbet *et al.*, 2015). Research by Garvey and Paavola (2021) on both this and a similar project in Calderdale, used interviews to explore the role of CFGs. Both projects stemmed from CFG formation and saw inclusion into NFM partnerships in which they were linked to wider institutional networks. They also benefitted from expertise and high levels of motivation to make a difference from within the communities, who were identified as the drivers of NFM. The study concluded that CFGs can be a valuable part of NFM governance, however the function and performance of groups are context-dependent, as their functionality depends on high levels of organisation and social capital.

Flood practitioners in a regional interview study suggested that community involvement is vital within NFM projects, as the management approaches often involve working with people's assets, outlining that communities have proactively approached flood risk agencies after severe flooding events (Keech, Clarke and Short, 2023). The value of local knowledge and experience, particularly regarding past flooding events can be considered highly important in understanding the flood processes involved and how to respond (McEwen and Jones, 2012). However, whilst community action can be a positive driving force for public good, and can have great potential in prompting institutional action to aid structural changes to flood-risk management approaches, there remains a fundamental need to involve a wide range of actors for NFM delivery (Garvey and Paavola, 2021; O'Donnell, Lamond and Thorne, 2018). In addition, flood professionals in a national study expressed concerns that communities may be over-confident or rely on NFM to entirely remove flood risk (Wells *et al.*, 2020).

2.2 Stakeholder Understanding of NFM

A barrier to uptake of NFM is a lack of confidence expressed by some stakeholders, due to limited understanding of NFM, concerns over its effectiveness and its recency as a concept (Howgate and Kenyon, 2009). NFM has been identified as an unfamiliar concept for communities and professionals to comprehend, particularly given the complexity of monitoring and legal obligations to adhere to, which make installations challenging (Keech, Clarke and Short, 2023). Understanding of NFM amongst landowners can be very variable, with some totally unfamiliar with the concept (King *et al.*, 2023).

A lack of shared understanding around NFM implementation and associated uncertainties was reported as a barrier to engagement amongst respondents in a national study on views of NFM from 118 environmental and water management stakeholders involved with NFM (Bark, Martin-Ortega and Waylen, 2021). The key challenges identified included balancing multiple interests and objectives, with one of the greatest concerns amongst respondents being a lack of understanding about the funding of schemes.

An interview study of flood management professionals identified that engagement with NFM can be limited by both professionals and communities finding it a

challenging concept to understand. Participants suggested that the scale at which NFM implementation needs to occur is unfamiliar, as typically flood management approaches have been distinctive between different areas within catchments. The biggest challenges identified were legislative issues such as the allocation of resources and funding (Keech, Clarke and Short, 2023). For many leading or engaged with flood risk management, NFM is deemed to be “outside of the comfort zone” according to Waylen *et al.* (2018, p. s1078), citing lack of depth of knowledge and expertise in NFM, particularly given many practitioners have backgrounds in engineering.

2.3 Stakeholder Attitudes and Perceptions of NFM

A frequently emerging theme is differences between stakeholder groups in their willingness to engage in NFM. Confidence in and support for NFM measures is typically higher amongst public sector and academic stakeholders over landowners and managers (Bark, Martin-Ortega and Waylen, 2021; Morris and Tippet, 2024).

In a study of flood management practitioners, no interviewees expressed overtly negative views on NFM but expressed doubt about prioritising it in schemes needing to control flood risks, a view reflected by landowners in another study (King *et al.*, 2023; Waylen *et al.*, 2018). Furthermore, flood practitioners emphasise that NFM does not always provide the same security against water as hard engineering (Wells *et al.*, 2020). In contrast, perceptions of NFM amongst the public are often positive, with key factors being the favourable appearance over hard engineering and biodiversity benefits brought by NFM (D’Souza, Johnson and Ives, 2021).

Landowners can often display limited engagement towards NFM, presenting a key challenge for flood management professionals to overcome in order to access suitable land (King *et al.*, 2023). For landowners, the type of land NFM is implemented on affects perceptions, as the loss of productive land could result in a loss of subsidies, demonstrating the importance of financial support to garner landowner interest (Holstead *et al.*, 2017; Rouillard *et al.*, 2015). Furthermore, financial opportunities are seen to increase interest amongst rural communities as a means of sustaining rural livelihoods in increasingly multifunctional landscapes (King and Bark, 2024). Within catchments, landowner attitudes can change over time as

often only the most supportive landowners are initially involved, growing to become extensive networks as projects develop (Short *et al.*, 2018).

A main point of contention and limiting factor for some is over the sharing of responsibility between stakeholders regarding implementation (Dadson *et al.*, 2017). In particular, there is contention around sources of funding and how management is paid for, with UK-wide survey findings suggesting that there is a consensus amongst flood professionals that costs should be shared across society (Bark, Martin-Ortega and Waylen, 2021). Other stakeholders have expressed a desire for shared responsibility between individuals, communities and government bodies, with particular concerns around difficulties of governance and working across multiple administrative boundaries (Holstead *et al.*, 2017; Wells *et al.*, 2020).

The aesthetics of NFM can be deemed important amongst some rural stakeholders, as attitudes in some locations are shaped by views around appearance. Landscape change can be perceived as a threat and there is a desire for NFM to fit within local aesthetics (King and Bark, 2024). Some farmers consider the visual appearance of NFM interventions as unsightly and an embarrassment (Holstead *et al.*, 2017). Stronger support for NFM can come from those representing environmental interests on the premise that it brings benefits to biodiversity (Keech, Clarke and Short, 2023).

Experience of flooding can also shape opinions. Whilst several NFM schemes have been driven by flooding events, it is common for those who have previously been flooded to have less favourable views of it as they associate hard engineering methods with guaranteed outcomes (Wells, 2019). In some cases, NFM interventions can risk flooding to farms and homes, given its implementation can involve trial and error (Howgate and Kenyon, 2009).

2.4 Summary and Current Literature

The key themes from this chapter are summarised in the summary matrix in table 1.

Table 1: Summary matrix of the key themes from the literature review.

Themes	Evidence
Community leadership	Communities have driven several flood management projects nationally, often in response to flood events, advocating for natural flood management and remaining actively involved with governance and implementation.
Complexity of governance	NFM projects typically see complex governance structures involving multiple stakeholder groups and the sharing of responsibility. Whilst responsibilities remain primarily with flood professionals and authorities, communities and landowners have roles of increased importance.
Sharing of responsibility	A key component of NFM governance is the sharing of responsibilities amongst a range of actors, including the community.
Variable understanding of NFM	As NFM is a relatively recent concept, levels of understanding vary, particularly amongst professionals and landowners, which can impede engagement.
Barriers to uptake	The mostly commonly cited challenges that present barriers to uptake are uncertainties around NFM interventions, governance and funding.
Landowner engagement	Engagement with landowners is important for accessing land. Landowners are often reluctant to engage, sometimes expressing negative attitudes towards NFM, however financial opportunities and knowledge sharing can increase their engagement.
Social benefits of NFM	Social benefits of projects include the building of networks amongst catchments and contributions from local communities in projects that impact their livelihoods and local areas.

Within the current literature, there is variation in the depth of research on different UK NFM projects. There is greater understanding of challenges of implementation at the start of projects rather than the long-term impacts and experiences as perceived by stakeholders. Meanwhile, much of the literature on NFM understanding and uptake is several years old and issues around lack of knowledge around NFM amongst landowners are likely to have evolved.

Although several studies explore attitudes and perceptions of NFM from a range of stakeholders, there is relatively little literature discussing experiences of project development, particularly studying extended periods of time, whilst capturing the wider social benefits of projects can be lost in conventional analysis approaches (Short *et al.*, 2018). Within the literature, there is a lack of systematic comparison between different stakeholder groups and addressing this gap may draw insight into how different actors perceive NFM and its implementation (Morris and Tippet, 2024). Community involvement with NFM has been historically under-researched, and literature addressing social aspects of NFM remains limited (Garvey and Paavola, 2021).

Although the natural flood management project on the River Isbourne has now been taking place for over a decade, research is yet to be conducted into perspectives of the project from stakeholders involved. This study builds on a scoping report from the project's outset by Clarke and Short (2016), identifying progress and effectiveness of the project after a decade, and contributes to NFM understanding by considering the project as a whole and lessons that can be learnt and applied elsewhere from its development and implementation.

3. Methods

This chapter outlines the suitability and efficacy of the methods chosen for the data collection process and the sampling strategy used, outlining the approach used to meet the second objective of this study, which is to conduct, record and analyse interviews with a range of stakeholders involved with the Isbourne project. The methods used for data analysis are also discussed, as well as providing a comparison to other potential methods that could have been used.

3.1 Study Location

The project being studied is located within the catchment of the River Isbourne, situated within Gloucestershire and Worcestershire, at the northern edge of the Cotswolds, with a catchment area of 88km² (Clarke and Short, 2016).

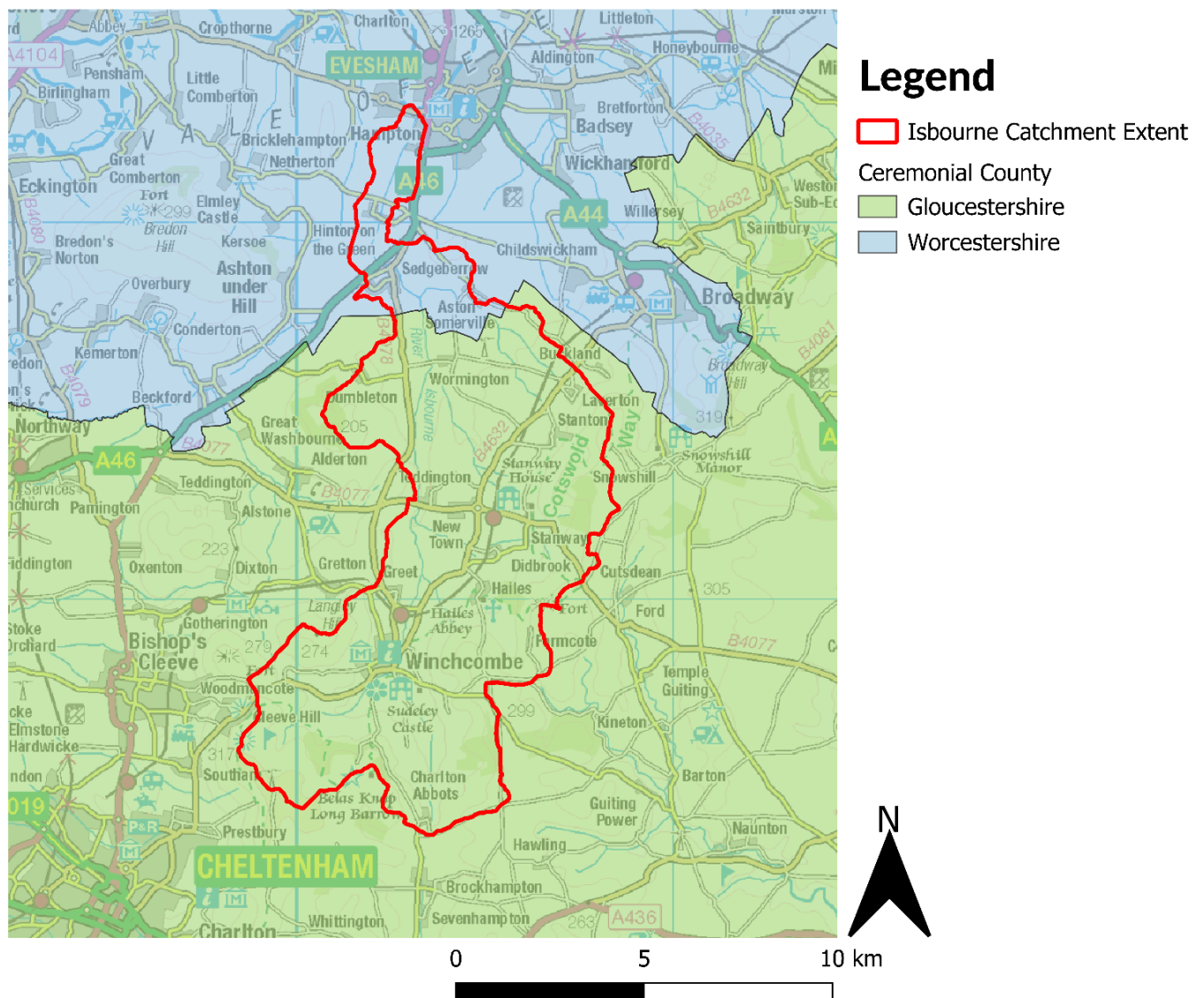


Figure 1: The two counties within which the Isbourne catchment falls.

The catchment area falls within two ceremonial counties and local authority districts, reflected by the boundaries shown in figure 1.

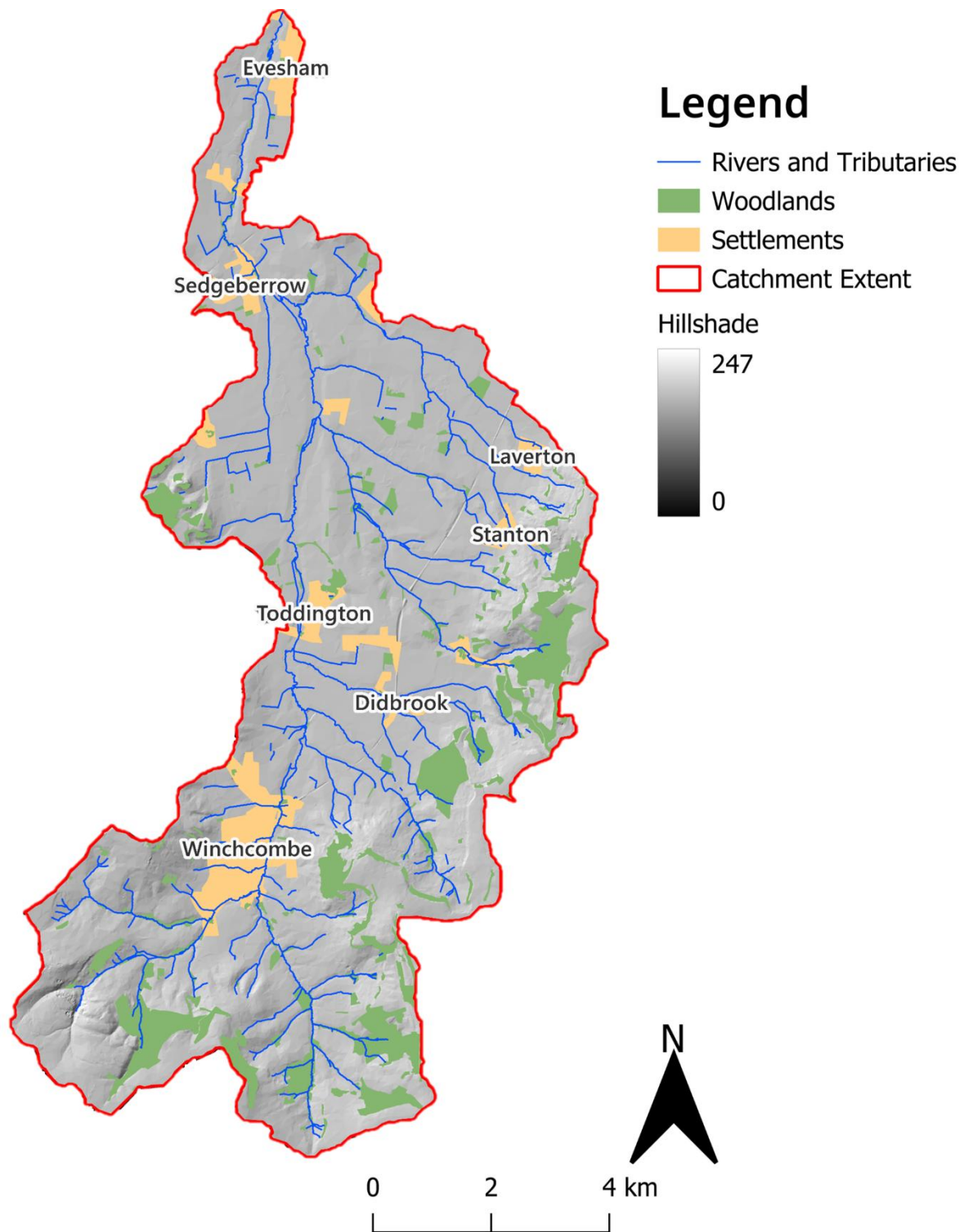


Figure 2: The watercourses and settlements within the catchment.

The river is 30.05km in length and uniquely northward flowing, with its sources located across the south of the catchment. The catchment is predominantly rural with its populations residing in villages, the largest of which is Winchcombe, as shown in

figure 2. The area is part of the Warwickshire Avon management catchment, which is a subset of the wider Severn River Basin (Clarke and Short, 2016).

3.2 Data Collection

The data used for this research is primary data collected by the researcher. Qualitative data was collected, given its ability to enhance understanding of topics and provide a greater depth of findings than quantitative methods (Queirós, Faria and Almeida, 2017).

In-depth semi-structured interviews were selected, as a suitable method for providing the means from which to understand perspectives on a particular topic and for understanding individual experiences of complex subjects (Osborne and Grant-Smith, 2021). They involve participants sharing their views through a conversation, in which the interviewer has specific research targets and were chosen due to the ability to pose open-ended questions, enabling a thorough examination of a participant's individual and independent thoughts (Adams, 2015; O'Reilly, 2025). Semi-structured interviews provide the means of filling in knowledge gaps, collecting a diversity of perspectives and enabling the participants to be more involved in the process, giving them the opportunity to benefit directly and shape the discussion (Dunn, 2016).

3.3 Comparison to other methods

Alternative methods considered were focus groups and questionnaires. Given the importance of understanding individual experiences for this research, focus groups were deemed unsuitable as they focus on providing collective views, which risks undermining understanding of independent viewpoints (Gill *et al.*, 2008). Additionally, focus groups require a larger number of participants and present the practical limitation of attempting to gather all participants in one location, which would have been challenging given many participant's busy schedules and geographic distribution (Guest *et al.*, 2017).

Interviews elicit more detail and have a greater consideration towards perspective and reasoning than quantitative questionnaires. They offer flexibility to adapt the conversation to themes that emerge from what the participant is saying, also allowing respondents a greater time in which to respond. A major drawback of

questionnaires in comparison is the lack of depth in response and requirement for a high number of responses, whilst the approach also risks loss of interest during survey completion (Adams and Cox, 2008). Unlike quantitative approaches that typically aim to survey representative samples of a wider population, in-depth qualitative interviews aim to explore the experiences and perceptions of individual participants regarding the focus of the investigation (Osborne and Grant-Smith, 2021). As the sample size for this research is relatively small, depth of response from each participant is of great importance.

3.4 Interview Process

All participants needed to have first-hand experience of the NFM project. To ensure this, purposive sampling was employed, where participants are chosen non-probabilistically, based on specific characteristics to yield the most useful information (Campbell *et al.*, 2020). Snowball sampling was used to further recruit participants who were recommended by interviewees. The former meant that the most important actor groups were represented, whilst the latter helped build understanding of the networks that exist between different stakeholder groups (Bryman, 2016). Whilst snowballing risks bias through shared experiences and reduces anonymity, the two sampling approaches are frequently combined and can enable access to difficult to reach populations (Parker, Scott and Geddes, 2019). Whilst convenient, this sampling strategy was primarily used to be able to ascertain individual experiences and build up a targeted understanding from those most involved. The approach is beneficial for research involving limited resources and small sample sizes (Palinkas *et al.*, 2015). Furthermore, the use of semi-structured interviews and this sampling strategy is an approach reflected across the literature on NFM projects (Garvey and Paavola, 2021; Holstead *et al.*, 2017; Waylen *et al.*, 2018).

Open questions allow for the participant to have greater potential to shape the interview, enabling them to address details they consider most important. A combination of primary (leading) and secondary (follow-up) questions were used and closed questions were generally avoided (Dunn, 2016). The in-depth interviews were structured using an interview guide, an example of which is included in Appendix 4. The guide listed an outline of topics to cover, reflecting the themes in table 1, with scope to allow the participants to shape the discussion, resulting in each interview

taking different directions with varying responses. The guide was adjusted during the research process based on topics that were discussed and emphasised by participants and was tailored to each individual's role (O'Reilly, 2025). As data collection and analysis were an overlapping and iterative process, themes that emerged from analysis of the early interviews were integrated into later interviews (Waylen *et al.*, 2018). Interviews took place face-to-face or over Microsoft Teams and were consensually recorded and transcribed, lasting between 40 and 70 minutes.

There is potential for bias within responses, as participants may choose to focus on issues that are important to them, overemphasising certain topics and trying to divert the discussion. Within semi-structured interviews, the role of the researcher is key to get the interview on track if it loses focus (Dunn, 2016).

3.5 Analysis

The interviews were analysed using thematic analysis, grouping the key findings into themes identified by the researcher for comparison and interpretation. This method of analysis presents a flexible approach that is useful for examining perspectives from different stakeholders and provides a detailed and comprehensive understanding of the data (Nowell *et al.*, 2017).

Themes and patterns within the data were identified through the process of transcribing the interviews for familiarisation, thematic coding of the transcripts and the grouping and comparison of findings. Data analysis followed an inductive approach, as the themes were data-driven, which enabled the inclusion of new themes and issues emerging from the interviews, ensuring that the most important findings were reflected in the analysis without trying to fit the data to a pre-existing coding frame (Braun and Clarke, 2006). A process of open coding was followed, in which distinct themes were identified from the data (Williams and Moser, 2019).

To ensure consistency in data analysis, specific codes were established and defined, which are outlined in Appendix 1. The coding was completed using primary codes for general themes that emerged and subcodes for specific topics within these broader themes. Coding was completed using Computer Aided Qualitative Data Analysis Software (NVivo 11), which grouped sections of text with the same code assigned,

from which the findings could be compared and analysed further. Illustrative quotations for each theme have been compiled and presented within the analysis as supporting evidence for the points made.

3.6 About the sample

A total of seven interviews were completed, with three community group members, two flood management professionals and two landowners, representing the three broad stakeholder groups involved in NFM implementation, for systematic diversity of response. For discussion of the findings, each participant has been assigned an anonymised code based on their role, as outlined in table 2.

Table 2: Participants included in the study.

Identifier	Description
CG1	Community group member/leader
CG2	Community group member/leader
CG3	Community group member/leader
FP1	Flood management professional
FP2	Flood management professional
LO1	Farmer/landowner
LO2	Resident/landowner

3.7 Positionality and Ethics

The researcher did not have any prior involvement with the project being researched or any similar. Although the topics discussed were not sensitive, it was important to establish a friendly and welcoming research atmosphere and keep an open mind to any topics that emerged that were not within the interview guide. Researchers have a significant role in the gathering and framing of interview data and must remain ethical and transparent when presenting interpretations (Shackleton *et al.*, 2021).

Ethical consideration was given to the study, with participants required to complete consent forms prior to the interview taking place, an example of which is included in Appendix 7. Confidentiality was retained in the interview scenarios and data presentation.

4. Findings and Discussion

This chapter addresses the third objective of the study, which is to identify the key experiences and themes that emerge from the interviews and their significance amongst wider literature. The key findings are presented and are grouped into different categories around the role of the community and the project's development, and the practical and social challenges of implementing NFM and understanding its effectiveness. The chapter concludes with a discussion of the wider significance of the findings and an evaluation of the strengths and weaknesses of this study.

4.1 Community involvement and Project development

The catchment has a background of flooding events, which was brought up by all participants, with many recalling regular flooding prior to the project's implementation. In response to a major flood in 2007, several village flood groups formed and later merged to create a singular Isbourne Catchment Group. Advocacy for NFM was driven by knowledge from community group members, who recalled contacting professionals and hosting meetings with groups of stakeholders, culminating in a study completed by Clarke and Short (2016), which was part-funded by the community and was instrumental in determining that NFM could be effectively implemented in the Isbourne catchment area. The conclusions from it led to the winning of funding from the Department for the Environment, Food and Rural Affairs (DEFRA) for a three-year pilot project, which has since been expanded, with the project now into a further funding cycle. The existence of an established community flood group had legislative importance, enabling the funding, which was directed at NFM schemes with demonstrable community group involvement, to be accessed:

“There had to be a demonstration that the community were involved. They identified us as a community group and as luck would have it, there was certainly some funding available for flood interventions” (CG2).

Community group members who participated in this study suggested that the group's existence was of particular importance in reaching this funding given they do not consider the Isbourne a major catchment, suggesting it would not have been targeted otherwise. Participants also outlined the value of consistency in funding for

enabling continuous financial support, stating that presently there are over 170 interventions in place as a result.

The pilot project aimed to test how well NFM and water management practices would be received amongst stakeholders, particularly given the contrast to traditional management approaches:

“Historically farmers have been told to get water off their land as quickly as possible, so we were trying to change the way that farmers have been working for years” (FP2).

The changes in practice this participant mentions reflects the paradigm shift in flood management approaches towards flood risk management and slowing the flow of water.

Participants outlined that NFM design on the River Isbourne was initially informed by two other UK projects that successfully implemented community-driven NFM interventions in Stroud and Pickering, detailed by Short *et al.*, (2018) and Garvey and Paavola (2021). Community group members had been closely following the former and considered lessons learnt from it to be applicable to the Isbourne, particularly given hard engineering possibilities were limited due to the catchment's geographical characteristics.

Both community group members and flood management professionals highlighted that the role of the community as an intermediary led to some interventions that may not have otherwise been possible: “Having the community involvement from the beginning, they just really helped bang the drum, so I wasn't going into cold calling” (FP2). Having the connections with landowners this participant outlined was identified as a major benefit of having a coordinated group and enabled softer introductions to NFM. Community group members stated that they have maintained significant involvement for the majority of the project's duration, with their input only reducing more recently.

It has also emerged that landowners not affiliated with the community group also came to NFM of their own accord in response to the 2007 flooding and contacted local authorities for implementation on their land. LO2 pointed out that although the work done on their land was part of the catchment project, they had no direct contact

with the community group, which suggests that the introduction of NFM cannot be wholly attributed to the community group.

4.2 Implementing Natural Flood Management

NFM is deemed to have benefits over hard engineering, such as relatively low costs, which have enabled it to be widely implemented:

“With NFM you can do something of negligible cost compared to putting in a traditional properly hard-engineered flood defence structure ... And the fact it is so relatively cheap, you can often get the landowners to pay for it ... Cost-wise it’s brilliant” (FP1).

As this participant suggested, low costs have been of great importance for the project’s development, particularly in accessing funding and convincing stakeholders. Community group members highlighted that costs appear especially low compared to the damages incurred from flooding events:

“You’re looking at £200,000 as the minimum claim [from 2007 flood] ... we’ve only spent probably somewhere in the region of £150,000 and that’s including a lot of project officer time” (CG2).

Whether these costs are truly comparable is debatable given the lack of specific evidence regarding the success of NFM and unknown lifetime costs, however the consensus amongst participants is that overall costs have been lower.

The contrast in approach that NFM brings compared to hard engineering methods means adhering to legislation such as the *Land Drainage Act 1991* was identified as a challenge by flood professionals:

“Section 23 states that anyone who owns a watercourse has a responsibility to maintain the flow in the water course, which of course is contradictory to what we’re trying to do in natural flood management” (FP1).

Despite this change in approach and some financial costs associated with work that impedes watercourses, no participants identified the requirement to meet legislation as overly challenging or detrimental to the project’s implementation.

Participants suggested that NFM implementation has occasionally been challenging in practice, owing to the physical processes involved, sometimes requiring

experimentation. As explicit results regarding the effectiveness of NFM cannot be reached, participants identified that knowing whether the most effective approach has been taken has proven a challenge: “It is a bit trial and error” (FP2). This view was reflected by landowners, as LO2 recounted that not all interventions that were installed had the desired effects initially and have required adjustment.

4.3 Working with other stakeholders

Implementation of the interventions involved the community, local councils, statutory bodies, advisory agencies and landowners all working together. A challenge identified by respondents to this study in relation to developing the project and implementing NFM was coordinating with multiple stakeholders. Members of the community group reported that one of the greatest obstacles to overcome was the location of the catchment over two county boundaries and multiple parishes, suggesting that responses from local authorities may have been out of phase during the project’s inception:

“We had a lot of difficulty getting [local authorities] to kind of sing off the same song sheet ... It was really interesting at the start that [one authority] were much more up for it than [the other] and took the lead” (CG1).

However, the flood management professionals who participated in this study offered a slightly different perspective, suggesting that a coordinated response across boundaries has been straightforward to achieve:

“It’s not a problem working between the local authorities. We both want the same thing for our own districts. Political boundaries don’t follow catchment boundaries and so you need to be able to work across borders in that respect” (FP1).

In general, participants were keen to emphasise that all actors involved were both straightforward and important to work with, particularly given the complexities of working with many different groups.

Another challenge reported by respondents was that the number of flood management professionals involved has varied over time and sometimes been very few, leading to a lot of responsibility falling under few individuals’ remit. The flood management professionals identified the time needed for site visits and attention

across the whole catchment as being demanding and labour intensive. Additionally, the involvement of some government agencies and advisory organisations was dependent on the knowledge levels and interests of key individuals within them, many of whom have moved onto other posts and are no longer involved in the project, without direct replacement.

Whilst both landowners in this study outlined that they were enthusiastic from the start, engaging landowners was identified by several stakeholders as the biggest challenge faced:

“The biggest obstruction we get to natural flood management is it is dependent on landowners and getting [their] agreement ... A lot of what we do has ultimately been based on opportunity rather than whether it’s really the best place to do it” (FP1).

Several participants highlighted resistance from landowners owing to the recency of NFM as a concept and their preference to carry out works using familiar methods. Gaining landowner involvement has been a gradual process, aided by the initial enthusiasm of a few key landowners who were interested in NFM and policy shifts towards implementing nature-based solutions that have increased funding opportunities:

“We’ve had some landowners who have now come to us rather than us go to them ... I think the more you do it within a catchment and the more heavy rain there is, then it just inspires more people to get involved” (FP2).

This view was reflected most strongly by flood management professionals, whose work has benefitted from access to a couple of large estates in the area, enabling a catchment-wide series of interventions to be put in place.

The involvement of local contractors who have good spatial understanding of the catchment for implementing interventions has been seen by all participants to have been beneficial for building trust amongst landowners:

“One of the things we wanted to establish from the beginning is that we wanted it to be community led. We wanted the contractors to be from the community” (FP2).

The approach outlined by this participant was viewed favourably by landowners in this study, who were positive when discussing the contractors undertaking the work, citing their understanding of the land involved. The inclusion of local contractors is likely to have had social and economic benefits to the area and local knowledge has been seen to be crucial to encouraging collective action in similar projects (Short *et al.*, 2018).

4.4 Monitoring and Maintenance

The low levels of maintenance needed for NFM interventions and limited requirement for inspection by professionals have been identified by participants as strengths of NFM that have enabled it to be implemented at a range of locations: “Naturally, the idea really is that these things should really be left so that there shouldn’t be a maintenance element” (FP2). Additionally, the interventions have benefitted from having potential for adjustments in response to changing conditions, offering capacity for adaptability in the approach taken (Iacob *et al.*, 2014).

Participants outlined that the agreement between local authorities and landowners is that the landowners take responsibility for maintenance, but because NFM is designed to be self-maintaining, there should be few, if any responsibilities. LO2 expressed disappointment at the lack of ongoing maintenance, suggesting that undertaking the action needed was beyond their practical ability. Furthermore, LO1 suggested that a lack of maintenance to roads and ditches may be inhibiting the effectiveness of NFM interventions.

Community group members expressed concern that as the individuals involved change and active community involvement lessens, there is a risk of awareness and knowledge levels decreasing and of complacency in assuming that future flooding has been prevented:

“The thing that I think is the greatest challenge is that we become complacent. And when we do have a really bad storm, we may well discover that we haven’t done enough ... I suppose you could say people take it for granted until you have a crisis” (CG3).

The complacency this participant describes comes as with a high number of interventions now in place, they suggest that interest has declined amongst the

broader community, highlighting the importance of ensuring the community group remains active to ensure knowledge is retained.

A challenge identified for sustaining NFM in the catchment is that a lack of monitoring may lead to long-term deterioration and declining effectiveness of what has been put in place: “How are we making sure that it isn’t decaying slowly to a point where next time we have a lot heavier rain you’ll have serious problems again?” (CG3). This view was reported most strongly by community group members, who have had the most direct experience of flooding. The lifetime of NFM interventions is relatively unknown and was brought into question by flood professionals in this study, underlining the need for long-term monitoring and assessment of the features (Keech, Clarke and Short, 2023). Although rain gauge data is collected within the catchment, there is no substantial monitoring scheme in place and some participants called for greater monitoring going forward (UK Government, 2026).

4.5 Effectiveness of NFM

Study participants outlined that no specific targets were set at the outset of the project. This means that the project outcomes cannot be compared to any set objectives, however the opinions expressed by participants imply how successful they consider the project to have been thus far.

Participants attributed a lack of major flooding since 2007 to have been significantly influenced by NFM, with community group members particularly positive: “We haven’t flooded since and we are convinced that it is because of the number of interventions” (CG1). Landowners were also positive about the interventions, highlighting the lack of recent flooding events despite periods of record-breaking rainfall. Flood management professionals were glad that the community feel they are benefitting and also agreed that it is likely NFM has been positively impactful but expressed uncertainty regarding the extent of this, owing to the lack of definitive evidence:

“Their perception is that the reason it did that was because of the interventions that we’ve put in. Whether it is or not, I don’t know! But it’s nice to think that they really think it is making a difference and it’s helping” (FP2).

Furthermore, they were keen to point out that under extreme weather events similar to 2007, the interventions may not prevent flooding. The differences in certainty between different groups are likely due to the differing backgrounds and involvement with the project, with flood professionals often needing to provide quantifiable evidence (Dadson *et al.*, 2017).

Determining its success is also influenced by the range of variables involved in NFM, including long-term weather patterns. The nature of the interventions in place makes accurately quantifying water attenuation levels difficult: “The biggest challenge, as we’ve all found, is it’s almost impossible to measure what’s actually retained” (CG2). This uncertainty was further reflected by landowners: “I know it’s holding water back a certain amount, but how much difference it’s making, I have no idea really” (LO1). Despite the lack of definitive evidence, all participants agreed that NFM has been beneficial in reducing flooding in the catchment.

4.6 Discussion

The findings from this study indicate that there are many positive components of the Isbourne project that may be reflected across similar projects.

The initial community leadership and advocacy for NFM at the project’s outset were fundamental in initiating the collective action to implement interventions. This was achieved through the community group’s ability to initiate and maintain a high level of self-organisation, which is an important attribute in bringing about meaningful change and has been influential in facilitating NFM and integrating several groups into a wider scheme (Thaler and Priest, 2014). Given its recency as a concept, awareness and understanding of nature-based solutions is of more importance for the implementation of NFM than hard engineering measures, and the project being community-initiated points to high levels of this amongst the local population (Anderson and Renaud, 2021).

Taking a connected, catchment-based approach has been beneficial to the project, with positive relationships between stakeholders outlined by participants as a key aspect of this. Short *et al.* (2018) argue that management approaches that incorporate the expertise of an array of stakeholders are fundamental in successful

projects of this type, demonstrating the importance of integrated working between stakeholders.

Landowner reluctance to NFM is reflected widely amongst the literature, for example Holstead *et al.* (2017) found in a regional study that landowners are the least convinced about NFM of any of the stakeholder groups and may oppose its implementation. This was reflected in the Isbourne catchment during the early phases of the project's development, but has gradually reduced, with landowners' engagement increasing over the course of the project's lifetime so far, which many participants were keen to emphasise. This can be attributed to the availability of funding during the project from several sources, meaning that stakeholders have not had to cover many costs, while landowners also suggested that NFM interventions within the catchment have not been on prime farming land. The responsibility has also been shared between landowners, the community and professional bodies, addressing common concerns for landowners found by Wells *et al.* (2020).

The challenge of monitoring complexity is commonly recognised amongst flood management practitioners regionally, especially considering the particularities of monitoring methodology (Keech, Clarke and Short, 2023). Given the number of variables involved and challenges of quantifying water attenuation, gauging the effectiveness of NFM is a weakness of the approach, which most participants identified.

A key finding from this study is unanimity in the perception that NFM has been beneficial, including amongst those who have previously experienced local flooding. In particular, the perceived value of NFM amongst the community was very striking. Flood management professionals showed agreement that it has had a positive impact on reducing flood risk but were less certain as to the extent. This aligns with previous research that has found that community members with active engagement in NFM projects can show a higher level of confidence than the public or other stakeholder groups (Morris and Tippet, 2024). This study shows active engagement of flood professionals, contrasting with literature suggesting that NFM is outside of their comfort zone, suggesting that knowledge of NFM has become commonplace (Waylen *et al.*, 2018). A key challenge highlighted by flood management professionals more widely for implementing NFM, is overcoming legal obligations

and restrictions, although participants suggested that these were relatively straightforward to overcome on the Isbourne (Keech, Clarke and Short, 2023).

Some participants have drawn attention to other benefits from NFM, such as improvements to water quality and biodiversity gains. Whilst these are outside the focus of this study, they demonstrate potential for NFM as a force for good in delivering wider benefits to rural areas.

4.7 Evaluation

One of the strengths of this research is the range of participants involved, meaning that although the sample size is small, a variety of perspectives have been represented. As many of the participants played proactive roles in the project, there is potential for the viewpoints expressed to be overly positive towards NFM.

A limitation of this research is that many individuals who were involved with the project at many stages are no longer in their positions, having retired or moved onto new roles, meaning they were not contactable for interviews. CG2 noted that throughout the project's duration, the community group representatives were consistent, whereas the practitioners have changed. Participants outlined the wide range of actors involved and a greater range of perspectives could have been reached with further interviews with more flood management professionals.

Some participants involvement emerged midway during the project, meaning they only have experience of more recent developments. As the community was involved from the beginning, findings from early in the project's development may reflect their perspectives more strongly, particularly regarding the involvement of professionals, without the balance from other stakeholders. Meanwhile, both landowners who were interviewed were keen on NFM from the outset of their involvement and a greater understanding of attitudes and experiences could have been gained had interviews taken place with initially reluctant landowners.

Some of the success of the NFM project can be attributed to the community group, who were highly involved in the community and had influential contacts, which helped progress the project. This is unlikely to be the case for all potential project locations and therefore may limit the applicability of findings. This reflects findings from Garvey and Paavola (2021), that those involved in community groups are often

already involved in the community and have understanding of flood management. Further analysis could be undertaken looking at perceptions amongst residents who have not been involved with the project, however this is beyond the scope of this research.

5. Conclusion

The aim of this research was to develop understanding of experiences and challenges of natural flood management projects as perceived by stakeholders, using a project on the River Isbourne catchment as a case study. Much of the literature on social aspects of NFM is made up of single actor studies or considers short timespans of only a few years, whereas this research explored the project's development over a decade with perspectives from a wide range of actors. Several key themes have emerged through the interviewing and analysis processes and whilst the findings are specific to the Isbourne catchment, many resonate with existing literature and may be reflected in similar flood management projects.

Overall, the findings suggest that experiences of the project have been largely positive, and all participants believed that NFM has effectively contributed to a reduction in flooding incidence. Whilst different stakeholders approach this from different backgrounds, the unanimity in perception suggests that the interventions have been successful in reducing flood risk and slowing the flow. It also implies that the project has thus far been successful in achieving its general goal of reducing flooding. The lack of quantifiable evidence was highlighted by flood management professionals and remains a limiting factor in conclusively determining the impact of the interventions.

The community was vital in bringing NFM to the area, forming a dedicated catchment group, which demonstrated extensive knowledge of NFM and high levels of organisation that contributed to the winning of funding. They proactively contacted authorities and landowners to initiate the discussions around NFM, and their connections with other stakeholders have enabled the implementation of interventions in locations that may not otherwise have been possible. Their role has been of particular significance, given that the catchment is small and had not received any prior attention for implementing NFM.

The governance approach, in which responsibilities have been shared between stakeholders has been fundamental in enabling the project's success. It can be considered a strong example of 'collective action', where the community, landowners and professionals have all been involved with the implementation of interventions, providing expertise. Participation from a range of stakeholders has enabled wide-

scale implementation of interventions within the catchment through the social networks and positive relationships that exist between different groups. However, the project has been susceptible to variable involvement from authorities and agencies over time. Community group members cited this as being where their role is essential, in ensuring the project continues and that sufficient maintenance is sustained, expressing concerns over the risks of complacency.

Landowner engagement has been crucial in achieving catchment-wide interventions and has increased over the project's duration, with the project benefitting from the promotion of NFM by landowners who were early adopters. Positive relationships between stakeholders and the introduction of funding have been of particular importance for engaging landowners, many of whom were initially reluctant to engage with NFM. This suggests that attitudes amongst those initially reluctant can change over the duration of a project, particularly when presented with demonstrable evidence of NFM's effectiveness. In addition, the decision to work with local contractors, has helped to build trust with landowners, whilst also providing some economic and social benefits to the local area.

The limited requirement for maintenance of NFM interventions has enabled a large number to be implemented. Given the large number of responsibilities faced by project officers, it presents a practical benefit that allows a small number of professionals in the area to work with a large number of interventions. In addition, the low costs of NFM interventions have enabled widescale implementation, comparing favourably to those associated with hard engineering methods or the damages from past flooding events.

The conclusions identified have come from a small study sample and could be strengthened with further interviews with a greater number of actors who have been involved. To further this study, there is potential for further long-term research on NFM, firstly to explore how the effectiveness of what is still a concept in its infancy proves over time and to further compare the roles played by different stakeholders in similar projects, particularly considering projects in their entirety.

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Appendices

Appendix 1: Codebook

The codes used in the coding process are presented below. Primary codes are presented in **bold**; subcodes are indented.

Catchment Group: Anything in which the catchment group is explicitly mentioned or involved.

Community Opinions: Where opinions of the project are expressed by community group members or the wider community.

Community Leadership: Examples of leadership or advocacy from the community.

Comparison to hard engineering: Points made that compare NFM interventions or processes of implementation or governance to those involved with hard engineering.

Effectiveness of NFM: How effective NFM is perceived to have been in reducing flood risk by participants.

Monitoring: Where participants discuss the monitoring of NFM interventions, relating to their effectiveness.

Other benefits: Any other positive attributes of NFM highlighted by participants that are not flooding-related.

Landowner engagement: Points where involvement from landowners is discussed.

Local practitioners: The involvement of practitioners to undertake the physical implementation work from the local community.

Opinions: Views expressed by landowners as to the project, both directly and communicated by other participants.

Maintenance: Reference to work done to maintain interventions and agreements over this.

NFM Appearance: Points relating to the appearance of interventions.

NFM Context: Background to natural flood management in a wider context beyond this project.

Past flooding: When participants recall previous flooding events and their impact on the catchment.

Project development: Anything related to the development and progress of the project itself, focusing primarily on administrative and governance factors.

Challenges: Any challenges associated with the development and progress of the project.

Funding and costs: Anything relating to money, including sources of funding for the project and costs associated with putting interventions in place.

Working with other stakeholders: Participants outlining involvement and cooperation with other stakeholder groups.

Appendix 2: Sample of a coded transcript:

The codes used in this section are colour-coded and presented below:

Funding and costs

Landowner engagement

Effectiveness of NFM

Comparison to hard engineering methods

Working with other stakeholders

Interviewer: Obviously a reason why some people would favour it is the cost. So from your experience, how much of an impact does the cost have?

FP1: Well, the cost is a big one. I mean the last government would pushing for NFM because as I say, people like to see something happening. With NFM you can do something negligible cost compared to putting in a traditional properly hard engineered flood defence structure so yeah, you can immediately get on the ground. Start doing things local government, you know, councillors love it. They can. They can point to stuff and show it to happen. Everyone can say, look, we're doing things so. And the fact it is so relatively cheap, you can often get the land-owners to pay for it. It's their land. They're the ones managing it. Yeah, cost wise it's brilliant. As I say, I don't know if we can yet prove that it's beneficial from a flood management point of view. I suspect it is. As you know, the common-sense view of it that, you know trapping all those small amounts of water upstream slows the flow, gives greater opportunity for infiltration. Probability is it is doing something.

Interviewer: Yes.

FP1: Whether the magnitude of that thing it's doing is significant is more difficult to determine.

Interviewer: OK. Yes. And then on a similar line, how much has the role of subsidies played a factor? Firstly, I suppose, is this an area for which funding has been widely available? And if so, what does that look like?

FP1: Well, the Isbourne project got some funding. As I say it was, it was led by [another authority] and that was their problem. In terms of getting land-owners to get interested in it, there are various agricultural schemes that they can use. We used to call it set aside, I can't remember what they call it now, but you know they can put

the land that's being used for flood compensation into various schemes to justify them not farming it and making money out of farming.

And that's essential. That's often the driver, to getting them to, to be able to do that. Very often they'll say that they'd love to do it, but they can't afford to.

They can't afford to lose the farmland, and that's where you go and it's those subsidies that enable it. *(This section was coded under both Funding and costs and Landowner engagement).*

Interviewer: Yes, and is natural flood management an obvious solution for the Isbourne catchment area? Because obviously hard engineering has often been used for flood defences or flood management. So do you think natural flood management suits this area better?

FP1: I don't know that you could put in a hard engineered system there. Again, when I was working [on another project], we did an investigation into seeing what it would take to put in significant structures that would achieve anything realistic, and it required structures of such magnitude and so expensive that the plan was ditched.

Part of that experience is why I question, you know, what real significance the NFM is actually having. But on the other hand, there's not much else you can do.

Interviewer: Yes. OK.

FP1: If you look around, I mean Winchcombe is in an area of outstanding natural beauty. If we wanted to put a great big concrete structure across one of the major water courses and dam up behind it, it wouldn't go down very well. I don't think we'd be able to.

Interviewer: And then you, you've touched on the fact obviously that this is a project that has been led in partnership with [another authority]. So because the river falls across two counties, multiple authorities and multiple parishes, has that proven challenging at all, or has it been fairly straightforward to cooperate amongst all the different stakeholders?

FP1: Well, it's not a problem working between the local authorities. I now know Wendy quite well and we get on very well. We both want the same thing for our own districts and we know that we know how it works and it works very well.

Interviewer: Yes.

FP1: We've had bigger problems where we're crossing between catchments because this is on the Avon catchment, which is part of the Severn catchment. One of the districts of Gloucestershire, the Cotswolds, is basically in the Thames catchment. That's a very significantly different catchment. They don't all go to the

same place. And there's been a few issues about, you know, whether we're doing work which is causing water to cross catchments. But I'd say in this particular one, it's not been a problem. We've worked very well with [another authority], I think. Other parties involved we up at up at this end of the catchment. We haven't had any issues about working with things like internal drainage boards. I'm not sure if there's any further down the Isbourne. I know elsewhere it hasn't always worked very well with internal drainage boards. They tend to be relatively traditional in their view of how things should be managed.

Interviewer: OK.

Appendix 3: Metadata Tables

Original (raw) datasets:

Dataset / file name	Description	Where it is used	Raster or Vector	File type	Data source	Organisation	Date/Year	Original projection
OS_250k	Ordnance Survey 1:250,000 map of the catchment area.	Figure 1	Raster	.tiff	<i>Digimap</i>	Ordnance Survey	28 April 2025	BNG
OS_Open_Rivers	Rivers and tributaries within the catchment	Cover Image; Figure 2	Vector	.shp	<i>Digimap</i>	Ordnance Survey	April 2021	BNG
Woodland	Woodland within the catchment extent	Cover Image; Figure 2	Vector	.shp	Forestry Commission Open Data website	Forestry Commission	2025	BNG
Urban_areas	Urban areas within the catchment extent	Cover Image; Figure 2	Vector	.shp	<i>Digimap</i>	Ordnance Survey	2025	BNG
Isbourne_Catchment_extent	Outline of the River Isbourne catchment area	Cover Image; Figure 1; Figure 2	Vector	.shp	Water Framework Directive (WFD) River Water Body Catchments Cycle 3 Classification 2022 (Full Resolution) - data.gov.uk	UK Government	2022	BNG
County_boundaries	Boundaries of ceremonial county and local authority district areas	Figure 1	Vector	.shp	<i>Digimap</i>	Ordnance Survey	2025	BNG
SP04	DTM Terrain data		Vector	.asc	<i>Digimap</i>	Ordnance Survey	2025	BNG
SP03	DTM Terrain data		Vector	.asc	<i>Digimap</i>	Ordnance Survey	2025	BNG
SP02	DTM Terrain data		Vector	.asc	<i>Digimap</i>	Ordnance Survey	2025	BNG

SO92	DTM Terrain data		Vector	.asc	<i>Digimap</i>	Ordnance Survey	2025	BNG
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Generated (new) layers

File name	Description / Creation process	Where it is used	Raster or Vector	File type	Projection	Data set used to create this file (if applicable)
Hillshade_DTM5	Merging and processing of SP04, SP03, SP02 and SO92 to create a hillshade map	Figure 2	Raster	.tif	BNG (EPSG: 27700)	SP04, SP03, SP02 and SO92

Appendix 4: Example Interview Schedule

Used by the interviewer for each of the in-depth interviews.

What I am looking for overall:

- Perspectives on NFM after 10 years of discussions – has it been 'successful' so far?
- Perspectives specifically from those involved in managing land – whether at a project or site level.
- Seeking to analyse the extent to which NFM has had a positive impact and particularly how it may compare to what was intended.
- Overall perceptions and how they vary between stakeholders.

Begin with asking what people's connection and experience of the Isbourne is – what the level of involvement is.

- *"Please could you begin with describing your role and what your involvement with natural flood management on the River Isbourne has been?"*

How has the project evolved?

Factors behind choosing Natural Flood Management

- Appearance etc.

Have expectations been met?

- Ask clearly what early expectations were.
- Comparing what was expected and comparing to what has been delivered.

Challenges of implementing NFM on the Isbourne

- Reluctance amongst different groups around implementation.
- Engaging with external stakeholders
- Without making it personal, any differences between different groups about ideas around implementation.

If relevant, ask about experiences of flooding events both during and after implementation.

- Impact of NFM on those experiences both personally and within the community.

Any suggestions as to why landowners may have been encouraged to take up natural flood management?

Has NFM changed anything?

Whether NFM has had any wider or unexpected benefits?

How unanimous the perceptions of NFM are?

Level of community involvement and whether they were involved with the introduction of NFM.

- Key takeaways about the role of the community.

Effectiveness of natural flood management

- At a catchment or sub-catchment level.

End with asking for overall perceptions and what standout thoughts and ideas are.

- Also ask about future ideas/work still to be done.

Appendix 5: Participant Summary Document

This document is to inform potential participants of what is involved, the context behind it and how data will be used.

Who am I?

My name is Andrew Arkle and I am an undergraduate student at the University of Gloucestershire in the final year of my BA Geography degree.

Why am I contacting you?

I am conducting a dissertation research project looking at stakeholder perspectives of the impact of natural flood management on the River Isbourne and its catchment. I am looking to interview project and land managers with connections to the Isbourne catchment and land management within it.

What information am I looking for?

There are several themes I am looking to investigate:

- The effectiveness of the natural flood management on the River Isbourne.
- Whether the management has so far delivered what was expected of it.
- What the greatest challenges of its implementation have been.
- How perceptions may differ amongst stakeholders, with a focus on land and project managers.
- The role of the community in the flood management.

Interview details

- Online using Microsoft Teams or in-person
- 30-90 minutes

Benefits of participating

Findings from the research will be made available to the Isbourne Catchment Group and CCRI. This information may be of use to inform any future discussions or decision-making for which it is deemed relevant.

What I will do with information I receive

All information gathered will be stored securely on the University of Gloucestershire systems and will be kept until the conclusion of the research project (April 2026). A copy of the University of Gloucestershire Research Privacy Notice will be given to participants, giving more details of how data will be kept and used. The dissertation supervisor has given ethical approval for this research to take

place. Interviews will be recorded and transcribed, and a thematic analysis will be conducted to identify prominent and emerging themes from the discussions. Should you agree to participate, you will be provided with a participant information sheet detailing what is involved and will be asked to complete a participant consent form. You will have the ability to withdraw from the research whilst the data is being collected and up to three weeks afterwards.

Kind regards,

Andrew Arkle, s4307520@glos.ac.uk

University of Gloucestershire

Appendix 6: Participant Information Sheet

Sent to participants prior to interviews to inform them of the research and interview process.

Date: 02/02/26

Title of research project: Exploring experiences of a natural flood management project on the River Isbourne from stakeholder perspectives.

What is this project and who is the researcher?

This is a project aiming to explore experiences and perspectives of the natural flood management within the Isbourne catchment. The research is being conducted by Andrew Arkle, an undergraduate geography student completing a dissertation on this topic.

What am I expected to do?

Take part in an online interview that will last about 30-60 minutes.

Do I have to take part?

Participants do not have to take part and can withdraw at any point whilst the data is being collected. Participants can withdraw up to three weeks after they have given data, as after this time it would be difficult to extract their data from the analysis. Participants can withdraw by contacting the researcher using the contact details provided.

Will I be identified in the project?

No, all participant data will be anonymised for the purposes of the research, meaning that participants will not be identifiable. Any relevant personal details that are taken will not be used outside of the project.

What are the benefits of taking part?

The findings of the dissertation will be shared with the Isbourne Catchment Group and CCRI, meaning the research may be able to be used to inform any future discussions or decision making for which it is relevant.

What are the risks of taking part?

Topics around flooding could be emotive, especially for anyone with past experience of it.

What do I need to do next?

If you agree to take part, you will need to fill out a participant consent form and agree to a time for an interview to take place.

Will my data be kept secure?

Data will be kept securely on the University systems and will be kept until the conclusion of the project (April 2026). A copy of the University of Gloucestershire Research Privacy Notice will be given to participants which gives more detail on how data will be kept and used.

What if I have questions?

You will be able to contact either myself (s4307520@glos.ac.uk) or my supervisor Professor Kenny Lynch (klynch@glos.ac.uk), who has given this research ethical approval, with any questions.

Kind Regards,

Andrew Arkle, s4307520@glos.ac.uk

University of Gloucestershire

Appendix 7: Participant Consent Form

Project Title: Exploring experiences of a natural flood management project on the River Isbourne from stakeholder perspectives.

I agree to participate in a research project led by Andrew Arkle, an undergraduate student at the University of Gloucestershire. The purpose of this document is to specify the terms of my participation.

	Participant Initials
1. I confirm that I have been given an information sheet dated 14/10/25 that outlines why the project is taking place, what its main aims are and what my participation in it involves.	
2. I have been given the opportunity to ask questions about the project and my role in it.	
3. I understand my participation within this research project involves taking part in an interview and answering a series of questions via Microsoft Teams which will take place on the date agreed by both parties. I consent to the interview being recorded and transcribed.	
4. I understand that my participation within this project is voluntary. I understand I can withdraw at any point whilst the data is being collected and up to three weeks afterwards. I understand that after this point the data may already be analysed and submitted for assessment as part of a dissertation.	
5. I understand that the information I provide will be anonymised to protect my identity and that my data will be kept securely in accordance with current data protection legislation.	
6. I understand that relevant personal details will be taken but not shared outside the project.	
7. I understand that data I provide will be used for the dissertation, but I will not be identifiable in this.	
8. I confirm I have been given a copy of the University of Gloucestershire Research Privacy Notice.	

Name of participant

Date

Signature of participant

Name of researcher

Date

Signature of researcher

(N.B. two copies should be signed – one for the participant and one for the researcher)

Appendix 8: Meeting Record Forms

SCHOOL OF NATURAL AND SOCIAL SCIENCES



Tutor/Student Meeting Record

STUDENT NAME: Andrew Arkle
NS6334

STUDENT NUMBER: s4307520

MODULE CODE:

TUTOR: Kenny Lynch

DATE: 25/02/2025

Summary of meeting:

(To include reason for meeting, summary of progress since last meeting, comments in relation to progress from tutor, agreed targets for action undertaken by student, and possibly tutor, prior to next meeting.)

Progress

- Set out and discussed broad area of topic interests.
- Discussed potential methods and the logistics and constraints of each.

Discussion

The meeting was focused on developing topic ideas, methods involved and sources of information.

- The dissertation topic could relate to something of interest careers-wise. There could be direct links between the topic chosen and the area of interest.
- Methods chosen for the dissertation could relate to potential employers.
- Each method requires thorough planning and preparation, regarding the target audience and size of the dataset.
- Considerations for potential secondary data analysis through content analysis or R analysis.
- The literature review and methods sections should be completed first and could be completed over the summer.

Target

For the next meeting, review the discussion points and spend some time developing topic ideas further, with a view to the methods that may be used.

DATE OF NEXT MEETING: 19/03/2025

Tutor/Student Meeting Record

STUDENT NAME: Andrew Arkle
NS6334

STUDENT NUMBER: s4307520

MODULE CODE:

TUTOR: Kenny Lynch

DATE: 21/03/25

Summary of meeting:

(To include reason for meeting, summary of progress since last meeting, comments in relation to progress from tutor, agreed targets for action undertaken by student, and possibly tutor, prior to next meeting.)

Progress

The meeting was held to further develop ideas and clarify a few aspects of the assignment.

Since the last meeting I have developed the topic ideas.

A meeting with Chris Short from CCRI has opened up some new avenues to take the dissertation in, including use of any relevant data and a potential project around flood management on the River Isbourne.

Perceptions of climate policy was decided as the topic for the proposal, although other topics will be researched beyond the proposal submission.

Discussion

Several considered pathways for the dissertation – methods and particular challenges were discussed and identified.

Highlighted the benefits of considering a topic around future career ambitions – both in terms of skills (research methods) and interests.

Basing survey questions around existing academic research, particularly around any surveys done by polling companies.

Discussed aspects of the poster presentation – thinking of it as a pitch and highlighting the most important aspects, including purpose.

Ethics of the proposed topic were also discussed.

Target

To complete a high-quality poster proposal for assignment 1 of the module.

After this has been completed, to focus on research for potential other topics to identify a definite topic by the end of the semester.

DATE OF NEXT MEETING: TBC

Tutor/Student Meeting Record

STUDENT NAME: Andrew Arkle
NS6334

STUDENT NUMBER: s4307520

MODULE CODE:

TUTOR: Kenny Lynch

DATE: 15/05/25

Summary of meeting:

(To include reason for meeting, summary of progress since last meeting, comments in relation to progress from tutor, agreed targets for action undertaken by student, and possibly tutor, prior to next meeting.)

Progress

The meeting was held to clarify next steps regarding progress with the dissertation.

Discussion

Confirmation that the identified topic – looking into the effectiveness of the natural flood management scheme on the River Isbourne through the form of interviews – is suitable.

The factors involved that will require initial research:

Methods – primarily interview based, however with considerations. Software could be used for transcription and to extract quotes.

At some point, the topic ought to be framed in a particular direction in order to consider who the target interviewees are (landowners, residents etc).

Some practical issues need consideration such as access to the area, research ethics.

Considerations regarding the flood management scheme: confidence regarding rainfall types (past success does not guarantee future effectiveness); complacency regarding the effectiveness of the scheme; people's perceptions; evidence of effectiveness – how it is measured; geographical area (in particular considering council and legislative boundaries)

Ensure that literature review and methods are well thought through before any data is collected.

This investigation helps to provide long-term understanding.

Target

During the summer, to complete a draft of the literature review and methodology sections. Approximately 2000 words for a literature review. 1200 for a methods draft.

DATE OF NEXT MEETING: TBC

Tutor/Student Meeting Record

STUDENT NAME: Andrew Arkle
NS6334

STUDENT NUMBER: s4307520

MODULE CODE:

TUTOR: Kenny Lynch

DATE: 16/09/25

Summary of meeting:

Progress

Since the last meeting, whilst still largely in note form, substantial progress has been made on the literature review and methods sections, with a range of sources found and explored, particularly general sources for interviewing, location-relevant context and background and some research into examples of natural flood management.

Discussion

The structure of the dissertation: The dissertation will begin with an introduction to introduce context and the aims and objectives of the research. The literature review should primarily discuss ideas and theories, and this can include other examples of sites with similar management that may be relevant to Sedgeberrow. Methods may include case studies of other sites.

The literature review should review other sources of relevance and therefore gain understanding of how others have undertaken similar research and help provide understanding of the main issues in order to initiate thoughtful conversation when conducting interviews.

Interviews should be undertaken throughout the autumn. Drafts of the participant information forms should be completed soon.

Theoretical ideas should be separate from the case study information.

Results and discussion sections could potentially be the same, depending on how data collection goes and what findings are.

Document formatting – using styles and contents page tools demonstrated as well as discussing referencing tools.

Target

The next tasks are:

- Flesh out the literature review, with more examples of similar research.
- Consider case studies of other examples of management.
- Re-order existing content and formalise the structure.
- Contact Chris to discuss plans and arrange a meeting in good time.
- Plan data collection – complete the forms needed.

DATE OF NEXT MEETING: 30/09/25

Tutor/Student Meeting Record

STUDENT NAME: Andrew Arkle
NS6334

STUDENT NUMBER: s4307520

MODULE CODE:

TUTOR: Kenny Lynch

DATE: 30/09/25

Summary of meeting:

(To include reason for meeting, summary of progress since last meeting, comments in relation to progress from tutor, agreed targets for action undertaken by student, and possibly tutor, prior to next meeting.)

Progress

Since the last meeting, the targets set have largely been met.

A meeting with Chris Short is booked for 06/10/25. The literature review is more substantial with more relevant sources. Content has been re-ordered, including the development of an introduction section. Potential case studies to be included in the lit review/methods have been identified.

Discussion

Update on progress. Literature review well on track and significantly developed since the last meeting.

A literature gap has appeared around civilian experience of NFM and its success, which may lead to a topic focus more towards landowner/manager experience as this is an area with more extensive literature.

Going forward the key target is to identify who is most appropriate to interview, in consultation with Chris Short. Participant recruitment was discussed. In order to do this, some background information ought to be provided to participants, which may feature as an incentive to participate. Ideally a wide range of people would be interviewed. Snowball sampling may be useful but risks a specific type of person being interviewed. Contacting participants may be guided by Chris.

The methods section is something to pay more attention to over the coming weeks, especially regarding the recording and transcribing of interviews.

Target

The next tasks are:

- Flesh out the methods section, particularly focusing on recruitment strategy.
- Discuss topics including NFM engagement and recruitment strategy with Chris.
- Complete documents for participants.

DATE OF NEXT MEETING: 16/10/25

Tutor/Student Meeting Record

STUDENT NAME: Andrew Arkle
NS6334

STUDENT NUMBER: s4307520

MODULE CODE:

TUTOR: Kenny Lynch

DATE: 14/10/25

16/10/25

Summary of meeting:

(To include reason for meeting, summary of progress since last meeting, comments in relation to progress from tutor, agreed targets for action undertaken by student, and possibly tutor, prior to next meeting.)

Progress

Since the previous meeting, a discussion was had with Chris Short regarding the dissertation. Chris has subsequently reached out to several contacts. Relevant interviews forms have now been fully completed and reviewed, whilst further progress has also been made with the literature review and methods sections.

Discussion

The first discussion was an impromptu discussion as one there was urgency in fitting in an interview with one of the interview participants before she changed jobs. Forms were discussed and reviewed, including the participant summary sheet. Transcription was also discussed and was practiced within the Teams call.

The second meeting followed the first interview, which was reflected upon. It was a positive interview that offered some interesting and unexpected findings. Acquiring Nvivo from Student Centres was also discussed.

Target

The next tasks are:

- Continue the interviewing process by contacting more participants. The first interviewee has provided four more.
- Try to arrange interviews with those who were contacted by Chris Short and are willing to have a chat.
- A longer term goal is to ensure that analysis methods and considered and that suitable software is acquired.

DATE OF NEXT MEETING: TBC

Tutor/Student Meeting Record

STUDENT NAME: Andrew Arkle
NS6334

STUDENT NUMBER: s4307520

MODULE CODE:

TUTOR: Kenny Lynch

DATE: 03/11/2025

Summary of meeting:

(To include reason for meeting, summary of progress since last meeting, comments in relation to progress from tutor, agreed targets for action undertaken by student, and possibly tutor, prior to next meeting.)

Progress

Since the previous meeting, three more interviews have taken place, bringing the total up to four. Further progress with the literature review has been made. All three interviews have been transcribed.

Discussion

Issue from one of the interviews of the interviewee trying to steer the direction of the research towards resident experiences. It was discussed that an email would be sent explaining that the direction of the research had shifted towards project management experiences.

Referencing of documents given by contacts but are not publicly available.

The structure of the first sections of the dissertation were also discussed and library books around literature reviews were referred to.

Target

The next tasks are:

- Arrange at least two more interviews.
- Continue progress with the literature review and methods sections.

DATE OF NEXT MEETING: TBC

Tutor/Student Meeting Record

STUDENT NAME: Andrew Arkle
NS6334

STUDENT NUMBER: s4307520

MODULE CODE:

TUTOR: Kenny Lynch

DATE: 04/12/2025

Summary of meeting:

(To include reason for meeting, summary of progress since last meeting, comments in relation to progress from tutor, agreed targets for action undertaken by student, and possibly tutor, prior to next meeting.)

Progress

Since the previous meeting, one more interview has been conducted with a farmer, meaning at least one landowner perspective can be included in the results.

Discussion

Discussion around who else to interview – two people that have been contacted have not replied so are unlikely to be possible interviews. A further member of the catchment group and a resident/landowner are two possibilities for further interviews.

With the poster deadline being not so far off, poster contents were discussed. Images of natural flood management from the Farmcote visit can be included as well as a catchment GIS map.

Base poster design off of good examples displayed and from the previous poster assignment, in which I got a grade of 75.

Target

The next tasks are:

- Work on poster content: GIS map, preliminary results and background to the research
- Consider who the next interviewees may be so that they can take place as soon as possible in the new year.

DATE OF NEXT MEETING: TBC

Tutor/Student Meeting Record

STUDENT NAME: Andrew Arkle
NS6334

STUDENT NUMBER: s4307520

MODULE CODE:

TUTOR: Kenny Lynch

DATE: 23/01/26

Summary of meeting:

(To include reason for meeting, summary of progress since last meeting, comments in relation to progress from tutor, agreed targets for action undertaken by student, and possibly tutor, prior to next meeting.)

Progress

All 5 interviews conducted thus far have been transcribed with initial findings explored.
Methodology section has been progressed.
Dissertation poster was presented.

Discussion

Progress so far was discussed. Elements of the methodology section were discussed, with positionality identified as not being as important for this as for some dissertations. The methods section is to include information on the geography of the area.

For the draft chapter submission, a literature review and findings section that is based on other peer-reviewed literature will be submitted.

A findings section will integrate ideas and theories from both results and discussion. Explanation rather than just description will be critical. Analysis will also include people and the evolution of the catchment group.

Nvivo will be used for thematic analysis.

Target

To have full draft chapters completed by the deadline.

DATE OF NEXT MEETING: TBC

Tutor/Student Meeting Record

STUDENT NAME: Andrew Arkle
NS6334

STUDENT NUMBER: s4307520

MODULE CODE:

TUTOR: Kenny Lynch

DATE: 03/02/26

Summary of meeting:

(To include reason for meeting, summary of progress since last meeting, comments in relation to progress from tutor, agreed targets for action undertaken by student, and possibly tutor, prior to next meeting.)

Progress

Since the last meeting, transcripts from the 5 interviews so far have been coded using Nvivo.
Draft introduction, literature review and methodology sections are written up.

Discussion

Aspects of draft chapter submission (referencing/formatting) discussed.

Integration of social theory into the literature review – if possible to explore community response/participatory approaches.

The aim of the research should explain what the scope of the research is and how the study site is being used.

The objectives should be met by the literature review, findings and overall throughout the writeup.

Structuring the findings by themes, built up from nodes and using indicative quotations where appropriate.

Participants should be listed in a table.

When considering specific stakeholders/groups/organisations mentioned by interview participants, draw interpretation from this but don't use straightforward criticism.

Only focus on the specific phrasing of quotations if relevant.

Target

To have full draft chapters completed by the deadline.

DATE OF NEXT MEETING: TBC

Tutor/Student Meeting Record

STUDENT NAME: Andrew Arkle
NS6334

STUDENT NUMBER: s4307520

MODULE CODE:

TUTOR: Kenny Lynch

DATE: 18/02/26

Summary of meeting:

(To include reason for meeting, summary of progress since last meeting, comments in relation to progress from tutor, agreed targets for action undertaken by student, and possibly tutor, prior to next meeting.)

Progress

Since the last meeting, extensive progress with the writeup of the findings and literature review chapters have been made. The final interview was arranged.

Discussion

Using a naming system to anonymise each participant, ensuring that each is identifiable to the reader without giving away any personal information.

Quotations should be used only where value is added to the text. If they are three lines or longer, then indent as their own paragraph, otherwise integrate into the flow of the text.

The structure of the findings chapter should outline general points at the beginning and then build on them with findings from literature.

Findings that align with previous findings amongst the literature are of great importance as well as anything that is a standout/unique finding.

The aim and conclusion should link together. Each chapter should outline at the beginning how it addresses what is outlined in the introduction.

Objectives can be numbered and could be explicitly referred to.

Target

To have draft chapters completed by the deadline.

DATE OF NEXT MEETING: TBC

Tutor/Student Meeting Record

STUDENT NAME: Andrew Arkle
NS6334

STUDENT NUMBER: s4307520

MODULE CODE:

TUTOR: Kenny Lynch

DATE: 16/03/26

Summary of meeting:

(To include reason for meeting, summary of progress since last meeting, comments in relation to progress from tutor, agreed targets for action undertaken by student, and possibly tutor, prior to next meeting.)

Progress

Since the last meeting, the draft chapters were submitted and feedback has been provided.

Discussion

The draft chapters were written well and thoroughly, meaning an editing process is required rather than redrafting.

The findings section is currently very lengthy and could be separated into separate findings and discussion chapters. These two sections would have two distinct purposes. A discussion chapter would draw out the main findings, reemphasise the main conclusions and would include the evaluation of the study.

The conclusion section should outline what this research is contributing what the primary evidence enables the researcher to conclude. Evidence does not need to be restated, but it needs to be clear where it has come from.

The literature review could include a summary matrix. This would give a summary of the main themes from the text. Could be presented as a table, using 'themes' and 'evidence' as headings.

The objectives should be reiterated and referred to throughout the dissertation where they are relevant.

The use of quotations within the findings writeup should be judicious. Too many weakens their effect. They should be emphasised when used.

Local authorities referred to in quotes should be instead anonymised using parenthesis.

The appendices should include a codebook, supervision meeting reports, interview guide, personal information sheet and consent forms.

Target

To act on the draft chapter feedback and edit the relevant sections.

DATE OF NEXT MEETING: 27/03/26

Tutor/Student Meeting Record

STUDENT NAME: Andrew Arkle
NS6334

STUDENT NUMBER: s4307520

MODULE CODE:

TUTOR: Kenny Lynch

DATE: 27/03/26

Summary of meeting:

(To include reason for meeting, summary of progress since last meeting, comments in relation to progress from tutor, agreed targets for action undertaken by student, and possibly tutor, prior to next meeting.)

Progress

Since the last meeting, progress has been made to all chapters, including acting upon feedback from the draft submissions.

Discussion

The findings and discussion could be either linked or presented as separate chapters. To reduce the word count of these sections, consider only including evidence that emphasises the points being made. Anything that could be considered additional information beyond the scope of the report could be removed.

At the start of each chapter, there should be signposting to the aim, objectives and other sections where relevant. Introductions to subsections are not necessary.

The conclusion is more than just a summary of the key findings. It should reflect what is most important and significant from the findings. The implications of the findings are important, and added value should be highlighted. A few key conclusions should be made within this chapter.

It does not matter if there are more quotations from some participants more than others. Qualitative research can be strongly influenced by a small number of respondents.

An example of a coded transcript should be included in the appendix.

Within the introduction, it is important to outline the value in researching this particular catchment. This would be picked up on in the discussion.

Target

Submit the dissertation.

DATE OF NEXT MEETING: TBC