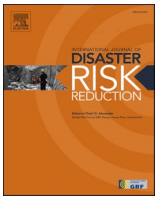
International Journal of Disaster Risk Reduction 118 (2025) 105266

Contents lists available at ScienceDirect

International Journal of Disaster Risk Reduction

journal homepage: www.elsevier.com/locate/ijdrr



Community resilience to flooding in the UK: A study of Matlock, Derbyshire

Ruth E. McKie [a,*], Adam Aitken [b]

[a] Criminology, De Montfort University, Leicester, United Kingdom
[b] Criminology, University of Salford, Manchester, United Kingdom

ARTICLE INFO

Keywords:
Community resilience
Community
Flooding
Matlock

ABSTRACT

The United Kingdom has faced recurring floods since 2019, with 5.2 million homes at risk. This has prompted the UK government to prioritise resilience planning in flood prone areas. This study focuses on community resilience in Matlock, Derbyshire, which has experienced intensified flooding since 2018. Using qualitative interviews and a focus group, the research examines evidence of community resilience and the barriers to its development by focusing on community activities during flooding incidents, if and how these were collective efforts and relationships, and what are the perceived challenges to community resilience building. Our findings revealed that residents of Matlock used local action groups and social media, community led warning systems and promotion and engagement in civic participation to foster and enhance community resilience. While bonding and bridging capital were critical to support community resilience building, there were significant barriers to linking social capital, such as the disconnect between community members and formal institutions (i.e. government organisations) that left participants disheartened and frustrated. In conclusion, the study argues that further fostering of linking social capital through policy recommendations and developments such as regular community, small grants for community initiatives and integrating local knowledge into policy frameworks will bridge the gap between communities and these external stakeholders. In doing so, activities that aim to enhance Matlock's flood resilience may inform broader strategies for place-based and devolved policies addressing environmental challenges in a wider context.

1. Introduction

Since 2019-20, the United Kingdom (UK) has experienced repeated yearly flood events, and the Environmental Agency reported that 5.2 million homes are now at risk from flooding and coastal erosion [1]. Accompanying more frequent extreme weather events is the expanding urbanisation of river catchment areas and the development of at-risk brownfield sites in the UK, increasing the geographical spread of flood risk and subsequently increasing exposure to more risk (e.g. Ref. [2]). Consequently, resilience planning in affected areas has become a political and policy priority.

Current thinking on resilience and resilient planning is diverse and complex, yet, at its most basic level, resilience and resilience planning refers to a system's ability to adapt and 'move on' from external shocks [3]. Furthermore, how resilience and resilient planning are operationalised can look very different, manifesting on the one hand, through top-down national and local authority-led

* Corresponding author.
E-mail addresses: ruth.mckie@dmu.ac.uk (R.E. McKie), a.aitken1@salford.ac.uk (A. Aitken).

https://doi.org/10.1016/j.ijdrr.2025.105266
Received 28 November 2024; Received in revised form 30 January 2025; Accepted 30 January 2025
Available online 31 January 2025

funded projects such as flood defence systems and emergency planning [4] and on the other, designed and led by communities themselves, as bottom-up community resilience building. With that said, the concept of community resilience itself is also diverse and notoriously difficult to measure, with no universal agreement on how it can be assessed [5].

Despite these conceptual and measurement challenges, community resilience is of focus here. This is because, there is an emphasis on resilience to flooding in the UK within policy, which means understanding what it is and how it manifests are a priority in policy (e.g. [6]). However, there are apparent gaps on community-led resilience building with the potential to facilitate community-level focused approaches in the UK (For exceptions see Ref. [7]). Therefore, looking closer at community resilience in a localised community setting (see also [8]) can enhance future policymaking on resilience building in the UK. Moreover, Carmen et al. [8], 1372) highlight that "there has been limited focus on the practical insights emerging from studies on social capital and community resilience … to actively enhance resilience across community settings." In other words, how does an exploration and understanding of social capital and the use of it help to enhance community resilience. Therefore, we also seek to fill this gap by exploring the specific role that social capital also plays in community resilience building.

This article contributes to the body of literature on community resilience in the UK, presenting the results of an empirical research project undertaken in the county town of Matlock in Derbyshire, UK, which has been subject to regular intensified flooding since 2018. An adaptive theory [9] approach to data collection and analysis was used to explore one overarching objective: *determine if and how community resilience exists in Matlock in response to flooding.* Within this overarching objective we had three sub-objectives.

1) What activities are undertaken by communities in respond to flooding incidents.
2) To what extent are these activities based on collective efforts determined by community relationships.
3) Identify perceived challenges to community resilience by community members.

Our objective and sub-objectives respond to and extend calls made to understand how community resilience operates in practice, given that participation of communities in responding to disasters can support better responses and abilities of the community to recover and adapt to subsequent changes [10]. Moreover, proposed by instruments such as Sendai Framework (2015–2023) calling for a more participatory relationship between communities and managing disasters means further investigation of how this may function and if and what the barriers are to this. Therefore, identifying what activities are undertaken by communities, how they are built and based on community relationships and what may be the challenges to this participation that attempts at community resilience building can contribute to this enlightenment.

The following section is a literature review centred on two core concepts*; community resilience, and social capital*. This review is then followed by our research method and context, describing more about the case study location, and in the paper's final section we offer a discussion to demonstrate if and how we met our objectives.

2. Literature review

2.1. Community emergency management and community resilience

To best understand community resilience in the context of this study, we must first identify the conditions in which community resilience can be created and/or embodied and applied in times of crisis. As such, we turn to how community emergency management to address this and help understand the context of community resilience building in response to, recovering from, and adapting following disasters.

Murphy [11], 297) describes community emergency management as the "planning, mitigation, and emergency preparedness" that takes place locally and is embedded in day-to-day activities and decision-making to minimise risks from extreme flood events. In community emergency management, how to effectively respond, recover and adapt from disasters can be separated into two categories based on how it manifests in the real world. Category One sees resilience built through planning measures designed and implemented through top-down state and local authority led funded projects. It prioritises the role of formal organisations such as local or national governments and individual households or private property owners in taking physical and financial planning to reduce the associated damages and costs of flooding. Examples of this may include flood defence systems, emergency planning, household designs, and property level management, such as raising electrical sockets and dry-lining walls within domestic and non-domestic buildings [4]. Notably, the operationalisation of top-down planning has dominated UK national and local level flood response strategies. For instance, the National Flood Emergency Framework for England provides a key series of guidance designed more specifically to support emergency planners and responders. It focuses on the feedback and information that can be sought from national bodies such as the Met Office, The Environment Agency, and Defra [12].

Category Two is a 'bottom up' approach that sees the role of and for communities acting against external threats. Importantly, research and governance practices have recognised that communities play a vital role in emergency planning and management particularly related to disasters (for an overview see Ref. [10]). This approach is characterised by mechanisms and approaches advised by those outside of an affected community, reflecting mechanisms advocated for by international institutions such as the UN most visible in the Hyogo Framework for Action of 2005–2015, and the Sendai Framework for Disaster Risk Reduction of 2015–2030. In its most basic sense, this strategy involves a community facilitating personal and collective action relying on local resources such as manpower, social capital, and social networks [13] to respond to and address future crisis; sometimes because of the disconnect between centralised forms of disaster response at the community level (e.g. Ref. [14]).

What a community is and, thus, what community resilience is, is difficult to define. This is because, a community can mean

different things to different people [15]. Wilkinson [16], 317) addresses the early differences in the concept of community and sees it as "a place where people live, but it is also a cultural configuration, a field of collective action and a phenomenological experience of the individual." Put another way, a community is not simply located within a geographic location but is connected by social-cultural experiences that can connect individuals and share experiences. Later, Clark [17] explains that community can refer to a locality, and the shift towards a place-based understanding of community emerges. These place-based approaches to community have been widely used across disciplines and applied to different crisis events such as flooding in a community (e.g. Ref. [18,19]).

Like community, the term 'community resilience' has been adopted in recent years to recognise that individuals within communities are often first responders to the effects of socio-natural disasters and are just as important as formal organisations in emergency planning and preparedness [20]. Where communities are concerned, what connects them is important for resilience against flooding. Communities must be able to work together within them and interact with other institutions such as formal organisations (e.g. local authorities) to build [flood] resilience [11]. Importantly, communities possess 'assets' that align with community objectives and create opportunities for communities to mobilise and act collectively [21]. These qualities include social interactions, networks, knowledge of a place, history, and perspectives on its future [22], that can build resilience within a community.

The building of community resilience observed from a place-based approach provides fruitful opportunities to explore this in the context of the UK and expand existing studies that have explored place-based approaches to community resilience building on a variety of issues. For instance, Glass et al. [23] studied five cases in rural Scotland, tackling different issues including climate change and land reform policy to establish the important role of policy that focuses on place-based communities that result in further engagement related to the issues, better opportunities and engagement for decision making creating a sense of place based autonomy for more opportunities for community resilience building. Salvia and Quaranta [24] discuss how place-based research, which then informs place-based policies, helps centre on community resilience and reactivate mechanisms that build resilience. These include what becomes a self-reliance on communities facilitating activities within a community to build their own resilience that includes networking and building meaningful identities. In turn, policies that also emphasise place-based approaches can invoke innovation that can have a cascading effect to better help communities deal with challenges at a local devolved level. Parkhill et al. [25] speak to UK community resilience focusing on place-based action in response to generating localised energy related initiatives. They highlight the positives and strengths of supporting and enhancing civic engagement and social action within communities yet recognise that external stresses such as outside community policy changes can impede a collective response, stalling resilience building within a community.

Bradshaw [26] airs caution noting that maybe a 'post-place community' conceptualization is needed in so far as the essential characteristics of community are the social relations (solidarity or bonds) between people. Nevertheless, we take 'community' to mean people living in a locality with a shared identity and commonality, manifesting through social interactions and networks within a defined geographical space. This understanding of community also helps elaborate on what community resilience means whereby community resilience refers to the actions of people living in a locality that are bonded by shared meanings, experiences and identities that help foster collective action in response to challenges they may face.

2.2. Community resilience and social capital

One of the core assets in communities is how social interactions and networks are created and if and how they are built and supported by social capital. As Rapaport et al. [13] note, one of the community-level strengths that facilitate personal and collective resilience alongside local resources such as manpower is social capital. The concept of social capital is diverse and has been used in various fields. Bourdieu's classic sociological thought connects social capital with its counterparts economic and cultural capital and is defined as:

> *"All current or potential resources which are linked to the possession of a sustainable network more or less institutionalized relationships of mutual knowledge and mutual recognition; or, in other terms, to membership in a group, as a set of agents who are not only endowed with common properties … but are also united by permanent and useful connections"* ([27], 2).

Bourdieu's social capital highlights the importance of a network or group with common interests, knowledge, and recognition. Putnam [28] emphasises that networks, norms, and a sense of trust between individuals can facilitate group action with a mutual interest. This mutual interest reflects the capacity for individuals to be bound by something that allows them to meet a collective goal; in this case, effectively respond, adapt, and bounce back from flooding in a specific place. Bakker et al. [29], 133) illustrate that these practices are one of many assets that *"contribute to the collaboration, functioning and collective action of the network."* Social capital then can become a mechanism through which collective and individual action can take place that can have positive outcomes.

But how does social capital influence community resilience and why is it important? For Aldrich and Meyer (2014) [30], social capital is vital for building community responses to disasters. Building physical resilience is extremely important, supporting and developing strong ties within and between communities to enhance preparedness and build resilience for future crises is equally vital. Likewise, Murphy [11] argues that social capital is strongly implicated in resilient community emergency management. A community is on the front lines of response to a crisis. In turn, ensuring the capacity for communities to respond and building disaster planning into their community structures requires strengthening social capital. This is important in spite of the challenges that may be faced such as a lack of financial infrastructure and support to communities immediately after a disaster. Pazhuhan et al. [31], 12) argue that "social capital is one of the major components affecting the resilience of local communities," in the context of climate change. They note that, social capital is imperative especially because it can also help improve the financial stabilities of local communities.

We contend that social capital is the most important form that informs and strengthens economic and cultural capital within the context of community resilience building. Woolcock [32], p.67) stresses for example *"the basic idea of "social capital" is that one's*

family, friends and associates constitute an important asset, one that can be called upon in a crisis, enjoyed for its own sake and/or leveraged for material gain. Those communities endowed with a rich stock of social networks and civic associations will be in a stronger position to confront poverty and vulnerability (Moser 1996; Narayan 1997)," In addition, without strong social capital, progress for instance in terms of economic capacity and the ability to capitalise on economic capital, would be limited.

Looking at different forms of social capital in action can also inform its relationship to community resilience building. These different forms of social capital are bonding, bridging, and linking that can be treated independent and interdependently. Poortinga [33] describes bonding social capital as ties between members in a network that appear similar, building a sense of social cohesion. In the context of health, the social networks built between people provide some levels of social support that contributed to better health and wellbeing outcomes. In the context of marine spatial planning, Bakker et al. [29] view the actions of communities they examined were successful in resilience building because of bonding social capital. Bonds formed between families of villagers based on a strong sense of belonging to a place and a willingness to participate in community activities to protect their industries. On flooding in Vietnam, Hudson et al. (2021) [34] note that bonding social capital presented opportunities for building social ties within communities, making individual experiences more attune to potential risks. Although, this does not necessarily mean community-based actions in response to flooding manifest.

Rustinsyah et al. [35], p.2) observe bonding capital in the case of flooding and communities in a village of Bengawan Solo Riverbank and the role of bridging social capital. Bridging social capital refers to "social relations between individuals to work together with other individuals or groups that are heterogeneous to provide benefits." Put simply, bridging social capital is based on building relationships with those who may not be directly within the same community, yet remain important relationships and networks to mitigate the impacts of flooding in this case. Communities are not homogenous, and there can be differential experiences of class, age, gender, and ethnicity. Similarly, physical geography and individual resilience levels can also have differential impacts and consequences of flooding within a community.

Despite the different experiences or social, cultural, or economic characteristics of those within one place, actions can be combined as support systems to build resilience in the face of challenges. For example, Jung and Song [36] locate bridging social capital in the case of disasters in South Korea where diverse actors shared resources and knowledge despite differing interests. Manyena and Gordon [37], 46) define bridging as "cross-cultural and inter-group linkages and has the potential to generate far more positive outcomes and inclusive benefits across and between different communities."

Azad and Pritchard [38] similarly observed bonding and bridging capital in the case of flood hazards in rural Bangladesh. Additionally, they observed linking social capital. Linking social capital refers to the ties between communities and more formal organisations such as governments, schools, local authorities etcetera. In a sense, linking capital allows cross-community relationships to form, with (place-based) community members working alongside external stakeholders with a vested interest in and need to support flooding preparedness and disaster response in this case. Fitzpatrick (2016**)** speaks to an emphasis on the importance of the outcomes of linking social capital to resilience building, describing a resilience that requires an 'all people,' emphasising a shared responsibility including formal organisations such as local government and emergency planners working together with local groups and community members that co-create programmes and policies in turn, collectively building social capital within communities essential for collective action.

Fig. 1. This image is taken from 2021 showing the main bridge connecting the two parts of Matlock with businesses located to the right-hand side. Sandbags are acting as provisional flood prevention measures, before reconstruction took place in 2022/2023. This area is prone to significant flooding and is at the highest risk level.

3. Research context and method

3.1. Case study location

The research drew upon a case study of flooding in Matlock, Derbyshire, a town with a population of approximately 10,000 people [39]. Matlock was chosen as the research location due to its long history and association with water. The town is a former Victorian spa town and has a history of flooding events. In the last few years, the severity and impact of flooding appears to have increased in Matlock and Derbyshire more widely [40]. Matlock is in a valley; homes are on its northern slopes, while the town centre is at its foot, alongside the river Derwent. Flooding is caused by two factors in the town: extreme precipitation results in surface runoff on the sloped hillsides, mostly affecting residential properties. The resultant surface water run off feeds into the Victorian drainage system and in conjunction with a swelling of the river levels, results in flooding within the town centre at the base of the valley, where residential homes and many businesses are affected (See example Fig. 1).

Several local authority-led measures are in place to monitor flooding in Matlock. It has a river flow observation station and the installation of an early warning system regarding flooding with a dedicated flood warden system. In periods of flood events, Matlock also has a dedicated flood strategy that describes to residents the steps taken during an emergency and the resources available to them [39]. Additionally, ongoing maintenance work and development of new flood defences continues, particularly around the town centre which aims to provide and enhance protection [41]

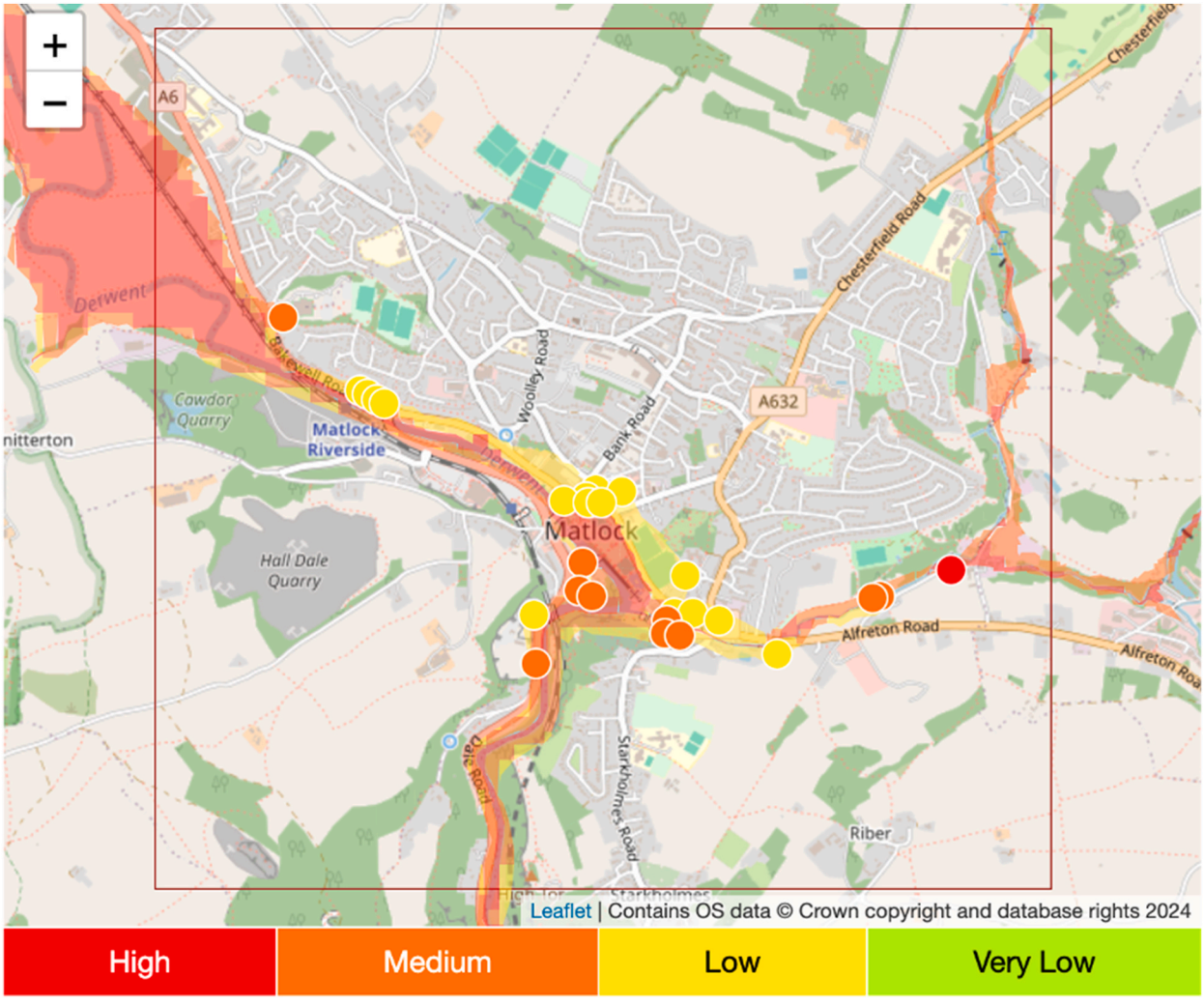


Fig. 2. Fig. 2 is a flood risk map of Matlock. The core shaded parts in the centre of the map indicate where the river is and are a significant number of high-risk areas to flooding along that line. The central location with the highest risk is also the town's main business and shopping district, with popular tourist destinations such as Hall Leys Park that regularly floods.

3.2. Data collection

The empirical research was conducted between May and September 2022 and adopted a qualitative methodology which involved semi-structured interviews and a focus group. Twenty interviews were conducted with thirty local residents and business owners, while a focus group was conducted online with ten members of a local action group, who were also local residents. An initial scoping exercise was conducted with the Mayor of Matlock, who also acted as the community flood warden. This interview was crucial in providing a historical and contextual overview of flooding in the area and identifying the areas, homes and businesses that are seriously affected by flooding. However, flooding does not impact everyone within a community in the same way. For example, some areas may be prone to flooding, and others receive no flooding or result in negative effects [4]. Therefore, in order to obtain a representative sample specific geographic areas were identified within the community to conduct fieldwork in according to the likely exposure to flood risk that they faced. This decision was influenced by their position within the valley, and our evolving knowledge of the specific nature of flooding in the area. The concentration of flooding impacts most severely on homes at the foot of the valley as well as those on its sloped hillsides due to surface runoff, while houses at the top of the valley are less likely to be directly impacted. Businesses in Matlock are located in the town centre at the foot of the valley and parallel to the River Derwent and experienced repeated flooding events. A sample of businesses and residents was deemed appropriate to uncover the breadth of perceptions and experiences relative to the research questions [42].

A purposive sampling strategy sought to capture an equal number of participants experiences across high, medium and low risk flooding sites within the community, therefore participants can be considered representative of the general population and the distribution of those directly and indirectly affected by flooding.

Door-to-door interviews were conducted in each of the target research areas, with interviews conducted in situ on doorsteps, gardens, and in participants living rooms or their business premises. The reason for the greater number of participants to interviews is that some interviews were conducted with several family members present. In the case of high and low risk areas only, this direct recruitment approach involved some snowball sampling opportunities whereby residents or business owners would recommend other neighbours or business owners (within the same purposive target sample areas) who had knowledge and experiences of flooding. In all cases, they would provide contact details (email/telephone) as well as specific address locations of potential participants. This served to speed up the recruitment process as existing participants provided an intermediate link between the researchers and new participants whereby interviews could be pre-arranged within each geographic location. The use of snowballing within this purposive framework meant that we were not just reliant upon the speculative opportunism of door-to-door inquiry.

The Adaptive theory Layder, 1998 [9] approach was used in all stages of data collection and analysis. Adaptive theory aims to combine the use of pre-existing theory and theory generated from data analysis, where there is the interplay of general theory with empirical research. In the adaptive theory approach, theories and concepts can both 'emerge' from data, as well as operate as a useful framework prior to its collection. The researchers had conducted a literature review in advance of our fieldwork trips, and so were aware of relevant themes and concepts from the literature, as well as gaps and limitations of prior studies. *"[Prior] In-depth knowledge of multiple theorisations is thus necessary both to find out what is missing or anomalous in an area of study and to stimulate insights about innovative or original theoretical contributions"* ([43], 173). Such knowledge provided guidance for the open-ended question topics used for interviews. For example, themes related to both 'community' and 'resilience'. Questions on 'community' and 'resilience' included asking how flooding has impact on participants sense of community, and how and where 'community' exists considering flooding events and their aftermath, and 'whether it was better equipped than before to deal with future flooding events and why'. Further questions asked for participant's interpretations of the word 'resilience' and evidence of it within the community.

Adaptive theory Layder, 1998 [9] advocates a multi-strategy approach to research, while the use of different qualitative approaches can add rigor, depth and complexity to an inquiry [44]. The purpose of the focus group was similar to the interviews, but aimed to gain further in-depth insights the community's adaptions and responses. Focus group participants were selected through access to a community group 'gatekeeper' from a local action group who had been recommended to us through the initial scoping exercise. The local action group is a group of "community minded residents" who were concerned about flooding in the local area, both in terms of its causes and contributing factors, as well as its effects and methods of prevention (both short and long-term). One of the campaigns of the action group was to hold property developers to account regarding their plans for the development of 400 new homes on a greenfield site at the top of the valley in the community Bisknell, 2023 [45]. This proposed development was viewed as something which would significantly exacerbate the effects of flooding due to the increased surface run-off. The broader purpose of the action group was to provide a place for residents to discuss a range of environmental issues from flooding, pollution, traffic congestion and destruction of natural habitats.

Contact was made with the gatekeeper through email and telephone before being invited to attend one of the community group's online meetings. The focus group took place online on Zoom with ten group members (who lived in a range of high, medium and low risk areas within the community) and lasted for 2 h. One of the researchers attended the focus group – questions were again open-ended. However, the nature of the focus group allowed participants to speak with each other in great depth, providing a much richer discussion, especially in relation to the historical origins and developments of flooding in the area, as well as giving their overview of normative standards of local governance and community involvement. Many participants in the interviews had mentioned tensions and disagreements between the community and local authorities, and so the focus group was an ideal in providing a greater understanding on the nature of this issue.

Forty participants took part in the research (both interviews and focus groups), nine males and thirty-one females. Six participants were businesses owners (all of whom were also local residents who lived in the area and contributed to interviews), the remaining thirty-four participants were local residents residing in the three key flooding risk areas (both interviewed and part of the focus group).

The youngest participant was twenty-three years old and the oldest was seventy-eight. The mean age of participants was forty-eight. Forty participants were considered adequate and at the point where data saturation was evident, with no new insights being obtained [42]. See Table 1 for a breakdown of participant demographic characteristics taken from interviews and focus groups.

3.3. Data analysis

The interviews and focus group were audio recorded and fully transcribed manually.

Adaptive theory advocates the use existing theory and concepts to guide research collection, whilst permitting theoretical elaboration and generation to emerge from the ongoing analysis Layder, 1998 [9]. The use of existing concepts to guide data collection e.g. around 'community' and 'resilience' provided an initial way of ordering data Layder, 1998 [9]. These represented the substantive thematic pre-codes. Data was coded according to the fit or non-fit in relation the substantive themes, with these themes based on the. A range of more nuanced themes and sub-themes became evident, and Table 2 identifies the number of times a subtheme emerged in each transcript. Amidst this process was the continual back and forward movement between theory and data, which allowed the research team to ask "whether these ideas, approaches or concepts can be reformulated, expanded upon, amended or extended in relation to new empirical data or new topics of inquiry" ([9], 115). It was here that the emergent theme of social capital was identified as being significant in relation to resilience building and community resilience. Thematic analysis and coding were conducted manually using Microsoft Excel. The researchers opted against the use of additional qualitative analysis software due to the relatively small sample size involved.

A coding scheme was used to refer to participants which consists of the interview number and the named initial(s) or pseudonym if requested by the interviewee e.g. '9: TT'. We include an indicator of age by grouped categories (i.e. 18-25, 26–35, 36–45, 46 and above), gender, indicated as M (male), or F (female), and geographic location indicated as low, medium, and high risk. Finally, we indicate with BO if the quote is taken from a business owner. Because focus group data included several participants and discussion points, we refer to details in the manuscript as FG1. Overall, our approach to categorisation ensures anonymity and confidentiality of our participants.

All primary data collection was undertaken with ethical approval from our institution. All participants were provided with participant information and provided informed consent through verbal followed by written confirmation.

4. Findings and discussion

4.1. Overarching themes

Our analysis revealed that there were four core themes that emerged in the data. Table 2 labels these themes, indicators of sub themes, and the frequency and percentage of the emergence of them in the data. The most common theme in the data was in the broad area of community networks (N = 30, 30.6 %). As a reminder, community networks refer to the relationships between individuals within communities that rest on the presence of some level of social capital creating opportunity for resilience building [46].

The next most common theme covered political participation and community engagement (N = 26, 26.5 %). This referred to participants referring to their efforts and attempts to reach outside stakeholders and engage in any civic community participation related to flooding or wider community issues and any formal political participation. The third most common theme was Knowledge and learning in the community (N = 24, 24.5 %). referring to how residents of Matlock applied their knowledge and understanding of the local area to engage in flood prevention and community resilience building. Finally, the last theme we identified related to the community led sustainable solutions (N = 18, 18.4 %), referring to what the community have done in relation to sustainable solutions building and how these have informed their actions. It is important to note, interviewees and focus group participants did not simply refer to a single theme, and instead each interview and the focus group often reflected on several of our emergent themes. Moreover,

Table 1
Participant breakdown.

Category	Subgroup	No. of Participants
Gender	Male	9
	Female	31
Total		40
Age	18–25	1
	26–35	3
	36–45	4
	46 and above	32
Total		
Location	Low Risk	12
	Medium Risk	17
	High Risk	11
Total		40
Business Owner	Yes	6
	No	34
Total		40

Table 2
Qualitative data themes.

Theme	Sub-themes	Freq (%)
Community Networks	Social Media Groups, Community Groups, Community Solidarity, Volunteering, Phone calls	30 (30.6 %)
Knowledge and Learning in the Community	Self-protective behaviour, Visual cues, Historical knowledge, infrastructure concerns/awareness of local service capabilities	24 (24.5 %)
Community Led Sustainable Solutions	Flood defences, Natural Habitats, Community Proposals, Ecological survey	18 (18.4 %)
Political Participation and Community Engagement	Town hall events, Dissatisfaction between communication, Responding to planning applications, environmental groups and activism	26 (26.5 %)
Total Number of Mentions		98 (100 %)

many of the themes would overlap and connect with one another, illustrating how each component is an important part of community resilience building and illustrated in Fig. 5. As a result, the breakdown of themes below explores these in more a more complex story than outlined in the table.

4.2. Theme 1: community networks

Our participants described the significant role community networks play in Matlock. What we observed in Matlock were examples of community networks that emerged during times of crisis, as well as existing networks that were exploited to stimulate a collective response to the immediate and long-term adaptations to flooding in the town. The following examples demonstrate how some residents used social media platforms such as Facebook to create an active community group which could be used to notify members about flooding and to aid,

> "Matlock Facebook community group. And there's a lot of people talking about, you know, the flooding and when where rains come people warn each other about it and stuff."
>
> (Interview 3: RD, M, 46 and above, medium risk)

> "And when we flooded, we noticed people walking by and checking if they can help, you know, volunteers on Facebook, everybody just tries to help …"
>
> (Interview 6: MA, F, 26–35, high risk, BO)

These connections were forged – particularly during flood events - based on what several participants highlighted as community solidarity. Community solidarity refers to a practice whereby individuals and groups share a sense of solidarity based on the community's needs Luhman, 2007 [47] and has previously been observed in community resilience studies (e.g. Ref. [48,49]). In a sense, this was an instinctive behaviour that had grown because of several rapid flood events, alongside other social, economic, and ecological challenges that Matlock's residents faced. This solidarity can also be understood as a form of local-level problem-solving whereby volunteerism became a natural element of community life. One participant who lived in a low-risk location and had not experienced damage to their property as a result of flooding recalled:

> "Yeah, people would help each other. I know someone that went down to the main part and helped move the sandbags around with some others … and I know someone else there was a woman who couldn't really get anywhere because the roads were closed and they helped her get some food and stuff"
>
> (Interview 2: SS, F, 36–45, low risk)

Importantly, we see here that a participant located in low-risk area describes the actions taken to support those who had experienced flooding differently. This illustrates an example of bridging social capital, engaging community members who may have had different direct flooding experiences, yet remaining part of a wider community-based in this one geographical location.

4.3. Theme 2: knowledge and learning

Community members engaged in what could be considered a form of community self-protective behaviours. More specifically, a form of 'flood neighbourhood watch' that extended online through social media in the Matlock and District Neighbourhood Watch group. These groups are very much like a form of crime prevention and control, but in this case act as harm reduction tools related to identifying risks from flooding and actions that can be taken to reduce these risks. These harm reduction efforts taken by community members are like Keogh et al. [49] study where Charleville in Queensland, residents believed they had personal responsibility for preparation and damage mitigation activities, which manifested through effective communication of flood event warnings and response measures, and assisting in evacuating family and friends.

In fact, community members in Matlock had attempted to alleviate the consequences of poor sewage and water infrastructure following rapid flood events as a form of harm reduction:

" … there were issues on the hills and that's purely because, and I walked across the road, and I cleaned myself, twelve drains that are completely blocked with leaves and branches, and as soon as I cleared them, it stopped going into the guy's house who was trying to brick his drive up. It certainly reduced the flow to where it started. Just by walking up and scraping my foot over the drains and unblocking them … So it's maintenance, it's maintenance of drains which contribute to flooding in places that aren't prone to it like the middle of Matlock …"

(Interview 3: RD, M, 46 and above, medium risk)

This informal neighbourhood watch accompanies formal and infrastructural flood management strategies and tools such as river flow observation stations. It is a finding that bares similarities to Twigger-Ross et al. [7] who noted in their flood risk management study that local groups had become actively engaged in drainage system maintenance, although often due to confusion or lack of clarity around ownership of this infrastructure.

The activities such as harm reduction align with what Maclean et al. [46] describe as knowledge, skills, and learning, a vital asset for a community if they are to respond efficiently and effectively to a rapid flood event, build preventative measures, and create new opportunities for the community. Learning can be defined traditionally based on acquiring knowledge and understanding, which can then be applied in practice. One such example of learning is flood forecasting and responding to risk alerts to make independent assessments, as evidenced here. Our participants were well-versed in some mitigatory, and pre-incident planning mechanisms based on local authority-led and national policy-related information. For instance, participants were acutely aware of how the government issues flood risk alerts makes clear forecasting models as a pre-incident planning measure to ensure protection for businesses and communities (GOV.UK 2018).

Yet we interpreted from some of our participants that these pre-incident planning practices stalled local business activities and day-to-day behaviour. These measures created confusion based on an unknown prediction of risk, especially considering 'false positive' alarms where business owners had been forewarned of flooding by emergency planners and told to shut up shop, only for no flooding to materialise.

"I got flooded again. But this time, someone's giving you warning. Lots of warning. So I've had many days where I've been had to stay shut because we've been told there's a risk that there wasn't a risk, because obviously, the agency are covering their backsides by warning you because that first time I never had a phone call …"

(Interview 12: CIP, F, 36–45, high risk, BO)

Fig. 3. Image of a local bridge with two signs indicating flooding levels in a historical setting. Community members refer to this information when reviewing the flood levels and assessing the risk of flooding. This is located in the centre of Matlock at Hall Leys Park in the main town centre location.

We know that this pre-incident planning is a crucial measure for individuals to actively find a means to respond to the flood event given significant warnings from government agencies. It can provide significant benefits for community members to use this resource effectively, particularly to help acquire knowledge, allowing them to apply that knowledge and then adapt learning to the ongoing changes that will occur due to flooding. However, the community was less supportive of the support these effective scientific models can provide. In other words, despite this learning process, community members still had unmet wants and needs that resulted in disillusionment and frustration illustrated in Int9's discussion.

Community resistance to external messages of environmental threats is not uncommon. Such examples are seen in the case of climate change action in Hornsey and Fielding's [50] study, or Kousky and Shabman's [51] reflection on flood risk and decision-making. Evidenced here are similar findings, instead of formal risk identification, community members relied more on their knowledge and understanding of flood risk in the local area and prior experiences of flooding (See Fig. 3 for an example). This is because, these individuals can usually identify the potential seriousness and impact of a flooding event by checking their own visual ques and warning signposts within the community, such as the water level at the river that flows through town, or by observing how well the drains are taking in water, or by hearing from residents about water collecting further up the valley.

This resistance and reliance on community knowledge illustrates potentially successful bonding and bridging social capital. However, the disconnect between community members and formal organisations suggests barriers to linking social capital to enhance community resilience. The lack of linking social capital connecting the knowledge and understanding of residents with formal organisations that have helped implement top-down flood emergency management strategies required to protect the town can sometimes conflict, especially if these are disconnected from the communities wants and needs.

Participants expressed this disconnect between the community and 'outsiders' as a sense of dissatisfaction. Participants felt that the community was the primary and sometimes only effective responder to rapid flood events and the recovery process and '*just had to do it*' (Interview 1: FS, M, 45 and above, high risk, BO), and there was a sense that they only did this because of inadequate support from formal organisations such as local authorities.

> "It is frustrating, a mean it is frustrating, cause it's the environment agency, the canal committee, I think it's the canal committee the council are all pushing blame onto each other for the ownership and the mistakes that are made … and it's just all in conflict, so just pushing the blame to everyone else."
>
> (Interview 10: CS, F, 36–45, medium risk)

> "I think everyone's just had enough, just frustrated by it … No one listens. And no one wants to come and do anything because it needs work. And everyone has a really good way to do it, but do as little as possible."
>
> (FG1)

One participant argued:

> "Some people think they [council] can be doing more, a lot lot more … they've done nothing to correct that and its just, they need to pull their finger out, really … The money. And they keep putting taxes up, but nothing is gettin' done."
>
> (Interview 10: CS, F, 36–45, medium risk)

Such findings describe some of the tensions that can exist within resilience pathways where there can be a lack of trust among community members in the ability of authorities and emergency planners to develop appropriate responses.

4.4. Theme 3: community led sustainable solutions

Sustainable regeneration, mitigation and adaptation are prioritised following a disaster, and operationalisation includes identifying new opportunities to revitalise a community and stimulate economic growth. In fact, this aligns with what Maclean et al. [46] define as a diverse and innovative economy, an essential attribute of community resilience building. However, our participants had significant worries about the impact of current and proposed regeneration activities. For instance, one participant described their concerns about the slow introduction of new and refurbished flood barriers:

> "I would imagine any flood works would take years. I would be thinking five years at least. But there's got to be some major thinking how to preserve access to the town, to get this work done. Because it has been for a while, there's two roads in, one road out. Businesses depend on people coming in on those roads … So it's a very difficult situation."
>
> (Interview 3: RD, M, 46 and above, medium risk)

Several other participants echoed this response. It centred on the short and long-term disruption to local trade, the ability to manoeuvre in and out of the town, and general community life. This finding does closely align with the work of Adger et al. [52] who state that the success of an adaptation method depends on how it affects the ability of others to meet their adaptation goals, where there may be unintended consequences "downstream" (81). In other words, the mechanisms for regeneration may be effective on the one hand, but on the other, may exert other negative consequences on other community members, particularly those whose voices have not been heard.

Residents in Matlock attempted to engage with other stakeholders and in particular, wanted to signal to 'outsiders' the important role of their own knowledge and understanding of the area. The community had put forward proposals using their knowledge about managing the risks and preventing significant impacts of flooding. For example, using land surveys, drones, and Google Map images to document the erosion/worsening of flood basins on farmland, some participants described how a community group used their local

knowledge to present alternative futures for the town. This was in response to proposed housing developments, that had become part of the broader regeneration and development opportunities spearheaded by outside stakeholders for Matlock.

> *"They're doing an ecological and environmental assessment, paid for it themselves, and found that there are habitats up there, unique habitats up there that's all about water. It stops the water from percolating down so it bubbles up. They found natural habitats and species, 50 species, some are on the red list … But that's having an adverse effect on them because they're having to do the job of the so-called professionals, if you know what I mean …"*
>
> (Interview 4: SW, M, 46 and above, low risk)

One participant even described their alternative proposal as a natural defence:

> "I mean, the other thing that we've done as a community is we've presented an alternative case, an alternative view of the land for a natural sort of defendant."
>
> (Interview 17: SM, F, 46 and above, low risk)

The wide range of green infrastructure literature supports these community-led proposals to help alleviate the pressures of rapid flood events (e.g. Ref. [53,54]). This is because, these proposals focused on the sustainable use of the land and nature conservation, capitalising on the existing ecosystem as a natural flood prevention barrier to create sustainable solutions that serve as flood mitigation and environmental protection tools.

Some examples of these natural and/or nature-based solutions have already been introduced with the collaboration of outside stakeholders (e.g. Fig. 4) and speaks to the possibilities of these solutions as suitable and important activities for flood prevention, mitigation and adaption. This is also what Imperiale and Vanclay (2021) signal as a central dynamic for community resilience building for sustainable futures. Arguably, residents often can and do have superior knowledge of the local environment grounded in their lived experience. This means they also have local knowledge of risks factors for flooding and the consequences of poor infrastructure. This also speaks to Maclean et al. [46] description of people-place connections, which refers to the interconnectedness between people in the community and their relationship with the environment. In a traditional sense, it is part of observing how the human-ecological systems interact and how these systems and relationships manifest, change, adapt, and potentially work together in times of crisis or flooding. Describing actions and proposals as a natural defence speaks to these attachments and far deeper understandings of the local land.

Fig. 4. Attenuation pond around a housing development in Matlock.

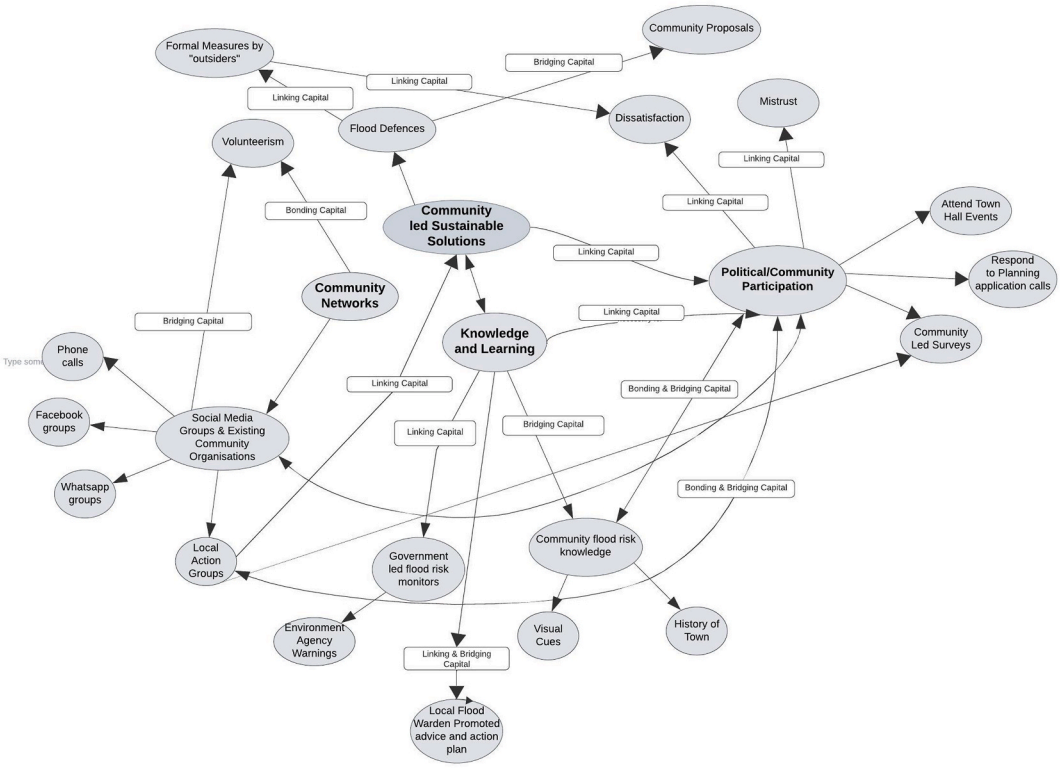


Fig. 5. This is a concept map divided into core theme areas that emerged in the data, with sub themes moving away from the centre. Bold text within circles indicates the core themes *community networks, knowledge and learning, community led sustainable solutions and political/community participation.* The arrows connecting themes are connected to the types of capital we observed in the data, linking, bridging, bonding, to illustrate how these types of social capital foster community resilience.

4.5. Theme 4: community participation/political participation

Residents from different areas used bridging and bonding social capital to coalesce round the issue of housing developments challenging proposals on the introduction of new homes. Participants highlighted that pressures would be placed on other already under-resourced and underprepared services such as schools and doctors' surgeries, and there were concerns about the overall environmental impact caused by the inevitable increase in car traffic and resultant pollution and its short and long-term effects. In essence, it would put pressure on existing community infrastructure thus undermining resilience building, based on knowledge articulated by community members:

> "Matlock is well and truly in trouble forever with flooding, everything extra, traffic, pollution, everything about it for the last of that valley was sat, the wildlife, absolutely"
>
> (FG1)

> *"… There's no way people are going to cycle there with the two bags of groceries on but that in and of itself will and more vehicles, will add more pollution, add more gridlock. And those are the thing that people don't like, that's what gets on people's minds, they're worried about having children having to walk to school, with increases pollution, all sorts of things*"
>
> (Interview 4: SW, M, 46 and above, low risk)

Combining our observations of the people-place connections, the knowledge of community infrastructure, and knowledge of planned changes for the future of Matlock, we can contend that there are tensions between what Bourdieu identifies as 'social capital' and other forms of capital that present challenges to community resilience building in Matlock. In Bourdieu's [27] traditional model, social capital is entangled with economic capital, and here participants felt the pursuit of economic capital by local authorities through proposed housing developments was not in the interests of the community and undermined successful community resilience building especially if flood mitigation was not appropriately implemented. If these conflicts and differences are not ameliorated, community resilience building will be stalled particularly when outside stakeholders - often with greater power - fail to account for all community voices. Which is where the community's resilience based around engaged governance become important because they attempted to engage in decision-making airing concerns in community meetings and/or appeals against planning applications.

Importantly, active efforts by the community to reach outside stakeholders is important for the broader area of political/community participation, risk governance and community resilience building. Put simply, political and community participation for

instance through voting practices, demonstrations or engagement in town hall events are important for promoting community resilience especially as it relates to disasters. This is because, *"citizens may be more interested in directly influencing disaster preparedness, response, or recovery programs than in deciding on government composition"* ([10], 9).

With that said, despite being well aware of community led proposals better attuned to the communities needs and wants participants still felt unheard by local government and other stakeholders

> "How loud do we have to shout before someone listens and takes notice and takes responsibility for their own for their own judgment in what they provide for the community. It's wrong."
>
> (FG1)

> "We as a group, really, we've been able to be quite vocal … But it's been going on for a very long time. We've been opposing this massive development of 430 houses at the top of [location] because everybody knows it's a flood risk."
>
> (FG1)

This highlights the failings of a linking social capital whereby the solutions offered for instance by government do not necessarily serve the purposes of the community. In turn, it can stall community resilience building much like the findings described by Bakker et al. [29]. Our participant data suggest then, like Fan's [55] study in relation to housing and community reconstruction in Taiwan following Typhoon Morakot, that distrust and dissatisfaction between communities and outside stakeholders put in place barriers to community resilience.

5. Discussion and conclusion

Our study aimed to meet one key objective: *determine if and how community resilience exists in Matlock in response to flooding.* We then had three sub-objectives: 1) *What activities are undertaken by communities in respond to flooding incidents.* 2) *To what extent are these activities based on collective efforts and determined by community relationships.* 3) *Identify perceived challenges to community resilience by community members.* Our findings revealed that in the case of Matlock, the community engaged in various activities that speak to actively enhancing community resilience in response to flooding. First, the community engaged in activities and actions that clearly contributed to attempts to build community resilience. The community actively used local groups or social media sites during flooding to act as warning systems for the community. These platforms also created opportunities for community members to gather and discuss sustainable projects that can meet some of the challenges facing the community, as well as attempts to build civic participation. These were successful because of bonding and bridging social capital activated in the community. For example, participants described evidence of bridging social capital bringing together community members with differing experiencing to support each other and take action to protect their homes during a rapid flood event and what they want in the future. Disasters can create unique moments that strengthen community cohesion, collaboration, and connection [20] and the community of Matlock had taken steps such as engaging actively in governance over decision-making, stimulated by their bonds and attachments to the place in which they lived.

However, community resilience building can only flourish if these networks and social relations lead to community recovery and adaptation [56] and in Matlock, some resilience building was stalled because of frustration towards other stakeholders that they felt failed to support the community. The failure of linking social capital between community specific and formal organisations or 'outsiders' meant in some ways, community resilience building was stalled, or in our case, left our participants disheartened. The failure to make these links presents a two-fold problem for empowering resilience building in communities affected by socio-natural disasters in the UK; especially if an approach to place-based policies is further introduced alongside increased devolution of policy and practice (see English Devolution White Paper, 2024). One, while proposing that communities can and should act themselves with additional support, the reality is that the top-down approach limited the capabilities of community engagement for our participants. Two, the emergence of and enhancement of community resilience relies on a collaborative approach between stakeholders, yet this needs to be reflected in practice. If not addressed will only reinforce tensions, building distrust. Distrust can harm community engagement [57] and citizens' active participation in providing innovative community-led solutions to disaster responses and future mitigation and adaptation to environmental problems.

Arguably, resolving this conflict and healing the fractured relationship between community and government requires the (re) building of trust through enhancing the linking social capital between community members and informal organisations that set the basis for enhanced community resilience. With that in mind, we recommend that building and improving linking social capital opportunities will enhance further community resilience building overall. For example, small local funding could be provided to community groups that come forward with recommendations on nature-based solutions, illustrating that their needs guide the support from external stakeholders, wants and local expertise. This can strengthen existing community relationships and build support and trust with outside stakeholders to build a more collaborative and cohesive element to recover, respond and adapt to flooding. Another recommendation would emphasise regular communication and assistance between local community members and local government/council members. For instance, while the flood warden provides an important liaison between local government and community members, more opportunities including increasing town hall events, would enhance the opportunities for building and strengthening linking social capital. Finally, future policies related to devolution or place based approaches to policy development must be when introduced, founded on the local knowledge and experiences of community members. Ensuring that communities are centralised even in top-down policy initiatives will enhance trust and build a more holistic and potentially more effective flood resilience strategy that could also be applied to other issues.

6. Limitations and future directions

There were methodological limitations for this study. 1) While our purposeful, snowball sample was employed to target the different areas of flood risk in Matlock (close to river, close to run off, not directly close to river/flooding), we may have inadvertently excluded some participants, especially those that may have different perspectives and limit some diversity. To address this problem in future, we believe additional methods of quantitative data collection through a specifically developed survey distributed to all residents or a larger sample could unearth some issues that may be different to different audiences. As such, while are qualitative method provides depth and understanding of this case study, future research should also seek to incorporate quantitative tools that offer standardized measures of community resilience may be beneficial (for example, see Ref. [58]). Furthermore, there is also the opportunity for future creative and participatory research methods that further connect the researcher with the community, incorporating community led participation in activities that allow this type of research to also bring together and work with the communities in a form of knowledge exchange. This could also have a further positive effect on community resilience, providing a platform for further collaboration between community members and alerting them to things 'going on' in their town that they may not be aware of. Finally, while are study focused on one community and thus prevented further comparative analysis, expanding and conducting studies at different flood locations may provide the opportunity to identify similarities and differences to the experiences, providing a more comprehensive and generalisable response that can be used in developing more definitive policy proposals.

CRediT authorship contribution statement

Ruth E. McKie: Writing – review & editing, Writing – original draft, Project administration, Methodology, Formal analysis. **Adam Aitken:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Data curation.

Data availability statement

Due to the data's qualitative nature, we have not provided open source data.

Funding statement

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the British Academy [grant number: SRG21\210429].

Declaration of competing interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article'.

Data availability

The data that has been used is confidential.

References

[1] N.W. Arnell, A.L. Kay, A. Freeman, A.C. Rudd, J.A. Lowe, Changing climate risk in the UK: a multi-sectoral analysis using policy-relevant indicators, Clim. Risk Mang. 31 (2021) 100265, https://doi.org/10.1016/j.crm.2020.100265.
[2] T. Harries, Feeling secure or being secure? Why it can seem better not to protect yourself against a natural hazard, Health Risk Soc. 10 (5) (2008) 479–490, https://doi.org/10.1080/13698570802381162.
[3] B. Manyena, G. O'Brien, P. O'Keefe, J. Rose, Disaster resilience: a bounce back or bounce forward ability? Local Environ.: Int. J. Justice Sustain. 16 (5) (2011) 417–424.
[4] T. Harries, L. McEwen, A. Wragg, Why it takes an 'ontological shock' to prompt increases in small firm resilience: sensemaking, emotions and flood risk, Int. Small Bus. J. Res. Entrep. 36 (6) (2018) 712–733, https://doi.org/10.1177/0266242618765231.
[5] Y. Li, A systematic review of rural resilience, China Agric. Econ. Rev. 15 (1) (2022) 66–77, https://doi.org/10.1108/caer-03-2022-0048.
[6] Defra, Government response to the multi-agency flood plan review. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/774349/mafp-review-government-response.pdf, 2019. (Accessed 24 January 2023).
[7] C. Twigger-Ross, P. Orr, K. Brooks, R. Saduaskis, Citizen involvement in flood risk governance: flood groups and networks, in: E3S Web of Conferences, 7, EDP Sciences, 2016 17006.
[8] E. Carmen, I. Fazey, H. Ross, M. Bedinger, F.M. Smith, K. Prager, K. McClymont, D. Morrison, Building community resilience in a context of climate change: the role of social capital, Ambio 51 (6) (2022) 1371–1387.
[9] D. Layder, Sociological Practice, Sage, London, 1998.
[10] L.F.D. Duque-Monsalve, C.P.N. Valladares, J.S. Díaz, Relationship between political participation and community resilience in the disaster risk process: a systematic review, Int. J. Disaster Risk Reduc. (2024) 104751.
[11] B.L. Murphy, Locating social capital in resilient community-level emergency management, Nat. Hazards 41 (2007) 297–315.
[12] Gov.uk, The national flood emergency management framework. https://www.gov.uk/government/publications/the-national-flood-emergency-framework-for-england, 2014. (Accessed 2 January 2025).
[13] C. Rapaport, T. Hornik-Lurie, O. Cohen, M. Lahad, D. Leykin, L. Aharonson-Daniel, The relationship between community type and community resilience, Int. J. Disaster Risk Reduc. 31 (2018) 470–477.
[14] E. Carabine, E. Wilkinson, How can local governance systems strengthen community resilience? A social-ecological systems approach, Polit. Govern. 4 (4) (2016) 62–73.

[15] R.E. McKie, M. Long, P.B. Stretesky, Guest editorial: safer communities, the environment and social justice: introduction to special issue, Safer Communities 23 (2) (2024) 105–109.
[16] K.P. Wilkinson, The community as a social field, Soc. Forces 48 (3) (1970) 311–322.
[17] D.B. Clark, The concept of community: a Re-examination, Sociol. Rev. 21 (3) (1973) 397–416.
[18] T. Coates, Understanding local community construction through flooding: the 'conscious community' and the possibilities for locally based communal action, Geo: Geogr. Environ. 2 (1) (2015) 55–68.
[19] K. Ingle, S. Chattopadhyay, A place-based approach to assess the vulnerability of communities to urban floods: case of Nagpur, India, Int. J. Disaster Risk Reduc. 75 (2022) 102933.
[20] T. Fitzpatrick, Community disaster resilience, in: B.W. Clements, J.A.P. Casani (Eds.), Disasters and Public Health Planning and Response, second ed., Butterworth-Heinemann, Oxford, 2016, pp. 57–85.
[21] K. Magis, Community resilience: an indicator of social sustainability, Soc. Nat. Resour. 23 (5) (2010) 401–416.
[22] S. Skerratt, Enhancing the analysis of rural community resilience: evidence from community land ownership, J. Rural Stud. 31 (2013) 36–46, https://doi.org/10.1016/j.jrurstud.2013.02.003.
[23] J. Glass, J. Atterton, C.M. Maynard, M.C. Craigie, S.J. Jones, M. Currie, A. Pinker, A.J. McKee, Facilitating Local Resilience: Case Studies of Place-Based Approaches in Rural Scotland, 2021.
[24] R. Salvia, G. Quaranta, Place-based rural development and resilience: a lesson from a small community, Sustainability 9 (6) (2017) 889.
[25] K.A. Parkhill, F. Shirani, C. Butler, K.L. Henwood, C. Groves, N.F. Pidgeon, 'We are a community [but] that takes a certain amount of energy': exploring shared visions, social action, and resilience in place-based community-led energy initiatives, Environ. Sci. Pol. 53 (2015) 60–69.
[26] T.K. Bradshaw, The post-place community: contributions to the debate about the definition of community, Community Dev. 39 (1) (2008) 5–16.
[27] P. Bourdieu, Le Sens Pratique, Les Éditions de Minuit, Paris, 1980.
[28] R.D. Putnam, The prosperous community, Am. Prospect 4 (13) (1993) 35–42.
[29] Y.W. Bakker, J. de Koning, J. van Tatenhove, Resilience and social capital: the engagement of fisheries communities in marine spatial planning, Mar. Pol. 99 (2019) 132–139.
[30] D.P. Aldrich, M.A. Meyer, Social capital and community resilience, American Behavioural Scientist 59 (2) (2015) 254–269.
[31] M. Pazhuhan, M. Amirzadeh, R. Värnik, M. Pietrzykowski, D. Lopez-Carr, H. Azadi, The impact of social capital on the resilience of flood-prone communities: the case study of northern Iran, Environ. Dev. 48 (2023) 100902.
[32] M. Woolcock, The place of social capital in understanding social and economic outcomes, Canadian J. Pol. Res. 2 (1) (2001) 11–17.
[33] W. Poortinga, Social relations or social capital? Individual and community health effects of bonding social capital, Soc. Sci. Med. 63 (1) (2006) 255–270.
[34] P. Hudson, M. Pham, L. Hagedoorn, A. Thieken, R. Lasage, P. Bubeck, Self-stated recovery from flooding: empirical results from a survey in central Vietnam, J. Flood Risk Manag. 14 (1) (2021) e12680.
[35] R. Rustinsyah, R.A. Prasetyo, M. Adib, Social capital for flood disaster management: case study of flooding in a village of bengawan Solo Riverbank, Tuban, East Java Province, Int. J. Disaster Risk Reduc. 52 (2021) 101963.
[36] K. Jung, M. Song, Linking emergency management networks to disaster resilience: bonding and bridging strategy in hierarchical or horizontal collaboration networks, Qual. Quantity 49 (2015) 1465–1483.
[37] S.B. Manyena, S. Gordon, Bridging the concepts of resilience, fragility and stabilisation, Disaster Prev. Manag. 24 (1) (2015) 38–52.
[38] M.J. Azad, B. Pritchard, Bonding, bridging, linking social capital as mutually reinforcing elements in adaptive capacity development to flood hazard: insights from rural Bangladesh, Clim. Risk Mang. 40 (2023) 100498.
[39] Matlock Town Council, Matlock flood warden scheme. https://matlock.gov.uk/matlock-flood-warden-scheme, 2024. (Accessed 29 September 2024).
[40] C. Sefton, K. Muchan, S. Parry, B. Matthews, L.J. Barker, S. Turner, J. Hannaford, The 2019/2020 floods in the UK: a hydrological appraisal, Weather 76 (12) (2021) 378–384.
[41] Gov.uk, Matlock flood defence completed and flood protection reinstated. https://www.gov.uk/government/news/matlock-flood-defence-completed-and-flood-protection-reinstated, 2023. (Accessed 29 September 2024).
[42] A. Bryman, Social Research Methods, Oxford University Press, Oxford, 2008.
[43] S. Timmermans, I. Tavory, Theory construction in qualitative research, Sociol. Theor. 30 (3) (2012) 167–186.
[44] N. Denzin, Collecting and Interpreting Qualitative Materials, SAGE, 2012. Thousand Oaks, Calif.
[45] E. Bisknell, Hundreds sign petition opposing homes on hillside above Derbyshire town, Derbyshire Live. Available at: https://www.derbytelegraph.co.uk/news/local-news/petition-opposing-homes-matlock-hillside-8528140, 2023. (Accessed 5 October 2023).
[46] K. Maclean, M. Cuthill, H. Ross, Six attributes of social resilience, J. Environ. Plann. Manag. 57 (1) (2014) 144–156.
[47] J.T. Luhman, Worker-ownership as an instrument for solidarity and social change, Ephemera: Theory and Politics in Organisation 7 (3) (2007) 462–474.
[48] A.J. Imperiale, F. Vanclay, Experiencing local community resilience in action: learning from post-disaster communities, J. Rural Stud. 47 (2016) 204–219.
[49] D.U. Keogh, A. Apan, S. Mushtaq, D. King, M. Thomas, Resilience, vulnerability and adaptive capacity of an inland rural town prone to flooding: a climate change adaptation case study of Charleville, Queensland, Australia, Nat. Hazards 59 (2011) 699–723, https://doi.org/10.1007/s11069-011-9791-y.
[50] M.J. Hornsey, K.S. Fielding, Understanding (and reducing) inaction on climate change, Social Issues and Policy Review 14 (1) (2020) 3–35.
[51] C. Kousky, L. Shabman, Understanding flood risk decision-making: implications for flood risk communication program design, Resources for the Future Discussion Paper 15–01 (2015).
[52] W.N. Adger, N.W. Arnell, E.L. Tompkins, Successful adaptation to climate change across scales, Glob. Environ. Change 15 (2) (2005) 77–86, https://doi.org/10.1016/j.gloenvcha.2004.12.005.
[53] M.C. Kondo, S.C. Low, J. Henning, C.C. Branas, The impact of green stormwater infrastructure installation on surrounding health and safety, Am. J. Publ. Health 105 (3) (2015) e114–e121.
[54] C. Li, M. Liu, Y. Hu, R. Zhou, W. Wu, N. Huang, Evaluating the runoff storage supply-demand structure of green infrastructure for urban flood management, J. Clean. Prod. 280 (2021) 124420.
[55] M.-F. Fan, Disaster governance and community resilience: reflections on Typhoon Morakot in Taiwan, J. Environ. Plann. Manag. 58 (1) (2013) 24–38, https://doi.org/10.1080/09640568.2013.839444.
[56] E. Coles, P. Buckle, Developing community resilience as a foundation for effective disaster recovery, Aust. J. Emerg. Manag. 19 (4) (2004) 6–15.
[57] J. Smith, A. Bond, Delivering more inclusive public participation in coastal flood management: a case study in Suffolk, UK, Ocean Coast Manag. 161 (2018) 147–155, https://doi.org/10.1016/j.ocecoaman.2018.04.026.
[58] T. Sim, Z. Han, C. Guo, J. Lau, J. Yu, G. Su, Disaster preparedness, perceived community resilience, and place of rural villages in northwest China, Nat. Hazards 108 (2021) 907–923.