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Sustainable flood memories, lay knowledges and the development of community resilience to future flood risk

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The paradigm shift to more distributed flood risk management strategies in the UK involves devolved responsibilities to the local, and the need to enhance risk ownership by communities. This poses questions about how communities build resilience to future flood risk, and how agencies support these processes. This paper explores results from interdisciplinary research on 'sustainable flood memory' in the context of effective flood risk management as a conceptual contribution to a global priority. The project aimed to increase understanding of how flood memories provide a platform for developing and sharing lay knowledges, creating social learning opportunities to increase communities' adaptive capacities for resilience. The paper starts by conceptually framing resilience, community, lay knowledge and flood memory. It then explores key themes drawn from semi-structured interviews with floodplain residents affected by the UK summer 2007 floods in four different settings, which contrasted in terms of their flood histories, experiences and kinds of 'communities'. Sustainable flood memories were found to be associated with relational ways of knowing, situated in emotions, changing materiality and community tensions. These all influenced active remembering and active forgetting. The paper reflects on varying integrations of memory, lay knowledges and resilience, and critically evaluates implications of the sustainable flood memory concept for the strategy, process and practice of developing community flood resilience. Given the concept's value and importance of 'memory work', the paper proposes a framework to translate the concept practically into community resilience initiatives, and to inform how risk and flood experiences are communicated within communities.

Key words sustainable flood memory; community; flood risk; lay knowledge; resilience; River Severn

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Introduction

Learning to 'live with water' is high on UK and international research and policy agendas. Within this context, research on flood memory, lay knowledges and local resilience sits at the intersection of different eco-social dynamics, disciplines and perspectives, involving ideas of floods as physical, social and political processes and forces (Krause 2016; Linton 2010; Swyngedouw 2004). Recent severe UK floods continue to impact adversely on social wellbeing and human livelihoods, highlighting limitations of flood risk management strategies solely relying on 'expert' flood knowledge.¹ Flood risk management implies negotiation of socially

acceptable levels of risk and exposure, with increased community participation in these processes. The UK summer 2007 floods represented a major civil emergency, with loss of life, houses and businesses devastated, and strategic infrastructures threatened or disabled over an entire region (Cabinet Office 2008).² How these floods unfolded, and how they were scrutinised by independent review, challenged earlier understandings of flood risk management.

Experts involved in emergency response should not ignore the skills, energy and ingenuity [...] latent in most communities; in preparing for an emergency, communities have important shared local knowledge and can harness local resources and expertise. (Cabinet Office 2008, 350)

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These floods exemplified the importance of lay knowledges in flood risk management, reinforced by further severe events (in 2012 and 2013/14). There is significant potential to integrate different lay knowledges (e.g. observational, cultural, experiential, inter-generational, archival) in flood risk management decision-making, as yet only partially explored (Whatmore 2009). Haughton *et al.* (2015) argue for hybrid knowledge formation and co-production of flood knowledge. Lay knowledges and 'watery senses of place' are important in building flood resilience for all community members (McEwen and Jones 2012). 'Watery sense of place' means living with water and 'water issues' (e.g. flooding) is part of individual and collective narratives of self and place. Clearly, post-flood learning needs incorporating into community flood education to increase adaptive capability (Duffy 2008; McEwen 2011). Yet, to what extent and how might individual and collective memories of extreme flooding be part of such learning, to inform lay knowledges, develop community capital and increase flood resilience?

Our interdisciplinary research brought new disciplines into conversation on social learning for flood resilience.³ It aimed to develop 'sustainable flood memory' as a concept, process and practice that could bring new insights to academic thinking and local flood risk management delivery. To achieve this, we aimed to:

- explore how knowledges, emotions, practices and materialities interact around floods and their remembrance for individual and community resilience;
- investigate formation – or otherwise – of flood memories after the 2007 floods by individuals and communities in different settings, investigating what factors link these memories and lay knowledges, and their connection and disconnection during and after floods; and
- evaluate whether communities with past flood histories are more resilient to future floods than communities with no previous flood history, or floodplain groups without shared flood memories, and how these factors can help understand processes of informal social learning to strengthen community flood resilience that might be supported in flood governance.

This paper frames key underpinning concepts – resilience, community, lay knowledges and flood memory. It then proposes sustainable flood memory as a conceptual contribution to a global priority. It outlines research methods, explores key findings and critically evaluates sustainable flood memory for the strategy, process and practice of developing flood resilience.

Conceptual framings: resilience, community, lay knowledge, memory

Flood resilience

Resilience is a contested concept associated with values, capacity, power, temporal processes of risk, vulnerability, response (adaptation) and recovery (Miller *et al.* 2010). The more rapidly a system can return to 'normal' or enhanced pre-event functioning, the greater its resilience. Resilience can encompass resistance, 'bounce-back', adaptation and transformation (Whittle *et al.* 2010). Most definitions of resilience as 'capacity' emphasise processes of successful adaptation of individuals/groups facing significant threats, disturbance, stress or adversity (Norris *et al.* 2008; 'social resilience' theory, Adger 2000). Literature suggests disaster impacts on communities vary temporally, with staggered evidence of resilience in recovery (Townshend *et al.* 2015). Levels of analysis differ from individual to community, and from purely social to social-ecological systems (Folke 2006).

Taken together, community resilience emerges as 'a process linking a network of adaptive capacities (resources with dynamic attributes) to adaptation after a disturbance or adversity' (Norris *et al.* 2008, 127). Network *and* adaptive capacities are distinct but connected elements in the process. Capacities (e.g. social, cultural, economic, institutional, infrastructural and community capital) are vital to resilience but insufficient in isolation, needing to be networked into wider resilience matrices (Cutter *et al.* 2010). Place-based social cohesion is also important (Townshend *et al.* 2015). Moreover, personal and collective memories are key components of individual and social capital in themselves, and also in lay knowledges. As such they play key parts within social networking matrices, and in connecting individual and collective 'capacities for resilience'. Norris *et al.* (2008) concluded that community resilience (and wellness) partly depended on trusted information sources that people can draw on in deciding how to act in unknown situations. All this implies significant value may lie in considering the intimate links between flood memory, knowledge and resilience, as evidenced in timely responses to flood warnings, motivations to form community flood groups, and shared actions of support during and after flood events.

Community in flood risk settings

Integrating local communities and their knowledges into flood resilience planning must address what 'communities' are, and how they are enacted and practised in flood risk management. Coates (2010; Yorkshire UK) found that in flood risk management, 'community' was variously understood as a group of individuals, residents of a defined area, inhabitants of a

rural area, an ‘at flood risk’ collection of people working with flood managers, people within a government-defined political or administrative category (e.g. parish communities), or people who lack ‘expert’ knowledge. Equally, a community might be conceived as a grouping with common interests or values. Coates concluded people felt part of a local community most intensely when

three aspects . . . social, spatial and mental, were understood to be present [simultaneously]. That is, there was an attachment or sense of belonging to the locality; residents felt a shared, place-based identity and dense localised networks existed within the community boundaries. (Coates 2010, 198)

In flood risk management, ‘community’ can be a generic term for localised populations of non-experts, making attention to ‘group’ dynamics crucial, while recognising communities are heterogeneous. This applies to their collective, cultural and communicative memory practices for flood resilience.

The changing nature of family is important here. Decline in traditional nuclear families (Office for National Statistics 2010) and multi-generational family households (ILC Global Alliance 2012) may reduce opportunities for intra- and intergenerational place-based learning. Communities may be contingent (i.e. exist only when needed); transient, marginalised or insular residents may not develop a ‘watery sense of place’ or memories to help them deal with future flooding. This poses important questions about how flood memories can develop in such communities, and how they are inherited and shared when people (rather than the issue) have moved on. Here, we use ‘community’ in its widest possible definition – not as a term including or excluding certain people in or from a location. We emphasise remembering and resilience are necessarily social connective processes involving disparate communities beyond those of place.

Lay flood knowledges

The concept of lay knowledge has been variously articulated – as local, informal, traditional or vernacular knowledge (Degen *et al.* 2003). It comprises subjective narrative accounts and stories constructed to understand, explain and assign meaning to events in everyday life. The challenges of, and potential for, flood risk management to draw on such knowledges have implications for mapping, sharing and redistribution of expertise (Donaldson *et al.* 2013; Lane *et al.* 2011; McEwen and Jones 2012). ‘Knowledge controversies’ (Whatmore 2009) can reflect mismatches between local knowledge and scientific assessment (e.g. around river management operations), with significant knowledge conflicts (scientific, local) evident during floods (e.g. Monbiot 2014). Lay knowledges

(including experiential, observational, hobbyist, cultural, intergenerational, archival) are variously accrued by individuals and groups. ‘Lay’ implies being non-professional – not embedded in formal scientific networks. However, lay knowledge is considered authoritative in terms of subject, locality and by other flood risk management agents. Collins and Evans (2002) reinforce this by distinguishing between ‘certified’ and ‘non-certified’ experts.

In response to the *Pitt Review* (Cabinet Office 2008), the UK government questioned how and where different knowledge and expertise develop and converge (Department for Environment, Food and Rural Affairs, DEFRA 2008). They acknowledged community lay knowledge was vital and needed further recognition. This is now evident in DEFRA’s strategies, impacting on who might be considered ‘expert’ by different stakeholders (within and between communities, agencies, the media and politicians). Similarly, the Sendai Framework emphasises the importance of ‘traditional, indigenous and local knowledge and practices’ used ‘to complement scientific knowledge in disaster risk assessment’ (United Nations Office for Disaster Risk Reduction 2015, 10). But lay knowledges cannot be considered uniform and separate from local politics and power relations (Firoz 2010; Pottier 2003). They may be contested within and outside communities, or remembered or forgotten in competing ways (see Rothberg 2009 on ‘multidirectional memory’). Community flood education strategies should consider how flood knowledge is acquired, developed, redistributed and acted upon. ‘Memory work’ provides one key entry point explored in our research. Inspired by Haug’s (1999) feminist and recuperative use of ‘memory work’ in the 1980s, we combined this with digital storytelling (adapted from Storycenter.org).

Flood memory and memorialisation

Memory studies literature has largely focused on national and collective memory frameworks from Erll and Nunning (2008), Halbwachs (1992 [1925]) and Olick and Robbins (1998), with recent expansion of the field into personal trauma. Brown and Reavey’s (2015, 70) work on ‘distressing autobiographical memories’ exemplifies this. Anglo-European theoretical and conceptual frameworks of ‘memory studies’ have tended to focus more on historical, collective and cultural memory, with less applied research on ‘communicative memory’ (Assmann 2008). Some argue ‘memory studies’ has reached an ‘impasse’ in ‘collective memory’ research (Vermeulen *et al.* 2012), being too narrowly determined by contained case studies. While our research is UK-specific, it is a response from perspectives of environmental and water research on global flood issues. It offers a new consideration of memory embedded in, and flowing across, social-digital-environmental spheres, structured (yet agentic) within unevenly available resources. Water

scarcity or abundance in such spheres is a memorable and increasingly mediated concern. Communicative memory, then, can be conceived as a vertical process in transmission (temporal), but also as a defined and shared body of knowledge networked horizontally (spatial) (Pickering and Keightley 2013). Vertical memory is enduring and intergenerational, while horizontal memory as intra-generational (McEwen *et al.* 2012; Garde-Hansen *et al.*, *in press*) is increasingly shareable through social digital media.

Therefore, one most relevant typology for our flood memory research comes from Assmann (1995, 128–9) in his distinction between ‘communicative memory’ and ‘cultural memory’, which we have used to frame analysis of relationships between personal or community remembering of floods and official memorialisation. Adapting Myerhoff’s (1982) work, our approach involved recollection as ‘re-membering’ that thickens flood stories by connecting them to people, places and practices at the personal scale. Researchers have noted mediated flood narratives tend to connect human-interest stories within wider discourses of class, politics, identity and society.⁴ Previous work drawing on flood recovery strategies has tended to focus on individual’s trauma, with less recourse to more recent memory studies. For example, the Hull Flood Project used recovery diaries to capture reflections on health, social networks and economic wellbeing, collated into an archive of community recovery processes (Medd *et al.* 2015). Examples of mediating floods could also be observed after extreme European events (Trümper and Neverla 2013), like the Hamburg Floods (in 1962; Mauch 2012). Here, ‘disaster memory became a veritable duty’ to engage with a ‘memory landscape’ of speeches, memorials, high water marks, signs, newspaper articles, photographs and films’. Mauch observes this provides ‘a perspective for the future’, as a coping and warning mechanism, by which ‘commemoration events and medial or material acts of remembrance make up an integral part of local and national memory culture’ (2012, np).

Table I Four floodplain settings

Setting	Character	Rationale
1	Established urban community flooded in 2007 with significant history of episodic extreme floods; regular flood experience	Possesses flood memory and lay knowledge that can be drawn on in flood adaptation (urban setting)
2	‘Newer’ urban community with no previous flood history (without flood experience since 1947, with parts built post-1947) but flooded in 2007	Possesses limited flood memory and lay knowledge; potential for flood memory and new lay knowledge post-2007
3	Floodplain city ward with history of extreme flooding including recent experience in 2007, and with significant transient or intermittent residency; low community capital	Possesses limited flood memory and lay knowledge; low potential for flood memory and new lay knowledge post-2007
4	Established rural community flooded in 2007 with a history of episodic extreme floods	Possesses flood memory and lay knowledge that can be drawn on in flood adaptation (rural setting)

Framing ‘sustainable flood memories’

Our research proposes the concept of sustainable flood memory conceived as an approach to memory work that is both individual and community-focused, taking account of materialised memories, e.g. in landscape, technology, social media, formal and informal archives. It integrates individual (personal) and collective (community) experiences across different media and materialities. Such memory is ‘sustainable’ and persistent in creating and supporting conditions for its furtherance, with strong attention to inter- and intra-generational exchanges and social learning. It generates strategies for associated lay knowledges (adaptive; building capital) for dealing with flood risk.

Resources⁵ for sustainable flood memory are the narratives, oral and archived histories, physical marks, artefacts and material practices in the landscape, and media representing floods, comprising folk memories, autobiographical accounts, personal stories and anecdotes of previous floods (routine–severe) and their impacts. These may be embedded or require surfacing in local communities, to become connected as ‘watery sense(s) of place’. Living with rivers and wider water-associated risks (scarcity, quality, security) mean knowledge, expectation and resilience become part of understanding place, distinctiveness and potentially ‘community identity’. This conceptualisation of place is evidenced in wide-ranging literatures. In Sutherland and Nicholson’s (1987) *Wetland: life in the Somerset Levels*, living with flooding is depicted as a marker of place identity (McEwen *et al.* 2014). Hence, research with emplaced communities on collective and communicative flood memories should afford a protocol connecting knowledge, community, memory and resilience.

Research methodology

Our research comparatively studied residents in four floodplain settings, with different histories, forms and levels of flood experience⁶ and kinds of ‘communities’

(Table I). In-depth semi-structured interviews (duration 1–4 hours) were undertaken with 65 residents across the case studies: 16 (Setting 1), 14 (Setting 2), 12 (Setting 3) and 18 (Setting 4). Interviews covered recording, communicating and maintaining or discarding flood memories, and their perceived relationships to community resilience. Interviewees were identified using snowballing techniques, combined with a quota sampling approach based on gender and age (35 males and 30 females). Age distribution was 27 respondents over 65, 25 aged 41–65 years, nine aged 25–40 years, and four under 25 years (with youngest participant at 18).

Younger people, weaker socio-economic groups and people from ethnic minority backgrounds were harder to access. To address this, techniques were adapted using ‘off-road’ interviewing, which allowed the environment to act as an ‘interview-prop’ to scaffold remembering in situ – prompting interviewees to talk in ways that might not occur in formal settings. Slim *et al.* (2006, 148) refer to ‘walkabout’ interviewee-led interviews – as ‘freeing the mind . . . allowing someone to recall the past more easily’, while Holmes and Pilkington (2011) adopted off-road techniques to attract interviewees who rejected formal settings yet possessed unique local knowledge. Similar methods successfully engaged reluctant interviewees, particularly in Setting 3, where pockets of local flood knowledge existed but also histories of mistrust between community members and experts. In addition, an e-survey covering similar themes was implemented to engage young adults, with 27 responses; 44.4 per cent of respondents were aged <40 years; only 11 per cent were >65 years. Using a grounded theory approach, themes emerging from interviews and the e-survey were coded using NVivo software (generating 168 nodes gathered under 11 parent nodes), and then analysed.

In reflecting on our methodological design, it is important to recognise we were not just capturing or analysing representations of memory but were also actively involved with ‘remembering flooding’ in (re) creating flood ‘memories’ with participants through our research processes. We actively sought to address ‘problems’ of forgetting flooding while seeking to interrogate forgetting as a productive informative process. This is important to emphasise because forgetting may diminish resilient knowledges and social learning that flood memories help develop. In fact, Muzaini argues that forgetting, ‘as it involves active embodied, material and spatial practices of producing absences’, is as important as memory and place, ‘espousing forgetting as productive practice’ and emphasising ‘absence in human–landscape interactions’ (2015, 102). In another context, Connerton (2008) articulates seven types, including ‘forgetting for annulment’ and ‘forgetting as constitutive in the formation of a new identity’ – both relevant for flood settings keen to move on. The extent of the timespan between the 2007 floods and our research also presented

methodological challenges. After dramatic flood events, vivid oral history accounts are often immediately gathered (e.g. Preston 2002, after the floods in Lewes in 2000), but what issues exist in garnering *later* reflections? Our research took place post-flood and made it harder to engage with how flood memories were created as the event played out. It did allow us to explore how memories had persisted as stories and knowledge.

Explorations in flood memory and knowledges post-2007

Below we have organised findings around five key themes that draw together the main issues when exploring sustainable flood memory: importance of emotion and affect, changing practices of flood materialisation, the proactive character of remembering and forgetting, and how ‘community’ varies.

Memory, knowledge, emotion and affect

Our data showed experiences of the flood elicited a spectrum of bodily, emotional and affective responses from anger, fear, sadness, grief, trauma, stress and loss to excitement, awe, challenge and triumph – in complex relations and intensities within individuals and communities as water came, stayed and receded. These responses extended beyond predicted emotional reactions to major incidents (e.g. shock, fear, guilt, anger; Health Protection Agency 2011). We suggest knowable emotions settled out of affective states (non-conscious intense experiences) into known feelings and became coded as flood memory. These memories form important knowledge ‘stocks’ in relation to flood resilience, which need to incorporate both psychological and informational ‘assets’. This settling of memory can also be collective through exchanges, media engagement, photograph sharing or battling with insurers and builders. Sifting through this memory is critical.

Emotions ranged from typical excitement ‘fight or flight’ responses to calmness or depression. ‘A shot of adrenalin’ is how one interviewee (Setting 4) described initial flood effects. Another remembered her living room filling with floodwater and her furniture ‘bobbing about’. Yet despite these circumstances, she recalled how she saved her possessions with strength and determination that, looking back, surprised her.

I had . . . flood bags . . . a good invention really, very strong polythene bags, nothing else, but how on earth I got the settee in the bag I don’t know. Because it’s a Parker Knoll and it’s ever so heavy! . . . I don’t think I could do it now. And I got the armchair in. Well I must have got both armchairs in because . . . I’ve still got the same furniture. They were bobbing about in the living room. A big settee and two armchairs in these huge polythene bags. (Interviewee 35, female, 79 years, Setting 3)

Others recall being calm despite chaos and their own expectations of their responses.

But actually on the day, the emotion on the day, I think strangely I was quite philosophical on the day wasn't I? [asking partner]. (Interviewee 48, female, 64 years, Setting 4)

Some remembered disempowerment and trauma.

We put in a flood barrier and when it started ... I thought, we are going to be alright, this is going to handle it. In fact water got so high, it washed the top of the flood barrier away. And I just told everybody [at business] get your cars and get out. And I sat in my pickup in ... the car park and cried my eyes out. There is a total helplessness about that situation. Floods and fire – you can't do anything about it. (Interviewee 68, male, 65 years, Setting 1)

Others reported rapidly alternating emotions of awe and grief as the flood played out, while some reported significant delays to emotion.

With the flood, the emotional bit came way afterwards ... (Interviewee 9, female, 48, Setting 1)

But memory, emotion and affect are highly complex, entangled and uncertain. Memory of a past flood was often also a memory of the emotion (fear) and in remembering that flood, emotional responses become active again. Throughout disasters, it is well established that frequently 'emotional highs' and 'emotional lows', reflecting duality of 'triumph' and 'trauma', occur in collective reactions (Health Protection Agency 2011; Klaebe 2013).

Materialising and memorialising floods

Flood 'materialisation' can be defined as the practices by which flood event, character and impact are visualised, captured and shared in public as well as personal settings, through use of graphic marks, objects, texts and images. Flood 'memorialisation' is the process by which 'facts' of the event (e.g. high water levels) are recorded and the (emotional) memory of flood impacts is honoured. Both are linked to processes and practices of 'active remembering'.

Respondents across all Settings indicated that diverse methods of materialising and memorialising floods were used during and after the 2007 events to capture experiences, and to differentiate 'routine' from 'exceptional' flooding. Epigraphic marking of maximum 2007 levels, sometimes relative to historic 1947 floods, took place in private and public settings (e.g. a church (Setting 1), tea rooms (Setting 1) and garages (Settings 1, 2)) on individual or group initiative (Figure 1A–C). Flood materialisation also occurred through more traditional archiving – in personal, family and collective 'flood albums' (Settings 1, 4; Figure 1D–F), and through oral history and reminiscence storytelling (Setting 2).⁷ In one instance, a decanter of turbid 2007 floodwater was still on display in the home in 2014 – a materialisation and a memorialisation that produced 'disgust' (Figure 1I). Notably, increased use of communication technologies (social media; photo-sharing sites) expanded 'community' connections from local to regional and global (Garde-Hansen et al. 2016; Krause et al. 2012).



Figure 1 Forms of flood materialisation: collective and personal settings. A/B, epigraphic marking of varying persistence; C, remembering personal flood levels; D, July 2007 'a weekend in history'; E, historic 1947 flood photographs; F/H, sharing 'flood albums'; G, historic community protection measures; I, preserved flood water

Flood materialisation varied in extent to which it was 'official' or 'unofficial' and verifiable, at personal or community levels. Locations for sharing and exchanging flood records included informal opening up of a house to display photographs *during* the event (Setting 1), and newly drawn together collections of historic photographs in local government 'county' archives (by volunteers; H). Flood materialisation also occurred as 'everyday' within the home – through repairs and improvisation (e.g. reflecting past flood recovery; Setting 3), individual resistance and resilience measures (e.g. electricity sockets raised; flood gates or 'slats') or community protection structures (Figure 1G).⁸ Importantly, two strong themes from interviews cluster around notions of 'active remembering' (conceived as part of establishing sustainable flood memory) and 'active forgetting' (symptom or failure of establishing sustainable flood memory), which we will incorporate later into a conceptual diagram (Figure 2).

Active remembering

Efforts of active remembering or continual efforts to remember – at individual and group levels – were evident to an extent in all settings, but in differing ways. Active remembering of flooding (e.g. of past levels) was articulated in Settings 1 and 4, with lived experience of flood memory as anecdotal lay knowledge.

And then the Sunday morning, I got up early and I could see the water was going to come in because at [city name] Lock, there's measurements and if it's 23-feet which the normal river level is about 10 ft. At 23 feet, it's going to come in the house. (Interviewee 35, female, 79 years, Setting 3)

In Settings 1, 2 and 4, social remembering occurred through development of tight 'associations' (Hemming 2011) – small clusters of people with shared mitigation objectives brought together during or immediately after the 2007 floods (e.g. in affected streets). Flood memory

could act as the 'grit' or catalyst for individual or collective self-organisation, action and adaptation, in implementation of resistance/resilience measures, in campaigning for structural protection or clearing local drainage ditches. Rehearsal and reinforcement of local flood memory was observed through action group meetings, and persistent activism at local, regional and national levels to secure organisational inputs to their collective flood protection.

Within some Settings (particularly 2 and 3), we encountered community members with high profiles in terms of flood memory and lay flood knowledge, who were trusted more than flood risk management organisations. In these urban floodplain groups, individual memories were articulated in terms of widespread long-standing disillusionment with, and distrust of, agencies. Below, a resident (Setting 3) describes a neighbour as a local 'flood champion'.

There's a guy by us – they call him Noah because he's permanently on about the floods ... Oh God, he's a legend. ... Everything he said would has happened ... Because the Authority said, 'No, no, it won't make any difference, you won't get floods and all this'. (Interviewee 35, female, 79 years, Setting 3)

The neighbour reflects on his knowledge.

'What qualifications have you got?' I said 'On paper, nothing. But I do believe my living in, on and around the floodplain and travelling in boats at flood time, and working on the river in all of its moods makes me an expert in my own right'. Because to me, you can't beat practical experience. (Interviewee 31, male, 73 years; Setting 3)

In other Settings (particularly 4), flood memories embodied much more positive experiences of working with official flood risk management organisations to mitigate risk after the 2007 floods. This ongoing co-working kept flood memory alive in the consciousness

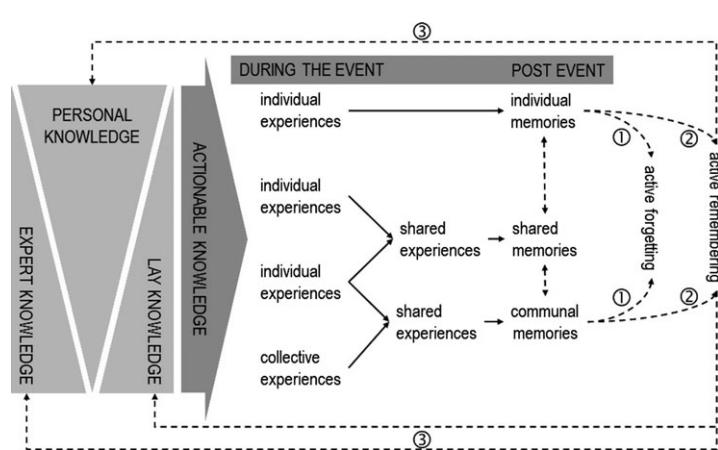


Figure 2 Towards 'sustainable flood memory': pathways of active remembering and forgetting in relation to knowledges

of both the ‘association’, other community members and the agencies.⁹

In my day, 40 years ago, we wanted to improve the flood banks then, and we had a sub-committee within the village that increased the [bank] height . . . with completely our own efforts really. [...] We were already existing with a pretty good set-up . . . then after the 2007 flood it was realised by the village that the flood defences wanted making much higher and . . . stronger. So this sub-committee was formed of five of us . . . , and we then started making plans to get grants. (Interviewee 56, male, 75 years, Setting 4)

Although only one resident had lived through the 1947 floods, this lay knowledge was actively shared within both ‘association’ and wider community. Exchanges drew on memories of an earlier ‘association’ set up to increase structural protection of the village after previous floods.

In remembering the 2007 floods, interviewees (frequently in Setting 1, less in others) drew on vivid childhood memories of extreme and ‘normal’ floods. Such memories originated only from places with flood histories, or with migration from these areas (e.g. in retirement), embodying attitudes to living with water. These included historic awareness of hydrological variability and differing perception of what today are considered risks in routine activities during floods (e.g. open schools).

I’ve always been brought up around flooding. As a child, we used to walk the floods. We’ve done it on Christmas Day, to walk to the pub at [name] across the embankments, the flood barriers. There was water rushing; it was quite deep. All holding hands linked; . . . mum had wrapped scarves around our hands [...] And then we all went to the pub for a drink. Well, they did; we all just played in the floods. (Interviewee 1, male, 34 years, Setting 1)

Within such accounts, emotional registers of response (nostalgia) and memory were evident.

It was always an exciting time when the floods came up because where we lived we had access to lots of little boats . . . It was exciting times back then. (Interviewee 11, male, 36 years, Setting 1)

Such memories were interwoven with lay knowledges of past coping strategies and ‘folk wisdom’ on how to minimise damage that could be drawn on in preparing for future flooding. Moreover, they related to maintaining urban and rural livelihoods.

Ever since I was a youngster I can remember the floods coming in . . . It was a regular thing that in February you always looked out to see . . . across the meadow as we called it . . . And because the river would overflow and you’d keep your eye on it, you see ‘oh it’s coming up . . . , get the furniture up, get the carpets up’. (Interviewee 36, female, 82, Setting 3)

There’s some vivid memories that I had when I was a boy. In 1947, for instance, rowing around in a boat and feeding the

chickens [which were] roosting in the trees. (Interviewee 56, male, 75 years, Setting 4)

Flood memories shared horizontally during flooding (conversations, messages, stories, media) revolved around specific impacts and support from close family and friend networks (in Setting 1), in responses to risk and losses. Motivations for active remembering included a strong will to give mutual support during crises (‘my biggest memory of the 1947 floods is going out to [help]’ (Setting 4)), and in collective activism for structural interventions. One model articulated (Setting 1) was the ‘flood friend’ – a trusted confidant offering emotional and other support during floods and recovery. Roles of ‘flood friends’, where personal links exist between memory, lay knowledge and resilience building (e.g. sharing archives, coping strategies and interventions), have strong potential for development in social learning in and across emplaced and virtual communities.

Active forgetting

One key aspect was the prevalence of ‘active forgetting’ – or repression of memories. Some interviewees associated floods with trauma, reporting being ‘on edge’ when it subsequently rained. This occurred particularly in Setting 2, where residents mainly lacked previous flood experience. Media narratives of flood victimhood may play greater roles in such settings.

I think you’ve got to actually try and forget them cause they were terrifying. [...] Obviously for two or three years after those floods every bit of rain, every bit of flooding terrified some people, absolutely terrified them. They thought that this was all going to happen again. (Interviewee 29, female, 76 years, Setting 2)

Active forgetting also related to belief in structural flood solutions as *total* flood protection, lacking awareness or choosing to ignore their design limits and residual risk. What messages are conveyed with new or upgraded flood alleviation works? ‘It will never happen again’ or ‘this is a flood risk area?’

And then after that in the 1970s we put up the new defences and it was working extremely well. People got more confident [...] some of the semi-derelict houses were bought and completely rebuilt and that sort of thing. So we were quite confident really. (Interviewee 56, male, 75 years, Setting 4)

Some individuals chose to forget through deferring responsibility to flood risk management agencies and government.

Okay . . . many people have done something about developing their houses better. But I just don’t think they should dwell on it. Otherwise it’s going to make life a misery. Quite honestly. Leave it to authorities to try and be alert and aware of the possibility of a flood. (Interviewee 29, female, 76 years, Setting 2)

Others actively hid memories (removed flood marks; did not share photograph collections) perceived as damaging socio-economically, i.e. better not discussed when promoting the town as 'back to usual business'.

I've got a whole load [of photographs] ... but I never got to upload them . . . You mention [town] and all people think about is this picture that appeared in [newspaper] . . . of [town] surrounded by floods. A lot of the business people thought it was quite negative. So I didn't publicise too much that I had the pictures because I didn't want people whining. (Interviewee 10, male, 41 years, Setting 1)

Tensions between economy and memory (concerns about local house values, tourism, retail and insurance premiums) decreased the desire to remember. Frustrations were manifest about media representations of the town's flooding, with associated local blight (lowering house prices; businesses closing). In Setting 1, this was connected to widespread miscommunications in national newspapers that equated 'routine' floods with 'extreme' flooding and closed businesses.

Changing nature of community and (re)developing flood memories

We now address the changing nature of communities with diminishing fragile lay knowledge networks. This has important implications for sustainable flood memory and local resilience, including reduced relationships with flood risk management agencies. Respondents in all settings reported memories of experiences of revitalised community spirit and galvanised community action in flood response (cf. 'social fusion'; Gordon 2004). In some cases, renewal had been sustained. In others, that spirit and opportunities for social learning were subsequently lost. In Setting 3, some flood memories, particularly those of older interviewees, described changing communities, break-up of groups and losses of lay flood knowledge.

All strangers . . . I don't know anybody next door that side. You see, this house this (other) side was all knocked into flats. I think it's either six or seven self-contained units for students. Never see anybody. (Interviewee 31, male, 73 years, Setting 3)

Examples also occurred of fragile historical flood narratives being kept alive (e.g. informal knowledge being passed between older people in collective settings like sheltered housing):

I said to them . . . I had lots of pictures and would anybody be interested, and they said 'yes' . . . this is a building where people retire, so we have lots of people moving in and out. We have had lots of newcomers who wouldn't have a clue, so of course they were very keen to come and have a look, and they were astonished. (Interviewee 33, female, 75 years, Setting 3)

When memories were exchanged horizontally (e.g. 2007 saw flood networking on Facebook), this was

generally disconnected from vertically integrated memories categorised above, but ripe for development alongside Twitter post-2007.

Reconciling memory, lay knowledge and resilience for practice

We now discuss questions about relationships between flood memory, lay knowledges and resilience, how one can lead or influence the others, and implications for flood risk management. To illustrate this, we refer to a conceptual diagram with pathways in discussion below (Figure 2).

How does flood memory become knowledge?

Our research indicates lay knowledge about flood risk can be built experientially from individual (personal) and community (including expert) memory of flood extremes into 'actionable knowledge' (Antonacopoulou 2008). This chimes with Haughton *et al.*'s (2015) account of 'hybrid knowledge formations' in relation to flooding. Such knowledge includes flood-generating conditions, coping strategies to mitigate losses, accessible knowledge networks and adaptive opportunities for recovery. However, flood memory–knowledge relations draw from collective experiences as floods play out (often shared) and individual memories (often private). Lay flood knowledge can also be derived from communicative, intergenerational and archival memory, unevenly accessible in settings though always considered communal memories. Relationships between memory and community lay knowledges are complex and connections unpredictable because in some settings, memory can be individualised, unevenly distributed, hidden or actively forgotten (pathway 1). What is selectively converted from flood memory into lay knowledge has congruence with individual and collective attitudes, identities and belief systems (Furnham 1988).

Critical to this conversion is the effectiveness and persistence of connectors and connections between memory and knowledge (pathways 1 and 2). Lay knowledge drawn from individual or community memory is not always accessible or connected to other forms of knowledge. Additionally, memory can fade or become silenced if not 'scaffolded' (Sutton 2016) through familial, neighbourhood, community and stakeholder relations as well as media (e.g. memorialisation of anniversaries). Notably lay knowledge is not a neutral term but rather a social framework or schema (Bartlett 1932; Brown and Reavey 2015; Halbwachs 1992 [1925]), and more than a collective memory framework. Other multimodal communication frameworks and their inter-relationships are increasingly relevant – integrating personal, collective, communicative and cultural memory through active remembering

(pathway 2) that feeds back to personal, expert and lay knowledges (pathway 3).

Our research indicated access to collections provided by public institutions – such as regional archives ‘preserving’ flood knowledge as a form of cultural memory – is at best partial and uneven. County archives were perceived as ‘where experts go’ (e.g. genealogists, local historians), whereas most people we interviewed would more commonly ask a ‘flood friend’ (if they had one). With development of social media, post-2007 lay archives were perceived as becoming more accessible and ‘flood friends’ as more than local.

One tension evidenced is where conflicts exist between memory, lay knowledge and expert scientific knowledge. We found lay knowledge (e.g. from local expert ‘Noah’; Setting 3) as available for conjoining with expert knowledge if actively reconstructed as a safe space for sharing of (possibly traumatic) flood memories. For example, detailed local-personal knowledge of flood runoff patterns from urban development may challenge scientific accounts but offers entry points for engagement, which ought to be more participatory.

What are the tensions between active remembering and active forgetting?

Relationships between remembering and forgetting flooding can be highly sensitive, contested and matters of local negotiation for, and between, individuals, communities and agencies. Strong flood memories were created, retained and shared during our research, acting as vital knowledge (re)sources for community resilience. However, strong memories also pre-existed our research in certain settings. For example, Setting 1 had significant community capital on living with water and ‘watery senses of place’. Likewise, rural Setting 4’s flood resilience, particularly within its structural protection, was based on well-developed senses of ‘community’, community capital (higher socio-economic status, education and well-networked), and home-grown collective interventions. While Setting 3 was originally selected for having higher numbers of transient residents (i.e. assumed higher instances of forgetting), in fact, we found a small but diminishing group of older long-established residents, with strong but spatially constrained networks. Here flood memory is more vulnerable to fading and forgetting, as changing neighbourhoods mean stories are not passed vertically through generations or horizontally across networks.

Therefore, complex processes of active remembering involved not only individuals’ mental processing, but also an evolving, unevenly distributed mix of community networking, photography, social media, local visual signals and flood marking, unofficial (personal) and official (archives). Where such memories were generated, archived and shared is, in effect, ‘best practice’ in sustainable flood memory, i.e. creating a strong

collective sense of flood history and place. These settings for sustainable flood memory were not always rural, or a settled community, but could be urban, where a community or a significant individual with lay expertise shares flood memories offline and online.

A key tension identified is between the drive for flood risk management governance to increase lay flood knowledges, and implementing this in particular contexts where flood memory is ‘hard-to-reach’, fragmented or repressed. This occurred particularly in settings without cumulative flood knowledges through repeated flooding and associated adaptation. For example, emotional stress, concerns over property values and perceived economic threats were challenges to remembering. Forgetting is also part of place making (cf. Muzaini 2015), but is often not possible completely. Even if people wish to forget, reminders exist (e.g. within the landscape or sensory) that bring memories back. This poses questions about the characteristics of people who ‘actively forget’, and whether certain aspects of forgetting be fostered for some individuals (e.g. from public health perspectives) but not for others (e.g. from flood education perspectives)? Is it possible to ‘forget’ emotionally and still draw on critical resilience knowledges in future? Is active or strategic forgetting necessarily a failing or problem, and remembering a virtue?

Towards reconciling flood memory, lay knowledge and resilience?

Here we explore how, when and where flood memory as lay knowledge can be turned into actionable knowledge to influence resilience. Fundamentally, memories – to become sustainable – need storing and to be made accessible to all groups, i.e. as flood memory interwoven with ‘portable’, ‘shareable’ lay knowledges, that act as important social capital for resilience. There was good evidence of self-organisation and adaptability in some communities drawing on such resources. However, it cannot be assumed lay knowledges are always positively framed or used to increase resilience.

First, Myerhoff’s (1982) ‘re-membering’ is useful. Processes of establishing sustainable flood memory require some re-examination of memories and reforming of a new set of memories, modified and annealed through constructive processes of sharing and reflection. Both need developing as means of increasing flood resilience within and across communities.

Second, flood memory with its potential to inform lay knowledges needs to feed into adaptive processes to develop resilience, through rehearsal, translation and potentially reconstruction of archived community/collective memory into practised lay knowledge and conversion into future action. Of paramount importance are knowledge sharing, social learning (i.e.

'productive mutual learning' with creative and cultural sectors; UNESCO 2013, 35) and preparedness beyond the individual. In Settings 1 and 4, strong evidence existed of 'trusted' lay knowledge being linked to flood resilience (structural, emotional) and community capital. Our research here showed active processes of collecting, recollecting and circulating flood memories underpinning trusted lay knowledge.

Third, conditions for effective social learning through memory are shaped by local socio-economic conditions, social capital, 'sense of place' and whether flood narratives survive. In urban Setting 3, notions of community memory and knowledge within older residents were significantly undermined by increasingly fragmented community relations. Residents here were less likely to develop a 'watery sense of place' to help them deal with future flooding. In contrast, in rural Setting 4, a coherent sense of community enabled extensive collecting, storing and sharing of memories (through anecdotal recollection and media), although not without some tensions. In evidence was linkage of memory to actionable knowledge for future resilience.

Fourth, memory can be practised vertically (between generations through time) as much as horizontally (in the moment of flooding and via intergenerational memory practices). (Re)connection of horizontal and vertical axes of memory (and associated lay knowledges) provides opportunities particularly for the 'vernacular' development of 'communities of memory' (Pickering and Keightley 2013) that actively pursue intergenerational learning as opportunities to 'thrive rather than survive'.

Finally, flood memory and lay knowledge relations as evidenced within archival memory need to be drawn on with reflective criticality throughout the flood 'adaptation cycle',¹⁰ not solely *during* floods and in recovery. Sharing of flood memories in public archive settings (as in our project) provided social learning opportunities when archives can be accessed, mobilised and connected. Future research on local 'memory organisations' (e.g. archivists, media actors and business archives) is important if we are to appreciate how sustainable flood memory as practice can be utilised to increase resilience at different scales, i.e. individual (micro-memory), household or community (meso-memory) and social-historical-political (macro-memory). We suggest development of 'resilient knowledges' can be fed through inter-scale relationships, with sustainable flood memory as potentially the connective tissue.

What are the implications of sustainable flood memory for distributed flood risk management?

Paradigm shifts in UK policy from 'flood defence' to flood risk management in the mid-1990s (Tunstall *et al.* 2004) have step-changed flood management to a more distributed model, in which the public take some

responsibility for residual flood risk and their own protection (*UK Flood and Water Management Act* 2010). However, individuals unaware of flood risk may fail to remember past floods or have little flood knowledge to be prepared. Research on public risk awareness critiques assumptions that information transfer – flood risk management agencies to public – can alter behaviour in predictable ways (Clark and Priest 2008). This situation suggests social, cultural and historical approaches are required. We argue for a deeper, more materialised and embedded (i.e. contextual) understanding of flood experiences and resilience through flood memories and associated lay knowledges. Accessing, protecting and sharing these memories (in all their forms), knowledges and resilient thinking recognises individuals and communities as powerful resources for distributed flood risk management. This requires specific engagement, not just with particular groups, but also with significant intra-group differences. Such understandings can be applied by communities themselves, and by or with flood risk management agencies, with potential to transform local resilience thinking and practice. However, it cannot be assumed by agencies or communities that memory and associated lay knowledge are *easily* accessible, shareable and not prone to active forgetting or fading. They need careful unpacking, enhancing and sharing.

Our research indicates that, in the UK, local flood risk management agencies to date have only made limited attempts to engage with, secure and enhance lay knowledges drawn from flood memories. Much more can be done. Policy calls for distributed flood risk management tend to focus at town or village scale through an overarching perspective of national flood planning. Framing through sustainable flood memory includes attention to personal, hyperlocal and micro narratives that can provide evidence for more inter-scale thinking within decision-making and practice. Personal memories show up diverse ways that individuals materialise flooding during events through horizontal and shareable modes (oral recordings, artwork, videos, photographs, social networking, diaries and news reports).

Thus, creating strategies for archiving and sharing mediated flood memories between researchers, flood risk management actors and communities has the potential to facilitate social learning over time. Likewise, institutional actors need to understand how community memory functions (at individual level), and how best to engage floodplain groups to increase their adaptive capacity through post-flood learning. Contrasts may be made between the character and longevity of individual, community and institutional memories, with implications for how organisations work with communities (e.g. through media storytelling). However, practitioners' mindfulness of active forgetting should note both

horizontal and vertical axes, and their connectivity. While memories can be passed on publicly or institutionally (e.g. flood groups, 'Water Festivals'), their sustainability depends on active 'rememberers' and listening audiences across generations.

Attention needs to be given to changing roles and potential of technology in horizontal and vertical exchanges of stories as a vehicle for developing sustainable flood memory across mediated forms. Flood memory also incorporates emotion and affect, having implications for developing lay knowledge, behavioural responses and decision-making (whether preparedness or lack of action), and endeavours to co-manage these in and with communities. Complex interplay between 'trauma' and 'triumph' of events and memory retention (as knowledge) is critical to notions of sustainable flood memory and resilience. These processes need careful investigation and management if individuals and communities are to develop psychological resilience and practical assets to deal with future floods and live with risk.

We offer recommendations about how sustainable flood memory (as strategy, process and practice) could be utilised to increase flood resilience at wide-ranging

scales. Such explorations require theoretically informed questions concerning production of sustainable flood memory (Table II), structured around *building, organising and sharing* of memories throughout the 'adaptation cycle' by communities and flood risk management agencies.

The future of sustainable flood memory?

In concluding, and in terms of future academic research into resilience, flooding and other disaster scenarios, we argue that complexities of memory must be engaged with more deeply. As Jones and Garde-Hansen (2012) and Jones (2011) have argued, in wider terms, memory is a fundamental underpinning of individual and collective life in place, and thus needs attention in any deliberation of individual and collective resilience (or lack of). But the deeply complex, fluid and ecological nature of memory means this task has barely got underway, and throws up many conceptual and practical challenges. While relationships between memory and lay knowledge are complicated and under-considered, listening deeply to flood memories and making space for them in flood risk

Table II A conceptualised framework for sustainable flood memory as process-practice within flood risk management decision-making for local resilience

Questions	Actions
<i>Building sustainable flood memory</i>	
1 Does lay flood memory exist?	If so, interrogate its use/usefulness, availability and accessibility. If no, go to 4.
2 Who are the marginalised groups disconnected from local memory and lay knowledge systems?	Establish which residents have no potential for links between memory and experiential lay knowledge. Establish whether young and older citizens are connected for communicative memory processes.
3 What are the opportunities and barriers for connection of horizontal and vertical axes of memory?	Rethink how intergenerational communities of memory develop locally.
<i>Organising sustainable flood memory</i>	
4 Is lay flood memory being archived? (NB. transient groups)	Provide active encouragement for lay and organisational archiving of flood experiences and their integration.
5 Where are the archives?	Work to signpost archivists and archives. Connect archives at different scales (local, global).
6 Who are the archivists and gatekeepers to archival memory and lay knowledges?	
7 What are opportunities and barriers for flood stories to be organised horizontally – not only during floods but in recovery and preparedness for future floods?	Revisit how flood risk management agencies deal with storytelling and anecdote at institutional and inter-agency levels; how knowledge conflicts are collectively reconstructed.
<i>Sharing sustainable flood memory</i>	
8 Where are the effective entry points for sharing sustainable flood memory and sustainable flood memory practices?	Encourage 'flood friends' in individual memory practices as valuable 'entry points' in sustainable flood memory within individual/household level planning. Flood action groups have similar potential for collective practice in sustainable flood memory; mix archives and 'flood friends' in remembering.
9 Where are the connections and disconnections between flood memory and lay knowledge?	Ensure spaces for critical reflection and social learning within communities; and between communities and flood risk management agencies.
10 How can memory and lay knowledge be integrated within more formal flood risk management decision-making processes?	Ensure protected and trusted spaces for sharing and reconstituting different knowledges (lay, expert).

management offers an applied and actionable approach within memory studies.

Distributed flood risk management requires flood resilient communities – empowered and well-informed groups with community capital across demographics that can adapt, thrive and seize opportunities. Our research has encountered considerable data and local learning resources that support the concept of sustainable flood memory, as a frame for multi-stakeholder flood awareness drawing on new as well as forgotten knowledge bases. These findings provide insights into the importance of embedded and embodied relations with memory as having potential for actionable knowledge in understanding flood resilience in different settings. If lay knowledge is vital, then sustainable flood memory (integrating individual, collective, communicative and archival memory) needs to be collected, re-collected and circulated if it is to become local knowledge for action. Most critically, memory work in communities and associated social learning needs to be practised vertically between generations as much as horizontally in an increasingly socially mediated environment.

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Notes

- 1 ‘Expert knowledge’ as a concept and its use in flood risk management include ideas of ‘top down’ state flood management, and primacy of engineering solutions as flood defence.
 - 2 These floods were caused by sustained, high intensity, spatially extensive rainfall, combining fluvial, pluvial and groundwater processes, with low annual percentage probabilities of occurrence (<0.5 in some catchments; Marsh and Hannaford 2007).
 - 3 ESRC *Sustainable flood memories* research integrated expertise in flood risk management, cultural geography, media and memory, social anthropology and oral history.
 - 4 For example, 2010 Pakistan floods (Murthy and Longwell 2013) or representation of UK floods (1950s–2000s) (Escobar and Demeritt 2012; Furedi 2007).
 - 5 ‘Resources’ is used both in the sense of the memories themselves, and as an evidence base for researchers that demonstrates the existence of sustainable flood memory.
 - 6 It is well researched that experience plays a crucial role in risk perception (Bradford *et al.* 2012; Tobin and Montz 1997).
 - 7 The most severe 20th-century flood occurred in March 1947, generated by warm rain on snow, and currently within living memory of older floodplain residents (JISC Co-Fast) forms part of collective flood memory.
- 8 ‘Slats’ are traditional wooden barriers slotted into doors for flood resistance.
- 9 The resultant partnership flood defence project was co-funded by the community and the environmental regulator.
- 10 This cycle comprises preparation, flood event, recovery and mitigation.

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