Assembling the flood: producing spaces of bad water in the city of Hull

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Abstract. In this paper we approach flooding as a socio – natural – technical assemblage, a phenomenon that comes into being in relation to the spaces that 'bad water' occupies. We use the case of the major flood in the city of Hull (UK) in June 2007, and the accounts of those who experienced it, to follow the water of the flood into homes and household spaces. We find that the spatial and temporal occurrence of the flood is not simply known and definable, but is instead emergent in specific local contexts. We show how the assemblage of the flood can be understood at different resolutions, moving from the flood as a city event; to the street-level processes and interventions which shaped how water flowed locally; and into the detail and materiality of the home, its transgression by water, and the process of the home becoming a flooded space. Through the analysis of data from two parallel projects examining the experiences of adults and children after the June 2007 event, we show that the boundaries of the flood remained open and contested, their spatial and temporal definition fuzzy and socially complex. Implications are explored in relation to the processes embroiled in producing flood status and the consequences for the actors involved. Wider conclusions for understanding the experience of disaster are also drawn.

Introduction

In late June 2007 sustained heavy rainfall delivered a deluge of water into the city of Hull, an urban space that proved unable to distribute the intense flows of rainwater into its infrastructure of drains and sewers. The water became a flood, a hazard, and an event, beginning on 25 June, ending on or about 30 June when the excess water drained away and disappeared from view.

In this paper we use this particular case and the accounts of those who experienced it to consider the phenomenon of flooding as a process of assemblage. Flooding we see as a relational phenomenon that comes into being through the spaces that 'bad' water (Kaika, 2005) occupies. That 'coming into being' involves the assemblage, or combined and often unstable mix of natural, social, and technological elements, that constitute the interacting and contingent processes of flooding. These, in turn, produce the emergent condition or status of 'being flooded'. Taking this conceptualisation into the setting of June 2007 in Hull, we follow the floodwater into domestic spaces to find that its spatial and temporal boundaries cannot simply be known nor generalised, and that the boundary of being and not being flooded is less distinct than at first it might seem. In doing so, we reveal hidden local geographies and ambiguities, and contested knowledge claims over the distinction between the wet and the dry and the victim and the onlooker.

In focusing specifically on following the water into the homes and lives of the Hull residents we do not attempt to provide a full account of what preceded or what followed the movement of water into domestic spaces. For the thousands of households who experienced the flooding, its impacts did not recede on 30 June 2007 or stay

¶ Formerly Sims.

within its initially defined borders. This experience, as for any form of disaster, has involved indelibly elongated and interwoven social and economic impacts that stretch far beyond its immediate time and place (Erikson, 1994; Graham, 2010; Harada, 2000; Oliver-Smith and Hoffman, 1999). In other outputs from our research in Hull we have examined the consequences for peoples' lives and the 'recovery work' entailed, highlighting in particular the value of listening to householders' accounts. We have also engaged directly with policy processes and with informing the practical work of local and national organisations in a very interactive research process (see Sims et al, 2009; Walker et al, 2010; Whittle et al, 2010). In this paper we step back to think more carefully about the phenomena we have been researching, and in so doing focus on a crucial entry point to the consequence of flooding—the movement of water towards and into the home. This, as we shall demonstrate, merits a more involved theoretical and empirical analysis than might at first sight appear necessary.

Our way into the case study is through the experiences and narratives of those most directly involved. The paper draws on the findings of two parallel projects in which the experiences of those flooded were accessed in various ways. The first project used interviews, group discussions, and the writing of diaries over an eighteen-month period by forty-four adult participants, each of whom had lived with the consequences of flooding since June 2007. Participants were recruited from October 2007 across all areas of the city, with a particular focus on West Hull, as this was the area most severely affected by the flooding. The methods used for this project were derived from an intensive, longitudinal study previously used to investigate recovery following the 2001 Foot and Mouth Disease disaster in Cumbria (Convery et al, 2008; Mort et al, 2004). In addition to the core panel of diarists, interviews were also undertaken with a range of actors involved in managing the flood and its aftermath, including council workers, community wardens,[1] Citizens' Advice Bureau staff and local schoolteachers.

We also conducted a second 'sister' project to explore the effects of the flooding on children and young people. As part of the project, the research team worked with forty-six participants aged 9 – 19 years (aged 7 – 17 at the time of the floods). The children and young people took part in workshops where they were encouraged to draw storyboards of their experiences since the floods. These storyboards were then used as a stimulus for individual interviews with the young participants.

For both the adults' and children's projects the transcripts and storyboards produced during the research were studied through a series of data clinics which involved the whole research team in an ongoing process of analysis and coding following the logics of grounded theory (Strauss and Corbin, 1994). In this paper we draw particularly on the interviews and storyboards, but all of the data elements were used to inform our analysis.

We begin our discussion by considering the meaning of flooding, outlining the significance of domestic spaces becoming flooded and the concept of assemblage as we employ it in this paper. We then follow the water, moving from the processes that produced the flood as a city event, through to street-level flows and accumulations, and into the material and social spaces of the home. The discussion focuses on what is revealed about the process of producing the status of 'being flooded' and we conclude by identifying wider implications for understanding the experience of disaster.

[1] Hull's community wardens normally deal with issues such as antisocial behaviour and environmental problems in their localities but, following the floods, they played a key role in helping more vulnerable residents with their recovery.

2 Floods, transgressions, and assemblage

Floods have an everyday familiarity and a seemingly unproblematic technical definition concerned with matters of hydrology, discharge, and water level, for example:

> "Floods are hydrological events characterized by high discharges and/or water levels leading to inundation of land adjacent to streams, rivers, lakes and other water bodies" (Petts and Amoros, page 2).

However, Arnell's (2002) more succinct definition of floods as "an excess of water in a place that is normally dry" (page 112) moves towards a more involved and relational notion. The most constant quality of water, Strang (2004, page 49) has observed, is that it is not constant. It is characterised by transmutability, moving readily between oppositional extremes, taking on and invoking meaning as an "acculturated artifact" (page 6). Flood is but one of the very many conditions or meanings that water can flow into, and out of. There is, therefore, more to understand about its contingency, and about its position amongst the multiple forms of social–natural hybrids within which water can be found (Kaika, 2005).

As Arnell's definition suggests, when water becomes floodwater, when its accumulation and/or movement constitutes a flood—rather than a river, a pond, a sea, a downpour—it moves across a boundary of spatially constituted normality. There is a transgression and a change of state. The flowing of 'an excess of water' into a water meadow, overflow channel, or sewer system maintains spatial containment and belonging. Its movement into 'normally dry' fields, streets, and car parks—beyond the familiar patterns of puddles and flows along gutters and drains—constitutes a transgression and movement 'out of place' (Douglas, 1966). When water becomes floodwater there is also a transition towards water becoming problematic and to some degree threatening, but this is not a transition which is necessarily complete or absolute (Strang, 2004). As various streams of work on understandings and perceptions of risk, and flooding in particular, have shown, the degree of perceived or assessed threat is value laden (what is valued and why), power laden (whose knowledge is at work), and wrapped up with the dynamics of experience and local familiarity (Bell and Tobin, 2007; Brilly and Polic, 2005; Buckle et al, 2003; Burningham et al, 2008; Erikson, 1976; Whitmarsh, 2008; Young, 1998).

Whilst floodwater may encroach onto streets, pavements, pathways, and gardens, for householders, with whom we are most directly concerned in this paper, it is the normality and dryness of the domestic space that matter particularly. The home (generally) represents a place of privacy, intimacy, familiarity, and security (Dupuis and Thorns, 1998; Mallet, 2004; Saunders, 1984; 1986) and is imbued with material and symbolic significance. Anything that threatens the home, including the movement of wild nature from unruly outside to ordered and domesticated inside, therefore becomes of particular significance. Kaika (2005, page 54) distinguishes between the purified 'good water' of the modern home, contained and supplied through pipe networks, and the dirty metabolised 'bad water' of external rivers, lakes, rainwater, and sewers. The spatial envelope of the home, she argues, functions as a membrane that separates 'bad' outside and 'good' inside, whilst allowing controlled interactions between the two. Under flood conditions, however, the normal functioning of this membrane breaks down, so that an uncontrolled and disfiguring interaction takes place. The movement of flowing 'bad water' into the home space has powerful agency in that it produces new forms of bad status—the home becomes a flooded home, a defiled and damaged space, its occupants 'flood victims'. These forms of status in turn have significance for aggregate metrics of the extent of flooding, for insurance claims, for the availability of compensation and support, for disruption, stress, anxiety, and much more (Sims et al, 2009; Tapsell and Tunstall, 2008; Tapsell et al, 1999; 2002;

Whittle et al, 2010). As already noted, becoming flooded acts as an entry point for much else that follows and its determination therefore has far more than just definitional significance.

One way of capturing and bringing together these lines of analysis of what flooding constitutes and how its meaning (and that which it touches) is contingently produced, is through the notion of assemblage. Assemblage has its roots in various theoretical sources and, as Marcus and Saka (2006, page 102) note, it has been the subject of piecemeal but productive appropriation across a diversity of research contexts. For us the notion of assemblage has three related dimensions: the coming together of diverse things, the product of emergent conditions, and the instability of the time – space in which the process of assemblage is taking place. It is useful, as others have found, as a way of capturing that which is heterogeneous, unstable, and situated, including how relations work out between scales of analysis (Braun, 2006; Ong and Collier, 2005).

As we shall see, for floods and becoming flooded the process of assemblage involves the human and nonhuman; the 'natural' circulations, dynamics, and flows of water; the built infrastructures of containment and spaces of dryness; and the social values, meanings, and institutions through which flooded spaces are produced and to which actions of various forms are attached. This coming together of dynamic social, technical, and natural systems creates emergent and transient outcomes that may be semipredictable in their generality but not their detail—no one flood in a place is ever the same as another [see Davies (2000) for related analysis of various forms of extreme event in California]. Indeed, as we concentrate in our later analysis on the home and its interaction with movements of water, the social position of inhabitants, and the institutional holders of expertise and power, we will see how contingent and unstable the production of the borders of the flood can be.

3 Assembling 'the Hull flood'

In order to begin constructing the assemblage which produced the particular experiences of homes and householders, we need to start with the historical and temporally specific processes that interacted to produce flows and accumulations of water in June 2007 in the 'normally dry' urban spaces of the city. Hull lies near the mouth of the estuary of a major river, the Humber. It is low lying, with over 90% of its area below high-tide levels. Historically, large parts of the city have been built on reclaimed marshland and some are permanently below sea level. As a consequence, most of the city is identified in Environment Agency flood maps as at risk of flooding, and there is a history of floods due to the movement and accumulation of both sea and river water. The June 2007 flood though involved neither category of water moving out of its place. As documented in detail in the report of the Independent Review Body on the Hull flood (Coulthard et al, 2007a) this was a 'pluvial flood', involving extremely heavy rainfall—the wettest month recorded in Yorkshire since 1882, and the highest ever recorded daily loading at various recording stations on 25 June (page 7).

A temporally particular 'coming together' of meteorological processes of air movement, humidity, pressure, and so on was at work in producing the unusually high volume of water falling from the sky. Essentially these might be framed as natural processes[2] coinciding with others that, in the particular time – space, served to limit the capacity for the fallen water to be contained. Soils in the area were already heavily surcharged and saturated from previous rainfall and the water table was sitting at a high point in its tidal-related cycle. The falling water also immediately entered into

[2] Note, however, that such extreme weather events are increasingly being linked to human-induced climate change.

and became part of the overtly social realm as it landed on the city, its streets, buildings, and open spaces. In these spaces rain water gradually changed status as it failed to be channelled and routed through the drainage infrastructure of the city, instead flowing and accumulating abnormally, and thereby becoming part of a flood rather than just a rain event.

Here the specific materiality and performance of the drainage system come into view. The drainage system in Hull is fully pumped, using mechanical rather than gravitational processes to make water flow. The system consists of a complex network of drains and sewers most of which link into the 'Humber Care Tunnel', a 10.5 km trunk sewer that transfers surface and foul water from the West Hull pumping station to East Hull's sewage treatment works at Saltend and then out into the Humber estuary (Coulthard et al, 2007b).

The particular role of the urban drainage system in contributing to the severity and geography of the flood became, in the days and weeks following, a matter of much contention. Some argued that this engineered system simply did not have the design capacity to cope with the extreme and very unusual summer rainfall of June 2007; others that various elements of the system were not properly functioning due to poor maintenance and management, including the mundane clearing of leaves and garbage from street gutters and drains by the city council. In reporting on its deliberations the Independent Review Body identified at least some institutional culpability through concluding that there were "a series of serious issues with the design, maintenance and operation of Yorkshire Water's pumped drainage system" (Coulthard et al, 2007b, page 4) and that "the flooding in Hull has revealed the difficulties of having multiple agencies responsible for different areas of the drainage system" (page 7).

At this broad resolution we therefore see the assemblage of interacting socio – technical – natural systems that produced this flood in its time and space. The coinciding dynamics of natural processes interacted with the city's urban history and topography and its failing infrastructures and institutions—which were in turn part of the wider arc of privatisation of the UK water industry through which Yorkshire Water was formed and given new priorities and demands (Bakker, 2004; Strang, 2004).

However, this is not where we concentrate our analysis. When we follow the water into the neighbourhoods and streets of Hull and thereby tighten our resolution, the generality of 'the flood' as an event becomes far more differentiated—a patchwork of local flows and accumulations of water and local processes of assemblage. The Independent Review Report comments that:

> "not all parts of Hull were struck with equal force. Given the nature of pluvial flooding, some wards or even roads within neighbourhoods were much more severely affected than others.... Even in wards that escaped widespread inundations, some localised flooding was severe" (Coulthard et al, 2007b, page 8).

As our interviewees made clear, it was not only the '*nature of pluvial flooding*' which produced the diversity of ways in which water moved within their streets and neighbour-hoods. They recounted in great detail the specifics of how water found its way through local topography, flowing across nearby fields, down streets and back lanes, into gardens and driveways, relentlessly finding its way, sometimes as a 'torrent', sometimes slowly accumulating and rising in level. For example:

> "After leaving work...I'm going up past one of the local hospitals going up hill and there's just torrents of water coming down the road. This isn't normal and then going across the top.... I've never seen rain come across a dual carriageway from one hill down to another, where there's normally no rivers and cars were literally at a crawl.... Some of the roundabouts were starting to be under water.... I was driving through water, and I was thinking 'this isn't real'" (Bruce, adults' project, interview).

They also observed the local particularities of the drainage infrastructure, the blocked drains of their street or alleyway, and the way in which 'puddles' of water became abnormally large around them, sometimes to appear and then disappear as levels ebbed and flowed. Some accounts described how the normal distribution of excess water had been shaped over longer time scales, disrupted by previous decisions to build on open land, or by the perverse actions of the council:

"Well, where I live and in many areas round here, there are ten-foots [alleyways], the refuse lorries have been down the ten-foot, broken the concrete and the council have come and tarmaced them and tarmaced over the drains" (James, adults' project, group discussion).

Other human actors also come into view in shaping the flows and accumulation of water in 'real time'. Many accounts convey a sense of helplessness in the face of encroaching water—for example, 12 year-old[3] Josh helped his dad and older brother empty the water out of the back garden into the drain with dustbins, only to find that, when they got back into the house, it was inundated anyway. Other attempts at redistribution were more successful. Tom and his friend, for example, describe how they went to great lengths to attempt to make the drainage infrastructure do its job:

"I went round to my mate's and the next morning I got up about seven o'clock and I went back round the street … . Alex went and got these poles and stuff and so we pulled it [the drain cover] up and we rammed it and it sort of worked but sort of didn't. So we got two other drains working and we were all up to our … legs in water" (Tom, adults' project, interview).

Other actions were observed to redistribute, one person's attempted resistance to flows of water shifting these into the pathway of others:

"Out here the main problem really was the neighbours on this side of the road were shovelling the water as quickly as they could … . So that was adding to the water in the road and the water here" (Jack, adults' project, interview).

Such socially produced dynamics in the flood water took other forms. As the water accumulated, settled, and lingered in public spaces a recurrent narrative was of cars and lorries creating local 'tidal waves', new repeated local flows—swishing, squishing, and showering:

"We were like sitting ducks in the middle … all the buses kept going past and lorries kept going past and they didn't realise that, as they were going past, it was making it like a tidal wave. So it was swishing, and I thought, 'I don't believe this'. … We've got three main buses that run on that back road. … so you imagine that every 10 or 15 minutes, what water was getting squished into your house. It was unbelievable" (Amanda, adults' project, interview).

These problems were so intense that 12-year-old Hayley's mum phoned up the council to try to stop them sending the refuse collection lorry on its normal round:

"The council, they were going to send a bin lorry down our ten-foot but the people rang up and said, 'oh if you send it down the tenfoot it's going to come in our house', sort of that much into our house" (Hayley, children's project, interview).

These various accounts of localised flows and accumulations of water demonstrate how the broad narrative of the flood becomes refracted through the contingencies of local circumstances and interactions. Again the elements coming together are heterogeneous—the water, the detailed topography of the urban landscape, the specific performance of parts of the drainage system, the actions of multiple social actors (council workers, neighbours, drivers). In some moments and spaces these agent

[3] Throughout the paper we have given the children's age at the time of interview, almost two years after the flood.

elements contribute to giving the flowing rainwater new meaning as local instances of
'the flood'; in other moments and spaces normal flow and status continues as water
moves along drains, into sewers, and out into the Humber estuary.

4 Transgressing the home: becoming flooded

"It was a tremendous amount of rain but the river held its banks but the drains
didn't cope—whatever they say the drains did not cope with half as much water.
We may have flooded a little; it may have flooded the streets, and maybe up some
of your drives and maybe in the garages where it was a bit low. But we may not
have flooded in our homes had the drains been better able to cope."

(Leanne, adults' project, group discussion)

In the accounts we have drawn on so far, as in the extract above, we can see a recurrent
positioning and perspective centred on the home with the water external, moving
towards and threatening to break the boundary of the domestic space. This perspective
ran through all of the interviews and group discussions of flows of water. The home is
at the centre, the encroachment is towards the house, the front and back door, and the
significant flows are those which threaten or produce movement from outside to inside
the house.

4.1 Breaching the boundary

At this point the specific materiality of the home enters the assemblage of the flood.
The movement of water into the home took place in different ways for different people
at different times, as particular flows and levels interacted with the particular built
form and physical materiality of their home. For many this was an uncanny rising of
water from below the floor (to which we return later), or seepage through airbricks,
bricks, and plaster into the room, often despite their attempts to keep it out:

"Anyway we went and we bought some sandbags as well as this time, for us and
the neighbours to try and help us but obviously it didn't. By the time we come
home it was too late, we looked in and it just started like coming in through the
walls. It didn't even come in through the door; we expected it to come in through
the door but it came in through the walls. And it just started seeping up into my
living room and hallway" (Barbara, adults' project, interview).

Similar experiences are recounted in the childrens' narratives where they reported
shock and surprise at the unexpected ways in which the water entered their homes:

"It didn't come inside our house it came underneath it and then all the floorboards,
they went all bumpy" (Hayley, children's project, interview).

"It got real deep so it started coming through the holes where you had the
[television] aerial, it's gone through there, loads of it … it's gone all over the house"
(Darren, children's project, interview).

For two interviewees the normal networks for dealing with wastewater and their
connection to the toilet and household appliances became the route through which the
'bad water' of the flood (contaminated with sewage) entered the home. Ten-year-old
Wayne was helping his parents move things upstairs when he noticed that the water
had changed colour in the toilet:

"And the toilet downstairs, all what it was, was just yellow in the downstairs
toilet. And then it all started coming through to all our washer and stuff. We
couldn't do nowt with the washer and the drier so we just left that and water just
started squirting out" (Wayne, children's project, interview).

The boundary of the home having been transgressed in these diverse, locally specific
ways, the homes and the households became 'flooded homes' and 'flooded households'.

Table 1. The definition of gold, silver, and bronze households by category and what this means in terms of council support (taken from Coulthard et al, 2007a/b, page 11) (source: Hull City Council FLOSS database figures, 13 November 2007).

Total	Number of					
	cases	council tenants	housing association tenants	owner-occupier	private rented	not known
Gold	3 741	1 161	425	1 842	303	10
Silver	852	378	18	228	224	4
Bronze	3 756	188	27	3 252	272	17
Grand total	8 349	1 727	470	5 322	799	31

Note. Gold households comprise residents over 60 years of age, people with disabilities, and single parents with at least one child under 5 years. Such households were allocated a personal caseworker, assisted with the replacement of essential household goods and the restoration of power and heating, received help with the initial cleaning and then the drying out of their properties, including additional electricity costs from dehumidifiers, and given priority access to the hardship fund.

Silver households include all uninsured properties that are not already covered in the gold category. In addition to assistance with the drying out of their properties and in the restoration of power and heating, people in this category received support with furnished accommodation if it was required.

Everyone whose house was flooded and who did not fall into either of the other two categories was designated bronze. These households were not charged for the replacement of wheeled bins and recycling boxes.

A new unwelcome status was entered into, produced through the coming together of all we have so far accounted for. This status was recorded at the time by the local city council through a door-to-door survey to record which properties were flooded and gather information that would enable the council to identify particularly vulnerable households. This database is reproduced as an impressive map in the Independent Review Body report with a red dot for every house affected. As of November 2007 the council's 'FLOSS' database identified 8349 properties in the city as having been flooded, with these divided into three categories of vulnerability—gold the most vulnerable, bronze the least (see table 1). The status of the household then determined the level of support they could expect from the council and other agencies. As table 1 shows, more than half of the flooded households were placed in the most vulnerable gold and silver categories, reflecting the social geography of one of the most deprived cities in the UK. In this way the local movement of water into homes and particular household profiles was recorded and mapped. The boundaries of 'flooded' and 'not flooded' domestic space were known, detailed, definitive, and apparently unproblematic. However, in the accounts of those involved, it soon became clear that knowing the flood and the spaces it occupied was not so clear cut and stable.

4.2 'Secondary' flooding: contested traces
In many of the accounts of participants 'secondary flooding'[4] was described. This is a phenomenon in which the home enters flooded status, but at some distance in time from the dynamics of flows of water we have followed up to this point. As noted earlier, in many places the floodwater was relatively shallow and it was a matter of a few centimetres that could determine whether or not the threshold of the house was

[4] This use of the phrase 'secondary flooding' to describe this phenomenon appears to be specific to the Hull flood.

breached and water flowed into front rooms and kitchens. However, even if the water did not visibly come over the doorstep, it could still invisibly enter the space of the home by flowing into voids under suspended floors, soaking joists and the underside of floorboards for a period of several days. When this water receded, equally invisibly, it did not entirely disappear, as some was left behind as an embedded trace in the hidden infrastructure of the home.

For this reason some householders were discovering over one year after the seemingly contained event of the flood, that the boundary of their home had been transgressed—that what they thought had remained outside had flowed internally. Across various interviewees and diary entries the uncanny, unexpected, and extraordinary revealing of 'secondary' flooding is recounted, each instance distinct in some way in its timing and its manifestation. For one diarist (and their neighbour) it was an abnormal physical movement of fixtures and fittings that first revealed the flood:

"What happened—the downstairs toilet, the door started to stick and it never stuck before and I got my brother in law to come and he shaved a little bit off the bottom because we thought maybe it had just dropped. But it did it again, it was sticking again and then my next-door neighbour's fireplace fell off the wall—the whole fireplace. ... I think in my mind I was saying 'well I didn't get any water in so I must be fine, I must be absolutely fine, I didn't get any water in so everything must be OK'. ... It's amazing that, it's exactly the same amount of devastation, as we would have had if we had had a foot of water in the house" (Rachel, adults' project, interview).

For others it was 'bumps in the carpet', 'wallpaper coming off the wall', or a 'bad smell' that announced the possibility of flooded status having reached their house; all proxy indications or shadows of what had taken place months before. However, these shadows themselves were not sufficient to achieve recognition of status as flooded. Rather there were crucial obligatory passage points (see Callon, 1986) that needed to be moved through, structured by powerful actors and agents—the expertise and technology of the insurance company, the 'professional drying company', or the surveyor. In the accounts below it can be seen how flooded status was not in place until the technology of the specialist camera and damp meter had determined it to be so:

"By mid-July I started to smell damp in the part of the house ... . I got someone out to do a damp survey... . And he said, quite possibly I'd had it into the house in the floorboard void but you know, watch this space, see how it goes and get back to us. Two or three weeks later I rang the insurance company and said 'I'm sure there's something wrong' and it sort of went from there. They sent another company, a professional drying company. He stuck a camera underneath the floorboards, near the meters and he was actually very upset. He came back and said to me that 'I've got some really bad news for you, underneath your joists they are all covered in moist and fungus'. And that's what I could smell ... . So at that point I was still confused and then he started to spell it out. The more he said the more I started to shrink" (Caroline, adults' project, interview).

"The floors had lifted and I couldn't close the doors and the smell was horrendous, it really did smell bad. So I rang the insurance company just to check it out and they brought Chemdry and they did the water reading and it had gone up the side" (Fiona, adults' project, interview).

The movement through this key passage point was in some cases not straightforward or uncontested, with different assessors and technologies providing conflicting boundary judgments. For example, 13-year-old Holly recounted how, although her parents had found puddles under their floorboards, a surveyor decided that their house

Figure 1 [In colour online.] Holly's storyboard.

had not been flooded. After damp started rising up their walls this judgment was overturned by another surveyor using a different method of assessment. To reflect the dispute that her family was having with the surveyor and the effect that this uncertainty was having on their lives, Holly drew a large question mark on her storyboard of the flood beside the surveyor saying "I don't think you're flooded" (figure 1).

In another example below, the household's status as flood onlooker or flooded resident switches back and forth, creating anxiety and bewilderment:

"The lady next door to me, I'm doing my best to help her. ... Hers is a council rented property and three times she's had people from the council down. The first one said there's nothing wrong; the second one said, 'You've got a definite problem'. And the third one that came was the first one that came and said, 'Oh they do that sometimes'. She's got problems now that her kitchen floor has started to come up, quite nasty problems in her bathroom and her living room is a dividing wall next to us. And she rang me in tears last Thursday because she said, 'I can't believe it, that man has been down here again and he won't do anything'. ... I said, 'You're attached to us, ours is being gutted now our house, your house is fastened onto ours cannot be an island in a lake of nasty water'. It doesn't hold water does it, the argument?" (Caroline, adults' project, interview).

Here the seemingly straightforward physicality of the flood and 'being flooded' becomes something far more ambiguous and socially produced. Not only are competing expert judgments involved, but these are being contested through lay common-sense observation

("ours cannot be an island in a lake of nasty water", "it's got to be coming from somewhere, hasn't it?") and the mobilisation of challenges to the boundary decisions that have been made. Also embroiled in Caroline's account are two forms of household tenure—the owner-occupier, who having exercised the 'right to buy' themselves out of their council tenancy is dealing directly with loss adjusters and insurance companies; and the adjoining council tenant, dependent on the judgments and gatekeeping of the local council.

Similar difficulties were faced by those who bought houses after the flood, only to find that these too had been affected. Eleven year-old Natalie was relieved because she thought her family had escaped the floods. However, several months later her dad married and they moved with her step mum and step brothers to a larger house. In her interview, she described what happened six months later:

"We started seeing all the damp up the walls…all the weird brown dots…and everyone started getting headaches and being sick.…The dog started getting upset as well" (Natalie, children's project, interview).

After lengthy arguments with their mortgage provider as to whether or not the house had rising damp, Natalie's house was eventually determined to have a secondary flooding problem and her family moved out into a rented house one year later. Entitled "my journey", Natalie used her storyboard to convey the frustration and stress involved in her family's lengthy dispute over their flooded/not-flooded boundary status, including drawings of the damp and mould in the dining room and back room.
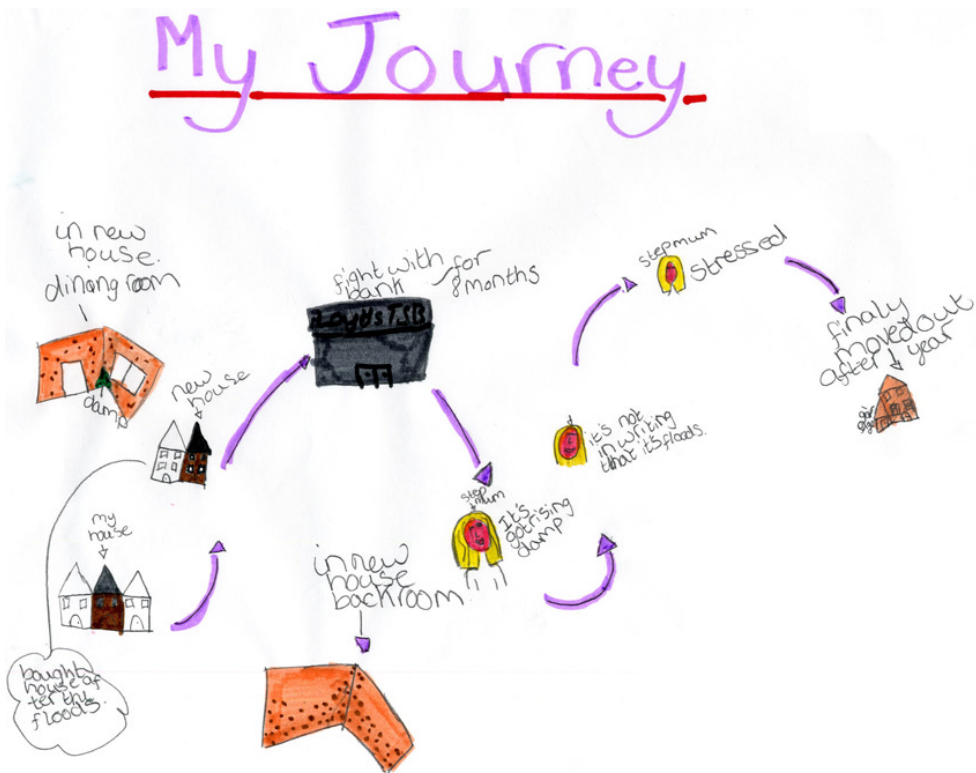

Figure 2 [In colour online.] Natalie's storyboard.

4.3 Concealing the flood: denial and dependency

Such stories portray a movement towards the flow of water becoming visible and towards the point of becoming a flooded household. However, this was not the only trajectory we observed. A quite different process of actively hiding the water was also encountered in our research, a deliberate concealment by some residents with the aim of *avoiding* the status of flooded household. Evidence here becomes problematic, as acts of concealment can inherently resist identification or explanation. However, interviews with 'frontline workers' closely engaged with the processes of recovery of more vulnerable households, and group discussions with diarists, revealed both brief mentions and more substantial accounts of how some older householders in particular were actively resisting the possibility that flood water had 'been in'. For example:

"A lot of old people—they're trying to ignore the fact that they've had water in because they don't want the upheaval of having their floors up" (Kate, adults' project, interview).

"I know one chap down my mum's street who refused to have any work done, he said 'leave it, it will dry out naturally'" (Joanne, adults' project, group discussion).

"I did the flood visits didn't I, for the council, and a few of the old folk off Willerby Road, as soon as they opened the door you could smell it. And I said, 'I think you've got a slight problem'. And he said, 'No, no I'm alright love, I'm alright'. And he wouldn't do nothing about it and we was advising him that he needs to take it further. We went further down and another couple said, 'Oh yes, we've been hit but it's only the wallpaper peeling off from the skirting board'. And we said, 'No you've been hit bad, you must call your insurance company'. 'No, no, he likes doing DIY, he'll sort it out'" (Laura, adults' project, group discussion).

These are mostly second-hand accounts and it is difficult to be sure about the extent or prevalence of denial or concealment. Always the reference though is to 'old folk', 'old people', or 'the elderly' and, in on-the-record and off-the-record discussion, a number of explanations are given as to the motives involved. Whilst references are made, as above, to 'upheaval' and 'hassle', deeper underlying anxieties and concerns are implicated. On the one hand, these are anxieties about the prospect of being moved out of a safe and familiar space, one that constituted the essential setting of routine, everyday life and its associated social networks. To be moved miles away from local networks whilst the house or flat was being gutted, dried out, and reestablished, even temporarily, could be a deeply traumatic prospect—particularly for those older people on the margins of being able to maintain their independence and concerned about leaving home and never coming back (Hockey et al, 2001; Milligan et al, 2005; Sims et al, 2009). For those renting from private landlords (tenure is again implicated) the prospect of 'never coming back' was exacerbated by concerns that, once they had moved out, tenancy rights would be lost and rents would be pushed up by landlords seeking to capitalise on the refurbishment that had taken place. Similar anxieties were imputed about the prospect of insurance companies pushing up premiums as a result of a flood claim, and the stress involved in dealing with loss adjusters, drying companies, and builders if being flooded is revealed and acted upon.

Here we see that flood status has become deeply socialised. The transgression of the flood into the home is being retained as a matter of private rather than public knowledge, with local judgment valued over external assessment, and the physical presence of bad water in the space and fabric of the home mediated by matters of social and financial vulnerability.

5 Discussion and implications

In this paper we have approached flooding as a phenomenon that comes into being in relation to the spaces that water occupies. We have used the notion of assemblage to characterise this phenomenon and to convey both how the complex processes of flooding operate and how the condition of being flooded is produced. Assemblage captures and reveals three key qualities—heterogeneity, emergence, and instability. Using the case study of Hull, we have traced the coming together of heterogeneous social, technical, and natural elements, moving from the assemblage of the flood as a city event; to the street-level processes and interventions which shaped how water flowed locally; and into the detail of the home and its transgression by bad water. Through this case study the emergent character of flooding as a phenomenon is clear. When complex, dynamic meteorological processes produced intense rainfall that fell into the urban space of Hull, much else needed to come into play and interact to produce a particular geography of flooded domestic spaces; much else that involved the interacting agencies of water, of material infrastructures and technologies (drains, air bricks, damp meters), and of social actors and institutions of various forms (residents, neighbours, landlords, water and insurance companies). We have also seen how the assemblage that produced this flooded status did not remain fixed in one set of temporalities that were stable and terminated in June 2007. Rather this status, and the boundaries of the flood, remained *unstable*, open, and contested, their spatial and temporal definition fuzzy and socially complex, wrapped up in judgments, expertise, dependencies, and vulnerabilities that variously contributed to producing or not producing flooded status, and extending or maintaining the flood boundary.

A number of implications follow from this line of analysis and the case-study material we have worked with. First, we can reflect again on the meaning of flooding. Rooted in the dynamic transmutability of water, and the necessarily 'abnormal' quality of floods, we can readily identify the slipperiness and contingency of the boundary between the water meadow and the flooded field (Strang, 2004), the car park full of puddles and the car park in flood. Inherently less visible is the contingency we have revealed within the space of the home, indeed within its bricks, plaster, and floor-boards. Here in 'secondary flooding' the physicality of the water of the flood takes the form of what we have called shadows, traces of water left behind whose status is indeterminate. It then takes the application of institutionalised professional expertise to draw a precise boundary to determine flood status, although, as in many other applications of such expertise, that precision is not absolute or uncontested (Wynne, 1991). Whilst this may be seen as a distinctive peculiarity of the Hull flood, discussions with the professional communities involved opened up a wider field of debate about the distinction between floodwater, damp, rising damp, and other related categories of water. In an interview with a damage-management consultant, for example, it became clear that there were fine distinctions made between the conditions under which insurance companies would classify damage to a house as being due to a flood, with the threshold of the property a crucial boundary:

> "If the water comes into the threshold of the property and it causes damage, then it's covered under the insured rules. If you've got a property and there's water in a cellar or a basement or it's in the sub-floor void and that water by definition will be there anyway because of exterior ground level conditions. If that water doesn't reach the threshold then it's not covered" (Martin, adults' project, interview).

For this interviewee secondary flooding in Hull 'did not exist', it was a 'media invention'. The problems being experienced with damp, mould, buckling floor coverings, etc were due to a breakdown in the damp-proof course and other structural defects, which are not covered by flood insurance provisions as the 'threshold of the property' had

not been breached during the June 2007 period. Being a flooded household for this professional was strictly and technically defined, not just by the presence of water in the materials of the home, but by the exact route through which that water came to be there. It was also clear from this and other interviews that there was also active work going on around the boundary of flood status, with householders, consultants, insurance companies, drying companies, and builders all variously positioned to benefit from how the specific determination played out. In this way residents who entered in some cases into protracted battles over their status as being or not being flooded, were wrapped up in the mutability of water, how it is given meaning in context, and the consequences that then flow from this.

Second, it follows that these questions of the meaning and definition of flooding are not simple analytical niceties: they have real and significant consequences for the actors involved. For those actively resisting flooded status because of concerns over what this might bring, there were potentially serious health consequences from continuing to live in a damp and contaminated home, and a lack of access to support systems which could provide help and financial assistance. For those encountering secondary flooding the problem of, in contrast, trying to obtain flooded status and thereby being able to claim on insurance policies (if these exist) could lead to much uncertainty, anxiety, and stress, including ultimately having to rectify damage from their own resources. For those who did get secondary flooding officially recognised, the timing of their entry into the boundary of the flood could be problematic. Systems for supporting the recovery of flooded households were designed in the (reasonable) expectation that the extent of the flood was understood and known at an early stage, that flooded households could be identified (for example, on the council database) and that there would be a profile of problems, needs, and demands for support that would evolve over time within expected parameters [see Whittle et al (2010) for an account of the limitations of institutional assumptions of recovery]. Those experiencing secondary flooding found themselves fitting awkwardly into the institutional systems of both the council and other organisations that were orientated towards the event as seemingly known in space and time.

Third, we can reflect further on what is achieved by using the notion of assemblage to discuss and analyse a 'hazard event'. As we have made clear, assemblage is a way of capturing and working with the heterogeneity of elements involved. In a field where problematic distinctions are often made between natural and social explanations of hazard or disaster, each being in danger of excluding the other, assemblage and the ontology it draws on offers a more symmetrical and potentially productive approach (see Davies, 2000; Graham, 2010). Assemblage also highlights the ways in which disasters are locally and contingently situated in their production. To focus on local particularities is not to deny the significance of the generality of processes producing disaster (Erikson, 1994; Oliver-Smith and Hoffman, 1999). Following the logic of Latour's (1993) analysis of socionature, it is through the local that we can see the complex web of global relations that come to produce the particular experience and which form the emergent phenomena. Thus the heterogeneity of the production of disaster can be seen through the prism of the local and, through this prism, the wider historical–geographical conditions of production can be traced (Swingedouw, 2004) and the impacts more clearly seen.

This kind of move requires a sensitivity to the conceptualisation of scale in our understanding of the production of disaster. The analysis of spatiality offered by Mol and Law (1994) is helpful here. Hull was, we might say, flooded. And yet not everywhere in Hull was flooded. What we see at a city scale is misleading because we lose sight of the very different experiences, and processes of production, of flooding within

the city. When we follow the networks through which water transgressed conventional boundaries, different forms of alliance emerge; the networks of flooding create a different version of near and far. And yet, looking even more closely we find the boundaries of these networks become hard to define, and indeed, are contested with significant implications. In this sense the flood literally becomes *fluid*, a spatiality in which "boundaries … come and go, allow leakage or disappear altogether" (Mol and Law, 1994, page 643).

With a shift in our understanding of the scale of disaster comes a call to open up understanding of the temporality of disaster. We have seen in our case study how the very definition of being flooded is contested and in this sense the timing of when the disaster strikes becomes varied. Likewise the 'timing' of recovery is also problematic and contested and yet this is a crucial defining element of both research and policy accounts of resilience insofar as resilience is defined as the ability to 'recover' (though in different forms) from the event. For example, within the Pitt Review, the UK government's inquiry into the 2007 floods, the recovery process is presented as a relatively brief interlude following the tightly defined disaster event. During 'recovery' the assumption is that things get steadily better until they are considered to be returned to 'normal' (or possibly even regenerated) shortly after the event (Cabinet Office, 2008). In contrast, an understanding of the production of disaster from the perspective of the everyday local experience points away from such a neat linear process in that there are ups and downs along the way, the very starting points of 'disaster' vary, and nor is there a clear end point to recovery (Whittle et al, 2010).

Finally, we should note that the analysis of disaster through the concept of assemblage, as well as inviting us to travel through the different spaces through which a disaster is produced, also requires us to embrace an understanding of the multiplicity of such an event. As we saw with the problem of defining flood status, this is not a matter of conceptual play; there are real consequences for how a disaster is framed. If taken as a singular event or phenomenon, institutional framings follow that delimit, usually with clear temporal and spatial boundaries, the 'when' and 'where' of an event. However, if such framings are assumed to be real, and not just a pragmatic response to an immediate event, then the more localised, specific, yet still wholly real, consequences of disaster might be lost. In Hull the institutional framing of 'the event' left many people's particular experiences of the flood completely unseen. To recognise multiplicity is therefore to keep open the possibility that there is more to be learnt about disaster and its consequences.

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