

The impact of flooding on urban and rural communities

R&D Technical Report SC040033/SR1

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Author:

Dr Clare Twigger-Ross

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Research Contractor:

Collingwood Environmental Planning, 4.2.3. The Leathermarket,
Weston Street, London, SE1 3ER.

Environment Agency's Project Manager:

Paula Orr, Social Policy Advisor

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Steve Killeen

Head of Science

Executive summary

Background

The research reported here forms Part 1 of a larger project 'Managing the Social Aspects of Floods' (Science reports SC040033/SR1–SR6 and SC020061/SR1).

Aim

The aim of the research was to explore the impacts of flooding on urban and rural communities. Two areas were investigated:

- understanding the relationships between urban/rural policies and flood risk management (FRM) policy such that opportunities for 'win-win' solutions could be explored;
- understanding the social impacts (e.g. economic, health, community) on urban and rural communities from an empirical perspective (i.e. what evidence is there for differential impacts on urban and rural communities in terms of flooding).

Recent urban and rural policy documents were examined, together with FRM strategy documents, in order to draw out synergies and areas of overlap. In addition, examples of flood alleviation schemes that have impact on urban or rural development were examined to show how some of these synergies might work in practice. As well as desk-based research, formal interviews were carried out with participants from the following groups: Environment Agency policy staff working in FRM, Environment Agency regional/operations FRM staff, Defra FRM policy staff and other government staff, academics/researchers working in FRM and community participation, other practitioners including a professional facilitator, a chairperson of a local community group, National Flood Forum staff, and local authority officers. Contact with these groups took the form of ten formally arranged interviews.

Results and conclusions

It is clear that there are some key synergies to be built upon between urban/rural policy and FRM policy so that FRM development becomes embedded within the urban and rural agendas. As the shift is towards living with floods, urban and rural policy agendas should be considering FRM as part of their design and landscape approaches. Both agendas would benefit from developing dialogues around planning for communities, thus putting FRM into a wider planning context.

FRM is already engaging with those agendas through some of the flood alleviation schemes. The examples presented in this report show how the Environment Agency is putting sustainable development into practice, creating environments that alleviate flooding, as well as providing urban green space and wildlife habitats.

With respect to the impacts of flooding on urban and rural communities, firstly, urban and rural as terms are used in a number of different contexts with more or less precision. From the brief review and the work carried out for Part 2 (SC020061/SR1) of the project it is clear there is still work to be done to unpack the relationships between impacts of flooding and specific communities (e.g. urban and rural).

Secondly, from the interview material it was clear that some stereotypes about the nature of urban and rural areas exist (i.e. 'friendly nature-loving countryside and anonymous city'). These could be unhelpful with respect to understanding the social impacts of FRM. Understanding of general social trends (e.g. migration both out of cities to the country and within cities) did not seem to inform most of the interviewees' comments. In addition, there were participants who felt that a focus on urban and rural communities was not useful, and that there were other issues that cut across the urban–rural continuum which were more important in terms of social impacts (e.g. the nature of the flooding).

Recommendations

R1: Facilitate dialogue and partnerships both internally (between Social Policy, Environmental Impact Assessment and FRM) and between the Environment Agency and ODPM (for urban policy) and Defra (for rural policy) on the embedding of FRM in urban and rural policy.

R2: Produce a publication/web page showing flood alleviation schemes that have provided benefits either to urban design or to rural landscapes. Use the language of urban and rural policy to present the flood alleviation schemes in the wider context. Use this as a tool to promote the place of FRM in urban and rural policy.

R3: Understand how Catchment Flood Management Planning (CFMP) can be linked into spatial planning through local development frameworks (LDFs).

R4: Carry out more detailed analysis of the relationship between the variables of density and sparsity and flood risk. Map the urban/rural communities onto the flood risk communities. Link to the deprivation mapping that has been carried out for Part 2 of this project (report number SC020061/SR1). Analyse existing data sets using the urban/rural division (e.g. the health impacts work carried out by the Flood Hazard Research Centre) to see if there are differences in health impacts relating to rural and urban characteristics that require different responses from FRM.

R5: Carry out some detailed work examining the social impacts of flooding on an urban community and a rural community. This could be preceded by an analysis of existing data from other projects, which could be categorised according to urban/rural.

R6: Further investigate the issues concerning low probability/high consequence flood risk areas (which are predominantly in urban areas), specifically in understanding the values and perceptions of people in those communities towards flood risk.

R7: Undertake more research to help **understand the relationship** between the sources of flooding in urban and rural areas and their impacts on communities (e.g. social impacts of sewer flooding, which is predominantly an urban phenomenon).

R8: Investigate the relationship between knowledge of and familiarity with rivers or the sea and the understanding of flood risk and its impacts. With increased migration, it would be useful to understand what knowledge would help newcomers to flood risk areas and how to pass that knowledge on.

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1 Introduction

1.1 Objectives of the research

The research reported here forms Part 1 of a larger project 'Managing the Social Aspects of Floods'. The overall objective of this part of the project is to understand the impacts of flooding on urban and rural communities. The brief specified the sub-objectives listed below:

- liaise with relevant stakeholders and draw on current knowledge and research to review and understand the impacts of flooding on urban communities, cities and urban regeneration schemes, and the policy context for addressing these;
- liaise with relevant stakeholders and draw on current knowledge and research to review and understand the impacts of flooding on rural communities and regeneration schemes, and the policy context for addressing these;
- make recommendations for the most effective ways of contextualising flood risk management in relation to urban and rural policy, particularly through the Catchment Flood Management Planning (CFMP) process.

There are six parts to the project 'Managing the Social Aspects of Floods':

- Part 1 – Understanding the impacts of flooding on urban and rural communities and the policy context for addressing these (SC040033/SR1).
- Part 2 – Understanding the social impacts of flooding on deprived communities (SC020061/SR1).

Parts 1 and 2 focus on impacts of flooding, and aim to provide some understanding of how impacts may differentially affect specific groups and communities.

- Part 3 – Understanding the relationship between stakeholder engagement and effectiveness and efficiency in flood risk management (FRM) decision making and delivery (SC040033/SR2).
- Part 4 – Understanding the relationship between community and citizen engagement and effectiveness and efficiency in FRM decision making, delivery and flood response (SC040033/SR3).

Parts 3 and 4 focus on understanding how engagement with stakeholders, communities and citizens can be effective with respect to FRM decision making.

- Part 5 reviews options for improving the contribution of social science to the FRM science programme. It aims to provide insight into the role of social science for FRM and to put it into the wider context of current progress around multi- and inter-disciplinary research (SC040033/SR5).
- Part 6 is a synthesis of the other five parts of the project and provides a summary of the key findings and a discussion of how the different parts relate to each other together with key recommendations (SC040033/SR6).

In addition, a further related study was commissioned examining the role of stakeholder engagement in Catchment Flood Management Planning and that forms report number SC040033/SR4 'Aire and Calder CFMP Scoping Study'.

1.2 Research approach

An exploratory approach was taken to this part of the research as it was acknowledged that this area (social impacts and urban/rural communities) is not one that has been well researched to date.

The work has taken the following approach:

- understanding and articulating the rationale for a focus on urban and rural environments in terms of social impacts of flooding;
- collating and reviewing relevant research and practice both in terms of general work on social impacts of flooding and in terms of specific research on impacts on urban and rural communities;
- exploring an approach to investigating the social impacts of flooding on urban and rural areas;
- presenting some examples of where flood alleviation schemes have been carried out in partnership with urban or rural regeneration schemes.

As well as desk-based research, formal interviews were carried out with participants from the following groups:

- Environment Agency policy staff working in FRM;
- Environment Agency regional/operations FRM staff;
- Defra FRM policy staff and other government staff;
- academics/researchers working in FRM and community participation;
- other practitioners including a professional facilitator, a chairperson of a local community group, National Flood Forum (NFF) staff and local council officers).

Contact with these five groups took the form of formally arranged interviews (ranging from 40 minutes to 2 hours). Nineteen interviews were carried out in total across Parts 1, 4 and 5 of the project. These were with: Environment Agency policy staff (2); Environment Agency operations staff (6); Defra and other government staff (3); academics (5); and other practitioners (3) – the interviewees are listed in Appendix 2. Seven interviews were carried out face to face, and twelve by telephone. This sample partly reflects the numbers of relevant individuals in the various groups but also the practicalities of arranging formal interviews in the timescale available. In addition, less formal contacts were made by email and/or telephone calls to gather as much further information as possible. Not every participant was able to contribute to all parts of the project. For this part of the project ten of the participants' interviews were analysed.

The interview schedule was designed to address a range of areas that were adapted for the different participant groups (see Appendix 1). The questions under Section 1 relate to Part 1.

Notes were taken during the interviews and these were afterwards transcribed and in most cases returned to the interviewees for amendments and additional comments. The amended transcripts were analysed and categorised into key themes.

1.3 Rationale for focus on urban/rural environments

Over the past decade there has been increased emphasis put on both urban and rural environments by central government. In this section, we will briefly examine how the FRM policy has a focus on urban and rural communities.

The key policy context for FRM is that of *Making Space for Water*, the draft strategy published for consultation at the end of 2004 (Defra 2004b), and its response published in March 2005 (Defra 2005a). While *Making Space for Water* has its focus on the management of flood risk so as to avoid or minimise negative impacts (social or otherwise) rather than on impacts *per se*, it nevertheless provides some drivers for an examination of the social impacts of flooding on urban/rural communities.

Within the *Making Space for Water* document there are two underlying points that provide rationale drivers for this work on social impacts:

- FRM is firmly embedded within a framework of sustainable development and quality of life issues;
- urban and rural issues are highlighted early on in the draft strategy and form substantial sections in their own right (Sections 5, 6 and 8).

The first point is important as the link to sustainable development and quality of life issues clearly points to an approach that includes the social, economic and physical aspects of FRM. Understanding the 'social aspects' of flooding is clearly acknowledged as a vital part of the FRM agenda in *Making Space for Water*.

Secondly, the inclusion of sub-chapters on urban and rural FRM issues also highlights that these are key agendas linking in the wider cross-government work on sustainable communities.

Making Space for Water is itself informed by the Foresight '*Future Flooding*' project, and again, within that report (2004), there is an emphasis on the issues concerning the forecasted increase in urban flooding and more specifically the social aspects of flooding.

These provide powerful reasons for why the Environment Agency should be examining the social impacts of flooding on urban and rural communities.

It is appropriate for the Environment Agency to be considering how FRM activities can achieve 'wins' for regeneration as *Making Space for Water* suggests: 'we should always seek to identify ways of implementing solutions that achieve the primary objective of managing flood and coastal erosion risk but also make a contribution to the strategic priorities of Defra and of the Government more generally' (Defra 2005a, p. 21).

In approaching the objectives in the brief it became clear that there were two ways of proceeding. These were:

- to focus on understanding the relationships between urban/rural policies and FRM policy such that opportunities for 'win-win' could be explored;
- to focus on understanding the impacts (e.g. economic, health, community) on urban and rural communities from an empirical perspective (i.e. what evidence is there for differential impacts on urban and rural communities in terms of flooding).

It was decided to explore both of these areas. Section 2 addresses the first issue and section 3 addresses the second.

2 Flood risk management in the context of UK urban and rural policy developments

2.1 Introduction

It is clear that the definitions of 'urban' and 'rural' have associated with them particular policy narratives and that these then influence what is focused upon. It has been observed (J Colvin, personal communication) that those different narratives highlight the issue of 'design' in the urban context and of 'landscape' in the rural context.

In addition, within the flood risk management (FRM) policy literature the terms 'urban' and 'rural' are used frequently. Although *Making Space for Water* (Defra 2004b) has no explicit definition of what constitutes 'urban' and 'rural', its definitions would seem to relate to the type of flooding and the type of measures that can be taken to prevent flooding rather than to the communities who might be affected by that flooding.

In this section, FRM is examined through the lens of urban and rural policy in order to understand how the concepts of urban design and rural landscapes link with current FRM policy.

2.1.1 FRM and urban policy developments

'... in recent years "the urban environment" has become a coherent concept, a political issue and a matter for the attention of the research councils' (Petts *et al.* 2005, p. 2)

The publication of the Urban Task Force report *Towards an Urban Renaissance* (Urban Task Force 1999), the DETR strategy *Our Towns and Cities: The Future* (ODPM 2000), the ODPM strategy *Living Places: Cleaner, Safer, Greener* (ODPM 2002a), together with the Sustainable Communities programme (ODPM 2003), firmly placed regeneration and urban issues on the political agenda. A fundamental message that comes from these strategies is the importance of the interrelationship between the physical and social environments and the need to plan spaces in order to create places that support communities. This message is coupled with an acknowledgement that the issue of planning places has been neglected over the past two decades in favour of a more market-led, piecemeal approach to urban design and planning.

From these strategies three interrelated themes that have important implications for embedding FRM policy within the urban policy field can be discerned. These are:

- holistic, planned urban design;
- public and green spaces;
- development of places, neighbourhoods and communities.

Firstly, **holistic, planned urban design** is considered. Specifically, there is an acknowledgement that urban design has not had a large role to play in the development of urban areas which has led to:

‘poor quality design and layouts and poor building practices which in turn create poor quality places’ (ODPM 2000)

Recommendations to address this were laid out in the earlier report from the Urban Task Force, specifically:

‘Introduce a national urban design framework, disseminating key principles through planning and funding guidance, supported by a new series of best practice guidelines.’ (Urban Task Force 1999)

The message that comes through in these strategies is that the urban environment needs to be planned and designed at a scale larger than that of individual buildings. This attention to the design of the physical environment, especially the design of connecting spaces, links with two changes within FRM: firstly, the move towards looking at solutions at the level of a catchment (manifest through Catchment Flood Management Plans) and, secondly, the development of a wider range of FRM solutions that are designed not only to alleviate flooding but also to provide well-designed spaces with a range of benefits (e.g. biodiversity, recreation).

Linked to the above is the emphasis that is put on **the role of public spaces, and, more specifically, green spaces**. In the Urban Task Force (1999) report there is discussion of the creation of a network of public spaces and this is reinforced in the DETR strategy (ODPM 2000) where there is a focus on parks, play areas and public spaces. There is the recognition that ‘they are therefore vital to enhancing the quality of urban environments and the quality of our lives’ (ODPM 2000). Urban green space was given further consideration with the establishment of the Urban Green Spaces Taskforce in 2001 and, following their final report in 2002 (*Green Spaces, Better Places*), the government responded with *Living Places: Cleaner, Safer, Greener* in 2002. In that strategy green spaces and parks were put on an equal footing with buildings:

‘Good parks and green spaces make neighbourhoods, towns and cities attractive and more appealing. They are an integral part of the wider public space network and as much a part of the urban fabric as its buildings.’ (ODPM 2002a, p. 24)

In *Living Places: Cleaner, Safer, Greener* (ODPM 2002a) it was announced that a new unit within the existing Commission for Architecture and the Built Environment (CABE) would be set up, and CABE Space was established in 2003. As stated in its introductory publication (*Making Space*): ‘CABE Space aims to bring excellence to the design and management of public spaces in our towns and cities’ (CABE Space 2003, p. 1).

As well as institutional development, the *Living Places: Cleaner, Safer, Greener* document also set targets:

‘High quality local authority service delivery on local environment, public spaces and parks – every authority should have green spaces that achieve the Green Flag standard for care of parks.’ (ODPM 2002a p. 15)

These strategies and institutions (e.g. CABI Space), together with planning policy guidance on open space, sport and recreation (ODPM 2002b), have put urban and green spaces at the heart of the urban renewal agenda.

Urban green spaces have an important role to play within FRM. They provide soft surfaces which will absorb water (as opposed to hard standing such as car parks which water runs off). In addition, one approach to flood alleviation is to develop schemes with landscaped green banks that are designed to flood and slow the flow of the water. Typically, rivers have been restored to a more ‘natural’ state and as a consequence provide attractive public green spaces. Brent Park, London, provides an example. Here the river channel has been opened up, the concrete sides have been removed and there are now gently sloping banks that allow for flooding and have provided a key part in the restoration of the park for local residents. FRM is changing from a ‘hold back the water’ approach to a ‘living with flooding’ approach (see *Making Space for Water* for details) and this provides a unique opportunity to engage with the urban green space agenda. Both agendas are differently calling for the development of green space within urban areas and that synergy should be recognised.

There is an emphasis in the urban policy literature on ***the development of places, neighbourhoods and communities***. What this means is a focus not only on the physical environment, but a recognition of the inextricable link between the physical and social within a defined space. The aspiration is that more than buildings will be created, and that communities with all the associated positive attributes of cohesion and neighbourliness will be developed.

‘It [the urban environment] can be impersonal and make contact between people difficult or it can foster a sense of community.’ (ODPM 2000)

There is also emphasis on community engagement and responsibility:

‘we will only succeed if everyone plays their part: local authorities...

- the private sector...
- community and voluntary groups
- individuals’ (ODPM 2000)

This emphasis on local responsibility is one that FRM is aiming to foster, by encouraging local communities to work with authorities to understand flood risk management and to learn to live with it as appropriate. Involving local areas in the issues of FRM as well as water management and planning more generally could be a way of developing community engagement and responsibility. Likewise, linking FRM planning to the community planning process (e.g. community strategies and local development frameworks) can bring benefits to both areas.

In addition, key urban research programmes such as EPSRC’s Towards the Sustainable City and NERC’s Urban Regeneration and the Environment (URGENT) have been funded.

This emphasis has also been reflected in the Environment Agency who in 2002 appointed their first urban policy advisor and published the first State of the Urban Environment report (Environment Agency 2002a and b). It is recognised that there is an urgency and excitement concerning regeneration of urban areas but that this needs to be planned carefully given existing and forecasted pressures on the physical environments in urban areas.

The promise now is of sustainable communities:

‘But now the agenda is moving, not just to prevent pollution, but to promote environmental performance to reduce the footprint of development as part of a more sustainable pattern of urban life.’ (Harman 2004, p.12)

Therefore, it is timely for the Environment Agency to be considering the urban environment, but what is the specific context for considering the impacts of flooding on urban communities?

The biggest issue for FRM in urban areas is the forecast that under climate change there will be considerably more flooding in these areas. Given the density of living in cities, many people would be affected by a flood in an urban area. These provide powerful reasons for examining the social impacts of flooding in urban areas.

The Adaptation Strategies for Climate Change in the Urban Environment project ‘attempts to assess the impacts of climate change at the town or city level; develop and test methodologies for the vulnerability assessment of three exposure units (building integrity, human comfort, urban green space), identify potential socio-economic impacts and provide an evaluation of adaptation options’ (Gill 2004, p. 4).

The literature review by Gill (2004) provides some important comments on the likely impacts of climate change on urban areas, and within that considers the impacts from increased flooding. The publication suggests that the increase in flooding will be the most serious direct impact of climate change in the North West.

‘Factors of concern for flooding include: sea level rise (combined with severe storms and wave heights); more frequent, severe or prolonged rainfall events; the large size of urban catchments; an increasingly built-up environment which increases surface water run-off and, in particular, the rate of development on floodplains; the age, condition and lack of capacity of existing drainage and infrastructure; the impact of rising groundwater in conjunction with surface flooding’ (Gill 2004, p. 34)

In addition to climate change, there are urban design features that can exacerbate the risk of flooding (e.g. reduction in urban green space, increase in hard surfacing, increased density of development and, potentially, increased barriers to flood flows such as road embankments).

Because of the density of population, flooding problems in urban areas are characterised as ‘low probability/high consequence’ (i.e. there is a low probability of flooding, but if

there is a flood it could have catastrophic consequences). Not surprisingly, there tends to be a low awareness of flood risk in these areas and there are communities who do not know they are at risk of flooding and that any flood would have serious consequences because of the sheer density of homes in urban areas.

Flooding can be from a number of sources: rivers (fluvial), coastal, tidal, sewers, groundwater and drainage. In the urban environment increased density adds pressure, especially on urban drainage systems and sewers. As a result flooding from sewers and drainage systems is an important part of the urban flooding equation and has implications for the type of social impacts experienced.

In terms of urban flooding the focus in *Making Space for Water* is on joining up the approach to drainage. Consultation supported this focus, and it was proposed that the concept of integrated urban drainage management should be taken forward. Such integrated urban drainage management would include fluvial flooding, pluvial flooding, sustainable drainage systems (SUDS), impacts on/from the transport network, groundwater rebound, groundwater flooding and sewer flooding.

2.1.2 FRM and rural policy developments

The rural environment, like the urban environment, has been established as a coherent concept over the past decade. The Rural White Paper (Defra 2000) had four aspects to its vision:

- a **living** countryside, with thriving rural communities and access to high quality public services;
- a **working** countryside with a diverse economy giving high and stable levels of employment;
- a **protected** countryside in which the environment is sustained and enhanced, and which all can enjoy;
- a **vibrant** countryside which can shape its own future and with its voice heard by government at all levels. (Defra 2000, p. 6)

The White Paper was followed by the Rural Strategy, published in 2004 (Defra 2004a). This highlighted the key priorities for rural areas as:

- **economic and social regeneration** – supporting enterprise across rural England, but targeting greater resources at areas of greatest need;
- **social justice for all** – tackling rural social exclusion wherever it occurs and providing fair access to services and opportunities for all rural people;
- **enhancing the value of our countryside** – protecting the natural environment for this and future generations.

Within both these reports there is a theme of protection of the natural environment together with a recognition that rural areas are living, not just 'views'. This is captured in the concept of 'landscape'.

'Landscape certainly encompasses the physical attributes of the environment, but adds something special which is often hard to pin down. To me, this "something special" is the connection with place ... the countryside is not just a set of natural

elements that can be understood by measuring and counting. It is a set of interlocking and overlapping layers, made special by associations with people and their histories, expressing many identities and known through stories and landmarks.' (Wakeford 2004)

FRM is part of the landscape, as flooding and its management have shaped the rural landscape, and continue to do so. In addition, landscapes have been enhanced and protected by environmentally sensitive flood alleviation schemes. The nature and identity of a frequently flooded landscape shapes communities and histories. Framing FRM in this way situates flooding as part of the landscape. In so doing it can help it to become 'everyday', which will be necessary if communities are to become able to live with flood risk. Practical actions that work with the landscape and the protection of natural environments are emphasised within *Making Space for Water*.

The discussion on rural land use focuses on how land might be managed to alleviate flooding. The response from the government to *Making Space for Water* (Defra 2005a) says that 'we should move to a wider portfolio of responses which includes greater uses of rural land use solutions such as the creation of wetlands and washlands, coastal realignment, river corridor widening and river restoration' (p. 25). In addition, the response discusses rural land management practices that would be 'capable of ameliorating run-off and reducing the incidence of flooding on a local scale' (p. 26). In this discussion, the impacts on farmers and how to encourage change in land use are mentioned. It is clear that, in terms of managing flood risk, the way rural land (and in turn the landscape) is managed is considered to be a key issue.

3 Examples of flood alleviation schemes that have environmental and/or social regeneration aspects

In this section some examples are given of flood alleviation schemes that have also provided benefits in terms of either urban regeneration or the development of nature reserves. The aim of presenting them is to show how schemes can influence both urban design and rural landscapes, building on the policy synergies that have been identified above. These examples have been taken from the Environment Agency website (Environment Agency 2005b). The first four are within urban areas and have a focus on regeneration and 'bringing some rural into the urban'. Gowys Meadows, the fifth example, is a nature reserve but is near an industrial area, and the final example is of a more rural area. All of these examples show sustainable development in practice as they contribute social, economic and environmental benefits to local areas.

3.1 Sutcliffe Park Flood Alleviation Scheme

'The scheme, on which work began in April 2003, will help to protect 600 homes in the London Boroughs of Greenwich and Lewisham from future flooding. In previous years there have been considerable flooding problems along Quaggy River, which runs through Sutcliffe Park, caused by under capacity in the existing river and inadequate flood defences.

When considering options for flood alleviation in the area the Environment Agency wanted a scheme that would not only protect residents but would also transform Sutcliffe Park and the river into an area encouraging local wildlife to flourish that the public can really enjoy.

The Environment Agency commissioned civil engineering consultants Halcrow, to fulfil these requirements. The scheme has also been developed in accordance with the urban regeneration plans of the local councils and following lengthy public consultation with both residents and stakeholders.

To date, the flood alleviation work has involved the construction of a flood detention area at Sutcliffe Park and will go on to involve the construction of a smaller flood detention area at Weigall Road and the restoration of some 4 kilometres of river channel through the London Boroughs of Lewisham and Greenwich. When in use as a flood detention area, the park will hold up to 85,000 m³ of floodwater – equating to approximately 35 Olympic size swimming pools.

Working with landscape architects, ecologists, civil engineering contractors and cost consultants, major visual and ecological enhancements were also made to the park and the river, providing a variety of habitats for local wildlife. Prior to the works, the section of the Quaggy River running through Sutcliffe Park was completely covered and contained underground in a concrete culvert.

This led to the loss of natural habitats, and reduced the number of plants and animals within the river – including fish. Restoring the river to a more natural state will provide a variety of habitats for local wildlife, with the retained section of the culvert forming a key operating component of the flood detention area.

Visual improvements to the park will include the installation of a board walk, bridges, footpaths and flowering avenues of trees and wildflower meadows – as well as an outdoor classroom – all of which will serve to provide an improved leisure facility for the enjoyment of the people of Greenwich and Lewisham.’ (Environment Agency 2005b)

The Environment Agency also commissioned research into the physical and mental health benefits of environmental improvements carried out by the Environment Agency at two sites in the UK, one of which was Sutcliffe Park. This research showed that:

‘The Environment Agency improvements also positively encouraged more people to visit the sites on a more frequent basis and spend longer engaging with nature on each visit. The research also demonstrates that an individual’s self esteem can be enhanced if they spend longer exercising within the green environment, leading to a variety of health benefits. Therefore, green space rich in biodiversity provides the ideal opportunity for outdoor recreation and acts as a valuable health resource for its users.’ (Peacock et al. 2005, Executive summary)

3.2 SMURF gets moving in Perry Hall Playing Fields

‘Work to improve an area of the River Tame has moved one step closer this week with the start of improvements in the Perry Hall Playing Fields.

The work is part of the SMURF project to look at ways of restoring and enhancing rivers running through Birmingham. The project’s contractors will be on site, preparing it for the works which will start in late January 2005.

They are currently installing compounds and protective features which will ensure the heavy plant carrying out the work will not impact on the park. Best practice procedures to ensure water voles are not living in the area where the work is going to be carried out are also being undertaken. The work will also involve the limiting of some public access for health and safety reasons, with the provision of alternative routes for the duration of the work.

In June 2004, part of the River Tame in Perry Hall Playing Fields was selected by the SMURF project as a demonstration site. The area will be restored to enhance the ecological status of the river and improve how the local community can interact with the river and local wildlife – to bring a bit of the rural back into the urban. The local community were closely involved in the discussions on what changes should take place in their park.

The project will provide an example of how urban rivers can be managed to provide more attractive, ecologically valuable and sustainable environments within urban areas.

Improvements to the playing fields will include:

- *widening part of the river channel to allow the river to behave more naturally;*
- *creating a more gently sloping bank allowing people to reach the water's edge more easily;*
- *creating a new wild flower meadow;*
- *installing information boards, bins and benches;*
- *planting trees and improving ecological diversity;*
- *improving footpaths.*

Speaking about the work, Project Manager Mark Scott says: "It is very exciting to see the work start and I look forward to seeing the Perry Hall scheme develop over the coming months. There may be a little disruption in the park during the work but hopefully it will not be too disruptive."

SMURF is a three-year partnership project that started in August 2002. This project is supported financially by the EU LIFE-Environment programme. It is a partnership involving, among others, the Environment Agency, Birmingham City Council, Severn Trent Water and The University of Birmingham.' (Environment Agency, 2005b)

The project's website address is <http://www.smurf-project.info>

3.3 Gainsborough: flood alleviation scheme kick-starts riverside regeneration

'It took a mere two weeks for Gainsborough's new flood prevention measures to be put fully to the test when, in contrast to many other areas, the town successfully emerged unscathed from the storms of November 2000.

Two years later, the wider benefits of the £16 million flood defence scheme are also beginning to be realised. With a smart new promenade now adorning banks that used to frequently find themselves submerged by the swollen River Trent, the town centre's image has been given a boost and new life breathed into the river front.

"As a result of the defence scheme, £3 million of Single Regeneration Budget funding was secured for the regeneration of the front," says Environment Agency Flood Defence Engineer Tim Hall, "That process is still continuing."

"Developers are starting to take an interest – flats are being built, theme pubs, retail units and sheltered accommodation are being discussed. Beforehand, the area was an absolute dead zone. Now it's actually drawing people in."

The scheme, worked on by a partnership involving the Agency, Gainsborough Regeneration, the District and County Councils and the former Ministry of Agriculture, Fisheries and Food (MAFF), has brought flood protection to over 400 properties.

Without it, says Tim Hall, Gainsborough could have suffered badly in 2000: "If it hadn't been for the defences, I'm convinced that the river would have breached its banks in two

places in the town – it would have been a disaster. As it was, the defence was sealed properly and there was no problem.” (Environment Agency 2005b)

3.4 Albert Park Restoration, Middlesbrough

‘The Environment Agency initially set up a project to regenerate the lake for angling as part of its urban fisheries initiative. Middlesbrough Council then expanded the project to regenerate the whole of this traditional urban park, and a partnership group was formed.

The project involved demolishing an old café, boathouse and roller rink. The lake was drained completely and all fish and silt removed. Vegetation and trees were pruned to reduce leaf fall into the lake.

The lake was relined with stone cladding and timber frames were constructed to hold new marginal vegetation.

Seventeen fishing platforms were designed and installed in consultation with local disabled groups. These are located along one side of the lake, far enough away from the pathways and duck feeding areas to avoid conflicts.

The lake has a new aeration system incorporating a fountain to help maintain water quality. The lake is designed to act as a flood alleviation scheme for the neighbouring beck.

A new boathouse, café, visitor centre and toilet blocks have been constructed. In addition, a new disabled car park, park entrances and pathways have been created to allow access for all.

Local community and school workshops took place during the consultation and development stages. The scheme was also used as a placement for local young offenders.

This scheme had a twelve other organisations working with the Environment Agency. The funding came predominantly from the Heritage Lottery Fund (£3,363,000 of £4.4 million) together with £850,000 from Middlesbrough Council, £96,000 from Northumbrian Water Environmental Trust, £20,000 from the Environment Agency and £105,000 from other sources. Not only did it bring together the Environment Agency with other partners, it also worked across functions: fisheries, recreation, conservation and flood defence.’
(Environment Agency 2005b)

3.5 Flood Alleviation Scheme, Gowy Meadows Nature Reserve

‘Location: Thornton Moors, Ellesmere Port, Cheshire

Environment Agency area and region: South Area, North West Region

Activities: Access, social inclusion, biodiversity and river restoration and re-engineering

Time taken to complete the project: Begun in 1998, ongoing

Funding partnerships:

*Environment Agency Conservation, Flood Defence and Recreation
Cheshire Wildlife Trust (CWT)
Countryside Stewardship
Shell*

Total expenditure: Approximately £1 million

Who manages the site now?

*CWT took over the management of the Nature Reserve in January 2001.
A site management plan and a ditch rotational management plan have been drafted in consultation with Flood Defence.*

What did the project involve?

*Restoration of a large proportion of this 165 ha Grade A site of biological interest as a floodplain grazing marsh.
Major flood defence works to protect Stanlow oil refinery. This included floodbank raising, tidal gate replacement and refurbishment, bank stabilisation and channel creation.
CWT has begun to implement the water level management for the site alongside the 10-year Countryside Stewardship Agreement (part of the England Rural Development Programme Countryside Stewardship Scheme).
Future work includes improved access, disabled access and a visitor centre.*

Who benefited from the project?

*Visitors, schools, landowners and wildlife.
Restoration works are delivering the actions for a number of Local Biodiversity Action Plans (LBAP) and national BAP habitats and species, including floodplain grazing marsh, ponds, hedgerows, great crested newts, water voles, skylark, mud snail and lesser silver water beetle.*

The strategy is working to encourage business and investment to Ellesmere Port by providing a greener environment to work in.’ (Environment Agency 2005b)

3.6 Knottingley flood scheme commended for wildlife habitat

‘The new flood alleviation scheme for Knottingley, completed in October 2004, has received a commendation for being bird-friendly.

The Environment Agency’s project was commended by the Royal Society for the Protection of Birds (RSPB) and Chartered Institution of Water and Environmental Management (CIWEM) Living Wetlands Award 2005. The judges congratulated the scheme “in particular (for) the outstanding biodiversity contributions on such a small site ...”

The site provides a valuable wetland habitat in the West Yorkshire area, which has very few other similar sites. The design and location of the site mean it will become home to birds such as redshank, snipe and lapwing, all of whose populations have declined in recent years, reed bunting, reed warbler and sedge warbler, which will live in the reed beds, and dabbling ducks.

Birds of prey like barn owls and kestrels are also likely to hunt on the site and it is hoped that water voles and otters, which already live in other places along the banks of the

River Aire, will eventually colonise the area. Dragonflies are also likely to be a feature, attracted by the year-round ponds the site will sustain.

Environment Agency project manager for the scheme Sarah Burtonwood said: “We’re delighted our efforts to add value to the environment in Knottingley as well as protect the homes there have been recognised.”

“We strive to bring as much benefit as possible to communities when we devise flood alleviation schemes and it’s great that this effort has been recognised.”

The flood alleviation scheme consists of raised embankments set back from the river’s edge to create a barrier against high flows as well as wetland areas, which provide valuable habitat year-round. A network of washlands provides essential storage of flood water.

The project took approximately seven months to complete, costing just under £2 million. The wetland area will be opened to the public later in the year.

The commendation was announced at the CIWEM World Wetlands Day conference in London on Monday 31 January 2005.’ (Environment Agency 2005b)

4 Definitions

4.1 Introduction

In this section, the social impacts of flooding on urban and rural communities are explored. Specifically the focus is on understanding the impacts (e.g. economic, health, community) on urban and rural communities from an empirical perspective (i.e. what evidence is there for differential impacts on urban and rural communities in terms of flooding).

4.2 Definitions of rural and urban

It was important for this part of the report to define the concepts of 'urban' and 'rural' empirically, so as to be able to gather relevant information on the social impacts of flooding on urban and rural communities. A key question that emerged was in what ways might the concept of 'urban' and 'rural' be useful in understanding the social impacts of flooding.

It became clear early on that the terms 'urban' and 'rural' are found in a wide range of policy and research contexts and vary in their definition and use. Within the Urban White Paper (ODPM 2000) places with populations of 10,000 or more are considered to be 'urban', and the definition is further developed for the Rural Strategy (Defra 2004a; discussed below). In addition, the Environment Agency (2002b) urban environment report states:

'We must start by saying what we mean by "urban areas". There is no common definition. Different partners have used different statistical definitions for reporting purposes (ONS 1997)' (Environment Agency 2002b, p. 12)

Within the Environment Agency urban environment report (2002b) four definitions that are linked to clear data sources are provided. The report suggests that 'Each of these definitions encompasses a wide range of settlements, but in qualitative terms our intention is to include towns, cities and suburbs but not dispersed settlements or villages.' (p. 12).

In this sense then, there has been a debate about how to define urban and rural areas, and that debate has been about finding what variables differentiate between the completely urban and the completely rural area. It is not surprising that there are as many similarities as differences and that the relationship is best conceptualised as a continuum through several types of settlement. Support for a less oppositional relationship is also given in the descriptions in both the Urban and Rural White Papers of the interdependence of the different settlements on each other:

'There are real differences between rural and urban communities but what binds them together is greater than the differences. Each has much to offer the other. They are closely and inextricably inter-related. The economic, social and environmental influence of our towns and cities stretches well beyond their boundaries into the surrounding regions. Whether we live in rural or urban areas

our livelihood and well-being depend on both. We spend our leisure time in both and value the contributions each makes to our quality of life. Improving the quality of urban life so that people want to stay in and return to the central areas of our cities and major conurbations is important not just to the health of those areas. It is also vital if we are to relieve the pressure for development in the countryside and preserve the essential qualities of rural communities.’ (ODPM 2000, paragraph 1.6)

In terms of differentiation between rural and urban the UK government has recently reviewed the definition and developed a new definition, which consists of two parts:

- ‘the *settlement morphology* comprising all places under 10,000 population comprising small (“rural”) towns, villages and scattered dwellings;
- the wider geographic *context* in which individual settlements are located, i.e. whether the wider area is defined as being “sparsely” populated or not.’ (Defra 2004a, p. 52, Annex A).

Using these two parts the new classification ends up with six categories which are detailed in the table below:

Rural					
Sparse			Less sparse		
Towns and urban fringe	Villages	Dispersed	Towns and urban fringe	Villages	Dispersed

Sparsity is calculated in terms of the average density of households across areas of radius 10,000, 20,000 and 30,000 metres. These distances were chosen to broadly represent the costs of overcoming distance in the delivery of different types of rural service. An area is defined as sparse if it meets a minimum density criterion on all three measures. That is, it is an area where there are very few households in that area. All other areas are classified as less sparse.

The definition of the settlement type is based on density per hectare for all places under 10,000 population: towns and urban fringe.

What is perhaps interesting is that one of the reasons for the change of this definition is that measures of social and employment structure, which were previously used for one of the definitions, ‘no longer clearly distinguished urban and rural areas’ (Defra 2004a, p. 52).

This new definition makes it clear that there is a continuum from urban through to rural and this should be borne in mind throughout this report.

In examining the definitions of urban–rural that have been used in order to analyse quantitative data, it was then possible to take a similar approach to the understanding of social impacts of flooding on urban and rural communities to that taken in Part 2 of this project *Addressing Environmental Inequalities: Flood Risk* (Walker *et al.* 2005).

5 Impacts of flooding on urban and rural communities

5.1 Social impacts of flooding

A recent review of the social impacts of flooding was carried out for Part 2 of this project. That review suggested that a broad definition for social impacts should be used such as the following:

‘all impacts on humans and on all the ways in which people and communities interact with their socio-cultural, economic and biophysical surroundings’ (IAIA 2003, p. 2)

Walker *et al.* (2005) did not differentiate between the sources of flooding, and that approach is taken in this section. However, it is recognised that there are significant issues concerning the differential nature of the sources of urban and rural floods and therefore impacts and, where appropriate, this is discussed in this section.

The work in Part 2 (Walker *et al.* 2005) divides social impacts into a number of broad categories:

- economic impacts;
- non-economic losses;
- impacts on physical health;
- impacts on psychological health;
- impacts associated with evacuation and temporary accommodation;
- household disruption;
- community and neighbourhood changes.

The review found that research has focused at the individual and household level, and that there is little work within the UK on social impacts at the community level. Table 5.1 summarises the differential experience of the social impacts of floods and is taken from Walker *et al.* (2005).

Table 5.1 Differential experiences of the social impacts of floods (from Walker *et al.* 2005)

Social impacts	Evidence of differential effect depending on individual, household or neighbourhood characteristics
Economic impacts	Ethnicity, age, income and property type all have a bearing on the experience of economic impacts
Non-economic losses	Age and property type inform the perception of, and extent of, this impact
Physical health	Pre-existing health status, age and gender all have a bearing on the experience of health impacts

Psychological health	Gender, age, social class and household composition all have a bearing on the experience of psychological health impacts
Evacuation and temporary accommodation	Age, gender and income are relevant to understanding how this phase affects people. Levels of social capital are likely to be important in understanding community response and resilience
Household disruption	Gender, ethnicity, age, property type and tenure type all influence how individuals and households are affected
Community and neighbourhood changes	No research evidence, but suggestion that deprived neighbourhoods and those with low levels of social capital will be particularly hard hit

To examine the impacts of flooding on urban and rural communities the same social impact categories as in Part 2 were used. The social impacts are discussed in two ways by examining:

- direct relationships between sparsity and density (as variables defining urban/rural areas), and specific social impacts;
- indirect relationships between key demographic variables that differentiate between urban and rural areas, and social impacts (i.e. establishing whether there are demographic variables associated with social impacts that are to be found predominantly in urban or rural areas).

5.1.1 Economic impacts

This includes the cost of damage done to a property by a flood, the costs of clean-up (e.g. paying for the house to be dried out), the costs of living in temporary accommodation, and possibly the costs of having a house that is harder to re-sell because it has been flooded or is in a defined floodplain.

There is no research evidence that directly links sparsity and density with economic impacts of flooding. However, in remote rural areas if a person has to be relocated to temporary accommodation then it may well be at a distance from his/her home, adding costs to his/her time and travel.

In terms of economic impacts at the community level, as is noted in Part 2, there has been little research in relation to flooding. However, again, for remote rural areas where there are few facilities, the loss of services and shops could have a disproportionately large economic impact on small communities. There could also be a negative impact in deprived urban neighbourhoods where business confidence is vital to regeneration. If businesses fail because of the impacts of flooding this could damage the perception of the area as an attractive place for investment.

With respect to demographic variables associated with economic impacts of flooding, the review for Part 2 suggests that of the people least likely to be insured 'Most were tenants living in disadvantaged urban neighbourhoods'.

There is significantly more self-employment in rural than urban areas, so impacts on employment could be significant in some rural areas.

5.1.2 Non-economic losses

This refers to the loss of items of sentimental value (e.g. photographs) as well as the feeling of loss of home that has been documented when a home has been violated in some way (e.g. through pollution, or burglary).

It is not clear that the variables of sparsity or density are likely to impact on these losses.

In terms of demographic variables there is evidence to suggest that older people might be more troubled by these losses than younger people, and in remote rural areas there are greater numbers of older people.

5.1.3 Impacts on physical and psychological health

The work carried out by a team of Risk Policy Analysts (RPA), Middlesex Flood Hazard Research Centre (MFHRC) and Economics for the Environment Consultancy (eftec) (Defra 2004c) provides a comprehensive review of health effects of flooding. Specifically, 'health effects caused by a flood event may result from: the event itself; the disruption and problems arising from trying to recover; and from the worry or anxiety about the risk of flood re-occurring' (p. 3, Phase 1 report). The potential health effects can be considered at three time periods:

- immediate: death by drowning, injuries due to being knocked over by flood waters or struck by falling trees, over-exertion during the event, hypothermia, electrocution, exposure to contaminants, the stress of the event itself;
- medium term: gastrointestinal illnesses, cardiovascular disease from over-exertion during recovery/clean-up processes, lacerations, sprains/strains, dermatitis, respiratory illnesses, carbon monoxide poisoning;
- longer term: mostly psychological effects.

Sewer flooding and the health issues associated with that are a key issue for urban flooding, whereas concern is growing over the effects of diffuse pollution in rural flooding (Heathwaite *et al.* 2005).

In terms of density and sparsity issues, because of the close proximity of people to one another within the urban environment there is more chance of their being an epidemic of illness, especially if sewer flooding is involved.

In rural areas, physical injuries may be exacerbated because of the distances to hospitals, and demand for GP services in areas where there are already low levels of service may increase.

There could also be impacts on mental health of isolation and density. People in remote rural areas who have experienced flooding may perhaps feel cut off, whereas in areas where a considerable number of people have been through the same thing then social networks and support do emerge.

5.1.4 Impacts associated with evacuation and temporary accommodation

These impacts include both the effects of having to leave home and those of having to live away from home.

In urban areas, if there are large numbers of people to be relocated then this will put pressure on services, and may mean that people have to live in cramped and overcrowded conditions, or have to move a distance from their homes.

In rural areas, especially remote rural areas, temporary accommodation may be located at a distance from the person's home.

For people in either the urban or rural environment difficulties will be experienced if they are relocated to areas some distance from their homes. Specifically, it will be harder to keep in touch with repairs etc. being carried out on their homes, and harder to maintain normal routines because of greater travelling distances and new routes to schools, work and services.

5.1.5 Household disruption

This refers to the business of cleaning up the house, dealing with builders, and dealing with living in a damp environment. It is rated as something that is very stressful for people (Defra 2004c).

In both rural and urban areas there is likely to be pressure on services to aid the clean up of the flooding. In urban areas, if a large area has been flooded then there may be difficulties in finding workmen to repair flood damage. However, if there are large numbers of people flooded, then networks of knowledge can emerge and there can be support for people in terms of helping to get things organised. In rural areas there may also be difficulties in finding workmen as there may not be many local people with the requisite skills, and this may lead to people having to be out of their homes for longer periods.

5.1.6 Community and neighbourhood changes

This refers to impacts at the community and neighbourhood level and, as noted in Part 2, little research has examined impacts at this level.

As noted above, for remote rural areas where there are likely to be more independent businesses, a flood which has severe impacts on those businesses could substantially change the nature of that community. For example, if a business such as a shop or pub that is the heart of the community is severely affected, taking away a meeting space for that community, there could be negative impacts on community cohesion. In addition, in rural areas if key community leaders have to leave their homes for lengthy periods it will negatively affect community cohesion.

5.1.7 Variables associated with vulnerability to flooding

A further key source of information on the social impacts of flooding comes from the work carried out on the project 'Flood Warning for Vulnerable Groups' (Environment Agency 2005a). This work focused on examining whether some groups within the population are particularly vulnerable to flooding by looking at:

- the social distribution of flood risk;
- the awareness of flood risk within the population in flood risk areas;
- the ability to respond to flood warnings and cope with a flood event within the population in flood risk areas.

The work has four aspects to it:

- a literature review;
- secondary analysis of flood data;
- a qualitative study exploring flood-related vulnerability;
- measuring and mapping vulnerability to flooding.

Much of this work has been drawn upon for the review carried out for Part 2 (Walker *et al.* 2005) of the current project, so we do not intend to repeat the detailed findings here. However, it is useful to note the following, taken from secondary analysis of the British Market Research Bureau (BMRB) data:

'If lack of awareness of flood risk is treated as an indicator of vulnerability to flooding then the following groups are particularly vulnerable:

- those who recently moved into a floodplain
- people renting
- people in socio-economic groups C2, D and E
- people aged below 35 and those over 55.

In flood events households with more than two members took more action than those where individuals lived alone, and those resident in the area for more than one year took more action than newer residents' (Environment Agency 2005a, p. 3)

A key finding from the qualitative study was that 'Levels of awareness [of flood risk] were found to vary according to knowledge of local flood history rather than category membership' (Environment Agency 2005a, p. 3).

There are greater numbers of older people in rural areas, together with greater numbers of people living alone, both of which are related to increased vulnerability to flooding. Furthermore, there is a net migration of people from the urban areas to more rural areas, and these newer residents could be more vulnerable as they have less knowledge of local flood history. Migration in general is a key issue for both urban and rural areas. In urban areas turnover of tenants in social housing is very high and this could potentially affect retention of flooding knowledge.

5.2 Perceptions of key issues in relation to impacts of flooding on urban and rural communities

5.2.1 Introduction

This section presents the themes that emerged from the interviews and discussions concerning the impacts of flooding on urban and rural communities. It should be said at the outset that for this part of the project the interviews were mainly focused on Parts 4 and 5 of the 'Managing the Social Aspects of Floods' project and that the questions on urban/rural issues were limited.

Ten of the interviews that were carried out asked questions about urban and rural community impacts. All the themes that were mentioned are captured below. The aim was to gather a range of views and opinions on the issues.

Two broad categories of theme were identified: those respondents who accepted the distinction between urban and rural communities and provided their views on the differences between those communities and their relationship to flooding, and those respondents who, for a number of reasons, were not convinced that it was a useful distinction. It should be stressed that the following are the views and opinions of those interviewed.

5.2.2 Perceived differences between the impacts of flooding on urban and rural communities

Relationship to nature

It was suggested that people in rural areas are more in tune with nature than those in urban areas – that is, they have more connection with the environment and therefore have a better sense of the indications of when a flood might occur. For this reason people in rural communities might be considered better prepared for flooding than those in urban communities.

It was also commented that flood defence walls in towns and cities often separate people from the rivers. It was felt that this might mean that people in towns and cities do not have a sense of the rhythm of those water bodies, which may make them less aware of flooding issues.

Sense of community

It was suggested that there tends to be a lack of sense of community within urban areas as compared with rural areas, which can mean that there is less resilience within the community to flooding. It was suggested that rural areas were more robust. However, it was also suggested that there is no evidence at present to suggest that there is a clear-cut difference in terms of sense of community between urban and rural areas.

Community engagement

It was also suggested that it is harder to organise community groups in urban areas as the boundaries of communities are more diffuse than in rural areas, and it was suggested that rural areas have better structures for organisation at a local level (e.g. parish councils).

Coastal flooding

It was suggested that there was more anxiety in coastal areas about flooding than in urban areas. The point was made that urban flood defence systems appeared to be more developed whereas on the coast there were communities living with considerable uncertainty about whether or not they would experience flooding.

Policy issues

It was suggested that there was more of an emphasis on urban areas because of the appraisal process, which is based on property prices. Therefore, areas with high property prices and/or many properties were more likely to secure defences than those areas with few properties, and this skews the system towards the urban areas.

However, even though that might be the case it was felt that the Environment Agency has had a predominantly rural focus, helping the areas that frequently flood. It was recognised that there is much to do in urban areas and that there is a need to focus on the low probability/high consequence areas, which also tend to be mainly urban.

5.2.3 Impacts on urban and rural communities not the key issue

Some respondents felt that the urban/rural split was perhaps not the most useful. Instead, it was suggested, for example, that how to work with communities whose defences had become unsustainable was a key issue. These may often be rural communities, but the point was that the issue was about sustainability of defences rather than the nature of the communities. Caravan sites were another area mentioned where defences might be regarded as unsustainable.

It was felt that the urban/rural division was an artificial one, but also one that had not been clearly defined by Defra. It was also felt that it was not clear whether urban flooding included flooding from all sources or just flooding from rivers and the sea. This has implications for decisions on which populations are examined.

5.3 Key differences in terms of demographics, economic activity, social exclusion and access to services in relation to the urban–rural continuum

In this section an approach to examining the relationship between specific variables that differentiate settlements along the urban–rural continuum and their relationship to vulnerability to social impacts of flooding is presented. The focus here is on data used in development of the Rural Strategy (Defra 2004a) but also could be carried out using data

developed from an urban perspective. The section is not intended to be comprehensive, but rather to present one approach to investigating this issue.

Some of the descriptive data are presented and some of the key differences between urban and rural areas and within rural areas are highlighted. The aim of this section is to summarise the key variables that differentiate between these areas. Those variables are then examined to see if there is research or anecdotal evidence to suggest that they may increase or decrease vulnerability to specific social impacts of flooding.

The Rural Strategy (Defra 2004a) is based upon an examination of key sets of data which are summarised in Annex B of that report. It is a useful summary as it provides a description of who lives in the rural areas, and a range of other useful socio-economic information. The Countryside Agency (2004) also provides useful evidence. From those two data sets five key areas have been analysed and Table 5.2 provides the results of those analyses.

The five key areas are:

- demographics;
- migration;
- economic activity;
- housing;
- access to services.

Table 5.2 Key areas, issues and implications for social aspects of flooding

Key area	Variable	Key issues	Implications for social impacts of flooding
Demographics	Overall numbers in different areas	80.7% of population live in urban areas; 19.3% of population (i.e. 9.5 million) live in all rural areas. Of people living in rural areas, 610,000 live in rural areas where the surrounding region is particularly sparsely populated. The remainder (8.9 million) live in small towns (4.2 million), villages (3.3 million and hamlets or isolated dwellings (1.4 million)	It is probably easier to define the characteristics of people in rural environments, as within urban environments the variety will be enormous

	Age	There are more older people in rural areas (18% are 65 and over compared with 15% in urban areas) and a significantly lower proportion of young people aged between 18 and 29. This is even more pronounced in sparsely populated rural areas, with 22% of people over 65. A total of 46% of people in rural areas are 45 or over, compared with 38% in urban areas	Rural areas have more people aged 45 and over than urban areas, and those in their 50s are more likely to be susceptible to health effects, therefore it could be hypothesised that more people in rural areas will be affected by health impacts from flooding
	Age and living alone	7.8% of all people living in rural areas are aged 50 and over and living alone	Living alone is likely to make coping with all aspects of flooding more difficult and may be exacerbated if people are 50 and over
Migration	Net migration	<p>The trend is for more people to move into rural areas with 33,000 more people moving into rural areas than out of them in the year ending April 2001. However, the greatest net migration was into small towns in less sparse areas, and there was a net outflow of people from dispersed settlements in sparse rural areas.</p> <p>Generally, there is quite a lot of movement, with 480,000 moving into rural areas and 450,000 leaving rural areas in the year ending April 2001</p>	The issue here is lack of knowledge of flooding, with new people moving into rural flood risk areas. The nature of rural flooding is that it may be less serious but more frequent and therefore people probably need to adapt to it

	Age and migration	Trend for retirees and families to make up the in-migrants	Both age and being new to an area are considered to increase vulnerability to flooding
Economic activity	Type of employment	Generally the differences in employment between rural and urban areas are disappearing due to the decline in traditional industries such as agriculture, fishing and mining. There is a higher percentage of people employed in agriculture in some of the poorest rural districts	In urban areas (given the lack of work related directly to the environment) there may be low awareness of rivers etc. This lack of awareness will increase in rural areas as the number of people involved in agriculture declines. Also, because it is in some of the poorest areas that people are involved with agriculture, whole livelihoods may be at risk in places where there are few resources to aid recovery
	Size of business	Of the 21% of English businesses located in rural areas, most tend to be small (employ less than 50 people). There is significantly more self-employment in rural than urban areas	Again, the impact on small businesses could be greater in rural areas
	Deprivation – generally	Rural deprivation tends to be more highly dispersed than urban deprivation. 1% of rural areas fall into the bottom 10% of areas on the Indices of Multiple Deprivation (IMD)	This may mean that there will be small numbers of people who are very vulnerable and this could be overlooked.

Housing	Access to housing	Poor access to housing – of those areas in the bottom 10% for geographical barriers to housing and services, 48% are rural areas	This may affect the ability to find temporary accommodation in rural areas
	House prices and availability of housing	House prices in the period 2000–2003 rose faster in rural areas than in urban and one impact can be seen in the increased problem of rural homelessness	If people cannot return to their homes, the high house prices may be a barrier to remaining within a local area
Access to services	Access to bus services, cars, post office and nearest GP	21% of rural households do not live within 10 minutes' walk of a daily or better bus service and within the rural areas in the bottom 10% of areas for the IMD 44% do not have access to a car (three times the level in all rural England). Rural households on low incomes spend 54% more on travel than low income urban households. Over 500,000 rural households are more than 2 km from their nearest post office and over 800,000 rural households are more than 4 km from the nearest GP	These figures suggest that access to these services are poor for a minority of people in rural areas. All the social impacts of flooding could be exacerbated by the lack of access to these services

6 Conclusions and recommendations

6.1 Conclusions

This research set out to look at social impacts of flooding on urban and rural communities. Within the short timescale available, we looked at what work existed, the issues considered important by key stakeholders, and how those issues might be addressed.

Two approaches were taken. The first examined some of the synergies between recent urban/rural policy and flood risk management (FRM) policy, and the second took an empirical approach to unpacking differences between impacts on rural and urban communities.

From the first approach it is clear that there are some key synergies to be built upon between urban and rural policy, and FRM policy, such that FRM development becomes embedded within the urban and rural agendas. It follows that, as the shift is towards living with floods, the urban and rural policy agendas should be considering FRM as part of their design and landscape approaches. Both agendas would benefit from developing dialogues concerning planning for communities, thus putting FRM into context and, importantly, making it part of the normal planning process.

In addition, it is clear that FRM is already engaging with those agendas through some of the flood alleviation schemes. The examples presented in this report show how the Environment Agency is putting sustainable development into practice, by creating environments that not only alleviate flooding but also provide urban green spaces, with all their benefits in terms of health and well-being, and wildlife habitats that have conservation and biodiversity benefits.

The second part of the report provided an overview in terms of the social impacts of flooding on rural and urban communities from an empirical perspective. Two key issues emerge from that review.

Firstly, the terms rural and urban are used in a number of different contexts with more or less precision. In this part of the report we looked at the Defra definition of the rural–urban continuum that focuses on density and sparsity, together with demographic variables that might differentiate between rural and urban areas. From the brief review here and the work carried out for Part 2 of the project it is clear there is still work to be done to unpack the relationships between impacts of flooding and specific communities, in this example rural and urban.

Secondly, from the interview material it was clear that some stereotypes around the nature of urban and rural areas exist. These could broadly be summarised as ‘friendly nature-loving countryside and anonymous city’. Such stereotyping could be unhelpful with respect to understanding the social impacts of FRM. We felt that some of the interviewees’ comments were not informed by an understanding of general social trends (e.g. migration both out of cities to the country and within cities). In addition, there were

participants who felt that a focus on urban and rural communities was not useful, and that other issues (e.g. the nature of the flooding) that cut across the urban–rural continuum were more important in terms of social impacts.

6.2 Recommendations for further work

Based on the research carried out a number of recommendations for further work can be made.

R1: It has become clear that in this area of urban and rural issues the Environment Agency has to work in partnership with others. Often for partnerships to be successful new languages need to be developed, or existing information needs to be packaged in such a way that is understandable to other groups. It is suggested that the Environment Agency facilitate dialogue both internally (between Social Policy, Environmental Impact Assessment and FRM) and between the Environment Agency and ODPM (for urban policy) and Defra (for rural policy) on the embedding of FRM in urban and rural policy.

R2: Produce a publication/web page showing flood alleviation schemes that have provided benefits either to urban design or to rural landscapes. Use the language of urban and rural policy to present the flood alleviation schemes in the wider context. Use this as a tool to promote the place of FRM in urban and rural policy.

R3: Understand how Catchment Flood Management Planning (CFMP) can be linked into spatial planning through local development frameworks (LDFs). Work at the University of Manchester (Tippett 2005) has developed an excellent participatory approach to spatial planning around water issues. The same approach could be used for CFMPs and also for LDFs and spatial planning. A way in for the Environment Agency is via sustainability appraisal and Strategic Environmental Assessment (SEA). Local authorities now have a duty to carry out sustainability appraisal of their LDFs and the Environment Agency is a statutory consultee at the scoping stage, which means that there is an opportunity for influence at an early stage of the LDF.

R4: Carry out more detailed analysis of the relationship between the variables of density and sparsity and flood risk. Map the urban/rural communities onto the flood risk communities. Link to the deprivation mapping that has been carried out for Part 2 of this project. Analyse existing data sets using the urban/rural division (e.g. the health impacts work carried out by the Flood Hazard Research Centre) to see if there are differences in health impacts relating to rural and urban characteristics that require different responses from FRM.

R5: Carry out some detailed work examining the social impacts of flooding on an urban community and a rural community. This could be preceded by an analysis of existing data from other projects, which could be categorised according to urban/rural.

R6: Further investigate the issues concerning low probability/high consequence flood risk areas (which are predominantly in urban areas), specifically in understanding the values and perceptions of people in those communities towards flood risk. This was a key recommendation from work carried out on this area (Defra 2005b) for the Flood Forecasting and Warning theme.

R7: Undertake more research to help understand the relationship between the sources of flooding in rural and urban areas and their impacts on communities (e.g. the social impacts of sewer flooding, which is predominantly an urban phenomenon).

R8: Investigate the relationship between knowledge of and familiarity with rivers or the sea and the understanding of flood risk and its impacts. With increased migration out to rural areas together with migration within urban areas, knowledge of flooding may be disappearing from some communities and not being developed in others. Understanding what knowledge is needed and how to pass that on to newcomers to flood risk areas would be useful.

Appendix 1 Interview schedule

Managing the Social Aspects of Floods

Section 1 – Part 1. The impacts of flooding on rural and urban communities

1. *What are the social aspects of flooding?*
2. *In which ways are rural and urban communities affected differently?*
3. *Can you think of any clear-cut differences of social aspects between rural and urban areas?*
4. *Do you know of any work which addresses these issues specifically?*

Section 2 – Part 4. Community and citizen engagement in FRM

We are particularly interested in the effectiveness and efficiency of the public participation process and outcome due to community involvement compared with reliance upon FRM decision making, delivery and flood response without community involvement.

5. *Can you think of any anecdotal work which would suggest positive/negative impacts of community involvement on effectiveness and efficiency during the three stages of flood occurrence (before, during, after flood)?*
6. *Which, in your view, are the key issues concerning community involvement and effectiveness/efficiency in terms of FRM?*
7. *What, in your view, could be done to improve local people's involvement?*
8. *Are there issues which you feel should be addressed by the Environment Agency and have been omitted to date?*
9. *What recommendations would you make to the Environment Agency for further research and future policies?*

Section 3 – Part 5. The role of social science in FRM

10. *What is the current role of social science in FRM and how is it perceived by organisations such as the Environment Agency, Defra, academia and others?*
11. *What is lacking in the Environment Agency's social science policy/programme to date? How could it be improved?*
12. *Any other comments/questions?*

Appendix 2 Interviewees

Below is a list of the people who were interviewed for the project and their contribution to the research.

Name	Affiliation	Contribution to research
Joanne Reilly	Environment Agency	<i>Part 1 The impacts of flooding on rural and urban communities Part 4 Community and citizen engagement in FRM Part 5 The role of social science in FRM</i>
Colin Candish	Environment Agency	<i>Part 1 The impacts of flooding on rural and urban communities Part 4 Community and citizen engagement in FRM</i>
Kevin House	Environment Agency – Senior Technical Officer Thames 2100	<i>Part 4 Community and citizen engagement in FRM Part 5 The role of social science in FRM</i>
Jonathan Chapman	Environment Agency Defra/Environment Agency research co-ordinator	<i>Part 1 The impacts of flooding on rural and urban communities Part 4 Community and citizen engagement in FRM Part 5 The role of social science in FRM</i>
Simon Hughes	Environment Agency – Flood Event Manager	<i>Part 1 The impacts of flooding on rural and urban communities Part 4 Community and citizen engagement in FRM Part 5 The role of social science in FRM</i>
Ruth Rush	Environment Agency – Corporate Affairs	<i>Part 1 The impacts of flooding on rural and urban communities Part 4 Community and citizen engagement in FRM Part 5 The role of social science in FRM</i>
David Wilkes and representatives from Bradford Council Neighbourhood Support Services	Environment Agency – Area Flood Risk Manager	<i>Part 1 The impacts of flooding on rural and urban communities Part 4 Community and citizen engagement in FRM Part 5 The role of social science in FRM</i>
Dave Hornby	Environment Agency	<i>Part 4 Community and citizen engagement in FRM</i>
Gill Holland	National Flood Forum	<i>Part 1 The impacts of flooding on rural and urban communities Part 4 Community and citizen engagement in FRM</i>
Julian Simcox	Independent facilitator	<i>Part 4 Community and citizen engagement in FRM</i>
Dr Mary Jordan	Clinical psychologist and chair of local community group	<i>Part 4 Community and citizen engagement in FRM</i>
Jessica Milligan	University of East Anglia	<i>Part 1 The impacts of flooding on rural and urban communities Part 4 Community and citizen engagement in FRM</i>
Prof. Tim O’Riordan	University of East Anglia	<i>Part 4 Community and citizen engagement in FRM Part 5 The role of social science in FRM</i>
Prof. Joe Howe and others ¹	University of Manchester	<i>Part 1 The impacts of flooding on rural and urban communities Part 4 Community and citizen engagement in FRM Part 5 The role of social science in FRM</i>
Prof. Susan Owens	University of Cambridge	<i>Part 5 The role of social science in FRM</i>

¹ Other members of the department were talked to on a more informal basis

Dr Andy Stirling	University of Sussex	<i>Part 5 The role of social science in FRM</i>
David Richardson	Defra/Environment Agency research, Policy theme leader	<i>Part 1 The impacts of flooding on rural and urban communities Part 4 Community and citizen engagement in FRM Part 5 The role of social science in FRM</i>
Paul Tabbush	Forest Research, Forestry Commission	<i>Part 5 The role of social science in FRM</i>
Civil Renewal Unit, Home Office		<i>Part 5 The role of social science in FRM</i>

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