SOLARIS
SOLIDARITY IN CLIMATE CHANGE

SOLIDARITY IN CLIMATE CHANGE ADAPTATION POLICIES: TOWARDS MORE SOCIO-SPATIAL JUSTICE IN THE FACE OF MULTIPLE RISKS

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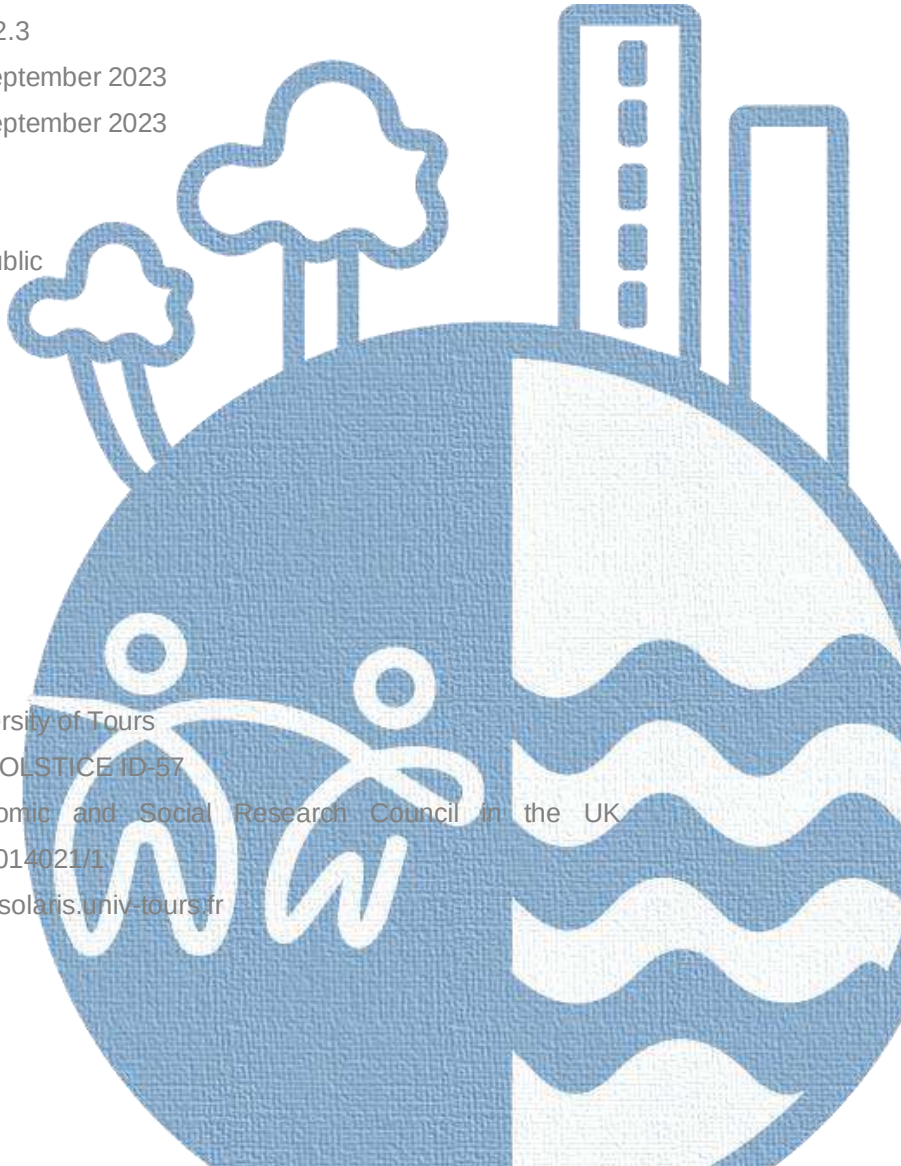

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Preface

What to find in this country report?

This report is part of the Work Package 2 (WP2) deliverable of the research project SOLARIS (SOLidarity in climate change Adaptation policies: towards more socio-spatial justice in the face of multiple RISks), funded by the participant countries to the SOLSTICE program of JPI Climate "Connecting Climate Knowledge for Europe". More information about the SOLARIS project, its purpose and outputs can be found here https://jpi-climate.eu/project/solaris/.

This document is part of the compilation of reports on the empirical investigations carried out at national level in the four SOLARIS countries (Belgium, England, Finland, and France) and eight case studies. WP2 is dedicated to case study analysis, based on common conceptual and methodological work conducted in in WP1, which enables cross-case analysis (WP3) and finally dissemination (WP4). The eight case studies cover climate change adaptation policies (CCAPs) and flood risk management (FRM) strategies implemented in the four countries. These strategies are implemented differently from one country to another, but they share similar questions when they launch projects and have similar concerns about the impacts of CCAPs. WP2 analyses the justice implications of these policies, the socio-spatial inequalities deriving from these strategies, and any initiatives that institutional stakeholders adopt to limit these inequalities.

An important aim of the project is to disseminate results of case studies analysis among practitioners and scientists via different media (practitioner's handbook, oral presentations, scientific articles, e-doc website etc.).

Context

Facing the unpredictability and unavoidability of climate change effects, public policies in Europe must (re)consider their CCAPs. In this field, adaptation to extreme hydraulic events such as flooding and erosion are more urgent than ever. As Tradsowki et al. considered when they examined floods in Western Europe in July 2021: "Models indicate that intensity and frequency of such events will further increase with future global warming" (Tradowsky et al., 2023).

In such a context, climate change impacts raise controversies on the distribution of negative consequences. At the same time, however, adaptation to climate change itself raises questions of fairness, justice, and equity (Adger, 2001; Byskov et al., 2021). Studies have highlighted the essential issue of justice in climate change exposure, especially in countries in the Global South (Bobo, 2006; Owen, 2020) as well as in Europe (Reckien et al., 2014), however further analysis of justice issues related to CCAPs in Europe is needed. The SOLARIS project focuses on flood risk issues and illustrates how justice can be considered in public policy.

FRM has long raised issues of justice (Walker & Burningham, 2011). Flood risk itself is often unevenly distributed, due to the diversity of causes of flooding, types of landscape, the location of the houses and assets on which people depend. The impacts of floods and their consequences on individuals and communities is

determined by a range of factors other than the severity of the flood itself, such as socioeconomic characteristics and capital, health conditions, age, and psychological characteristics (Thaler et al., 2018). Furthermore, access to the benefits of FRM is also said to be "inherently unfair" (Johnson et al., 2008; Johnson et al., 2005). The (un)fairness of FRM is principally a question of who benefits from the measures and who pays for them (Begg, 2018). But other considerations include the ability of stakeholders to influence the decisions made and the way in which vulnerable people are recognised and defined.

As such, justice in FRM can be categorised as ***distributional justice*** (winners and losers in FRM including who pays for measures and whose flood risk is reduced), ***procedural justice*** (mechanisms to support representative and fair decision making), and ***recognition justice*** (how vulnerable and/or disenfranchised people are identified so that injustices can be tackled).

These three forms of justice – as well as the way FRM is carried out – help to define some related terms, namely fairness, solidarity, equality, and equity. To analyse the socio-spatial injustices within CCAPs related to FRM, SOLARIS utilises three key research questions:

1. How and when are issues of equality and justice identified and addressed in FRM? How does it link up with other policies, like CCAPs?
2. How is participation in decision making for FRM facilitated?
3. What is the role of (and access to) knowledge in FRM? How does this support capacity building for addressing social inequalities?

Methods

SOLARIS is a qualitative social science research project aiming to explore justice in FRM across four countries: Belgium, England, Finland, and France. The three research questions have been answered for each participant country at both national and sub-national (case study) level.

This project takes a case study approach with a common protocol used during the investigation. The above research questions dominated the analysis, and the case study approach utilises four main empirical tools (mixed-method design): analysis of policy/guidance documents/grey literature, interviews with stakeholders, local discussion groups, and participant observation.

The first method of data collection is ***document analysis.*** Document analysis involves the analysis of legal and policy documents such as legislations, rules, and programs (Massey et al., 2014) to underline how FRM has considered the issues of justice. We aim to note the distance between the formal documents and the discourses of the different groups (through interviews and local discussion groups). In total, 187 documents (France, 86; Belgium, 24; Finland, 43, England, 34) have been formally analysed by the four countries, however others may have been consulted to direct the research. Where appropriate it has also been possible to draw on the analysis of documentation undertaken in previous research projects (see, e.g., Alexander et al., 2016).

The second method of data collection is ***semi-structured interviews*** carried out with public authorities, policy makers, and other experts and practitioners involved at the national and case study level, as well as local

NGOs. In some of the cases, interviews were also conducted with local at-risk inhabitants to supplement data. Specific attention was given to the implementation from national to local. Interviews typically lasted 60-90 minutes and began with a set of pre-prepared questions focussing on the role of justice and equality in FRM, both in policy and in practice, as well as participatory practices and the role of knowledge. Following on from these questions, the interviews would become less structured to expand and probe issues that participants had raised. All interviews were recorded with the participants' permission, transcribed, and thematically analysed through an iterative process. A total of 166 interviews were conducted in the four countries (France, 53; Belgium, 39; Finland, 49; England, 28).

The third data collection approach is the organisation of local discussion groups. The aim was to contribute to the analysis through a discussion with a limited number of relevant experts (flood risk managers, i.e., engineers, spatial planners, etc.; policy makers; NGOs, local resident experts) invited to the local discussion group. The idea is twofold: first, to ask for feedback on preliminary results and to provide knowledge exchange concerning next steps, and then to invite experts to reflect on the (in)equality and (in)justice issues that are raised by current spatial planning policies for FRM. Each country organised a Local Discussion Group per case study level.

The final and fourth data collection approach is participation observation. Participant observation implies the presence of the researcher in the social world of the respondents, in their usual activities (Beaud & Weber, 2003; Bryman, 2016). The objective is to understand their relationships and daily practices beyond the mere collection of their discourse (carried out in the context of an interview). This data collection strategy was implemented according to the case studies, the disciplinary context, and the willingness to experiment in each country. For instance, Finland realised an art experience called SOLARIS-ART: Engaging with Solidarities in Flood Risk Management Through Community Art. It is "a temporary public space for listening called the Outdoor Living Room (OLR). This is a unique method that was developed to set up a living space in public places to engage people, who would otherwise not feel comfortable attending more formal meetings" (Mazzotta, 2022).

Case selection - England

West Sussex provided an opportunity to investigate a coastal system in SOLARIS. With sea level rise and the increase in the frequency and intensity of storms, coasts face some of the most severe FRM challenges. The area has several active flooding and/or resilience volunteer groups who are keen to share their insights into flood risk. The SOLARIS themes are particularly relevant for the Manhood Peninsula in West Sussex, where climate change processes threaten the viability of local communities.

The river Thames case is large and complex and contains a number of large-scale FRM schemes that span several decades. In the case of Slough, there is recent resilience funding to trial a novel 'Sponge City' approach. The case provides access to a range of communities with very different socioeconomic and cultural characteristics. The chosen comparative analysis of these was between Slough Borough Council and Surrey County Council.

Data collection and analysis

As mentioned, the data for this case study report was collected through document analyses and interviews. SOLARIS project teams across the four countries agreed on main topics for the thematic analysis of policy. These themes were considered in policy at national and at case study level.

We also conducted semi-structured interviews with public authorities and other stakeholders. In total, 28 interviews were conducted for the English contribution to the SOLARIS project. A list of these with dates and participant type is provided in Appendix 1 of this report. Interviews typically lasted 60 minutes and began with a set of pre-prepared questions focussing on the role of justice and equality in FRM in England, both in policy and in practice, as well as participatory practices and the role of knowledge. Following on from these questions the interviews would become more improvised as I asked participants to expand on issues that they had raised. All interviews were recorded with the participants' permission, transcribed, and thematically analysed through a systematic and iterative process.

Section 1: National-level analysis

Type of flood risks

England has a variable climate but overall suffers relatively high levels of rainfall. This is largely due to the westerly, warm Atlantic winds combining with cooler European air masses to the east. The varied topography is also a factor, with the higher altitudes of Cumbria and The Lake District causing high levels of relief rainfall from the arriving Atlantic air masses. In general, the west of England receives higher average rainfall levels (800mm for Liverpool and Manchester) than in the east and southeast (600mm in Ipswich and Cambridge, for example).

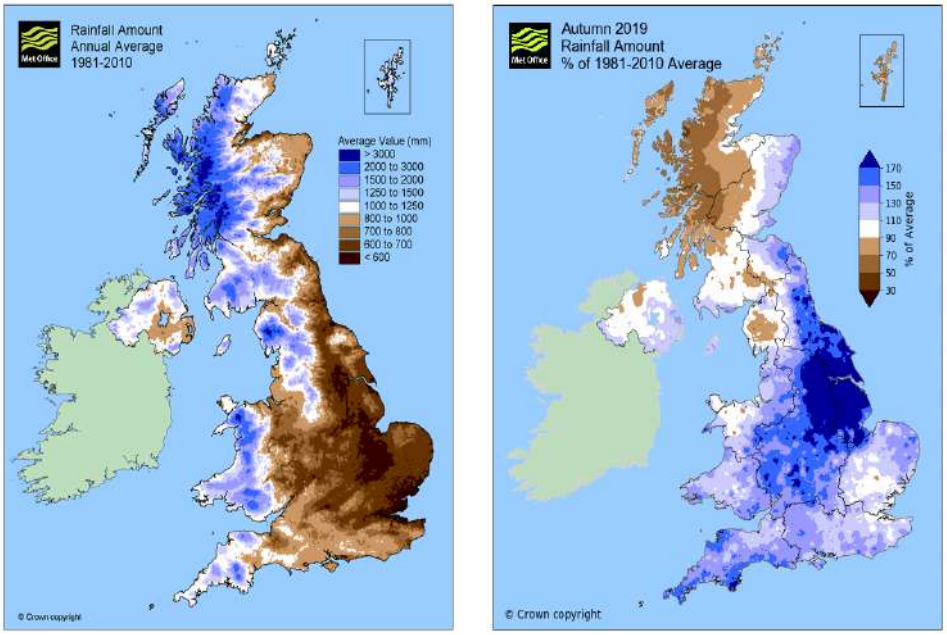

Figure 1: Maps to show the distribution of average rainfall amounts in the UK (1981-2010 - left) and that of Autumn 2019 (as a percentage of the averages from the same period - right). Source: The UK Meteorological Office - https://www.metoffice.gov.uk

The diversity in the UK's climate, geology, and land use result in high levels of variability in flood events and flood risk (Marsh et al., 2016). However, rain patterns for individual events can be more unpredictable. The left image in Figure 1 above shows average rainfall distribution between 1981 and 2010 for the whole of the UK, whilst the right image shows rainfall distribution in the autumn of 2019 as a percentage of the 1981-2010 average. In this event some of the heaviest rainfall was experienced in eastern areas of the country that typically experience some of the lowest averages (covering areas of Lincolnshire, Nottinghamshire, East Riding of Yorkshire, and Leicestershire), whilst in many western areas the levels remained near or below average. The geology of the UK also plays a big role in surface run off and groundwater flooding. The UK has a relatively high water table, which can rise rapidly in some areas. In addition to this, areas of softer bedrock such as limestone can cause planning and development restrictions due to the dangers of erosion and

sinkholes forming. A range of other factor influence flood risk at the national, regional, and local level – as is the case in other countries: land use change; population growth; ageing drainage infrastructure; and natural processes (Alexander et al., 2016). Population growth in England is a risk-enhancing factor for flooding as pressure increases to meet housing demand whilst also managing flood risk (Ibid).

There are five main forms of flooding in England: fluvial; coastal; surface water flooding; sewer flooding; and groundwater flooding (Environment Agency, 2020b), which present a genuine danger to property and human life and wellbeing. According to the latest National Assessment of Flood Risk (NaFRA):

> "…around 5.2 million properties in England, or one in six properties, are at risk of flooding. More than 5 million people live and work in 2.4 million properties that are at risk of flooding from rivers or the sea, one million of which are also at risk of surface water flooding. A further 2.8 million properties are susceptible to surface water flooding alone." (Environment Agency, 2009(b): 3)

The lack of mention of sewer and groundwater flooding from this assessment is due, in part, to the fact that these forms of flooding have only been explicitly dealt with in English policy more recently than 2009. This is partly because the problem is a lot more difficult to tackle in a country with a relatively high groundwater level.

It is well documented that climate change will increase flood risk in England, and most likely already is (Kay et al., 2020; Met Office Hadley Centre, 2021). Recent data published by the independent Climate Change Committee suggests that average annual rainfall levels are currently about 2% higher than the average between 1981 and 2001, and sea levels have risen by 7cm relative to the average in the same period (Climate Change Committee, 2021). Coastal erosion rates are causing significant concern, with 28% of coastlines across England and Wales deemed vulnerable (Ibid.). In some of the worst affected areas of English coastline communities face surface run off flood risk as well as the risks from storm surge and sea level rise.

The economic cost of recent flood events

The UK has suffered a several major hydrological events in the past decade, several of which were floods[1]. Figure 2 below provides a timeline overview of major flooding events in the UK since 2012. It is interesting to note is that there is a growing tendency in more recent flood reports to chronicle the number of properties

[1] It is worth noting that extreme weather events are typically reported on a UK level. Incoming storms, for example, are reported in terms of their impacts on the countries of Northern Ireland, Scotland, Wales, and England. Climate change adaptation policy (CCAP) and FRM policy, however, are typically managed at devolved administration level – i.e. independently by the governments of the four countries to match their own demands and opportunities, with the exception of some overarching policies and documents, such as 'A Green Future' (see below).

protected by FRM defence schemes[2] and warnings (see 2019 and 2020 in Figure 2). This is reported by the Environment Agency, which estimated that "flood risk management schemes protected almost 130,000 properties in the same period [November 2019 to February 2020]. Our defences also helped to avoid significant economic damages. The economic losses from the winter 2019 to 2020 flooding are estimated to be about £333 million but the economic damage avoided because of the protection provided is at least 14 times greater, at around £4.6 billion to £9.3 billion" (EA online). It should be noted that the success of these FRM schemes is measured in terms of total number of properties protected and economic losses avoided. There is no mention in the report of the distribution of properties and the types of properties, nor of total numbers of vulnerable people protected, for example, based on their socioeconomic circumstances.

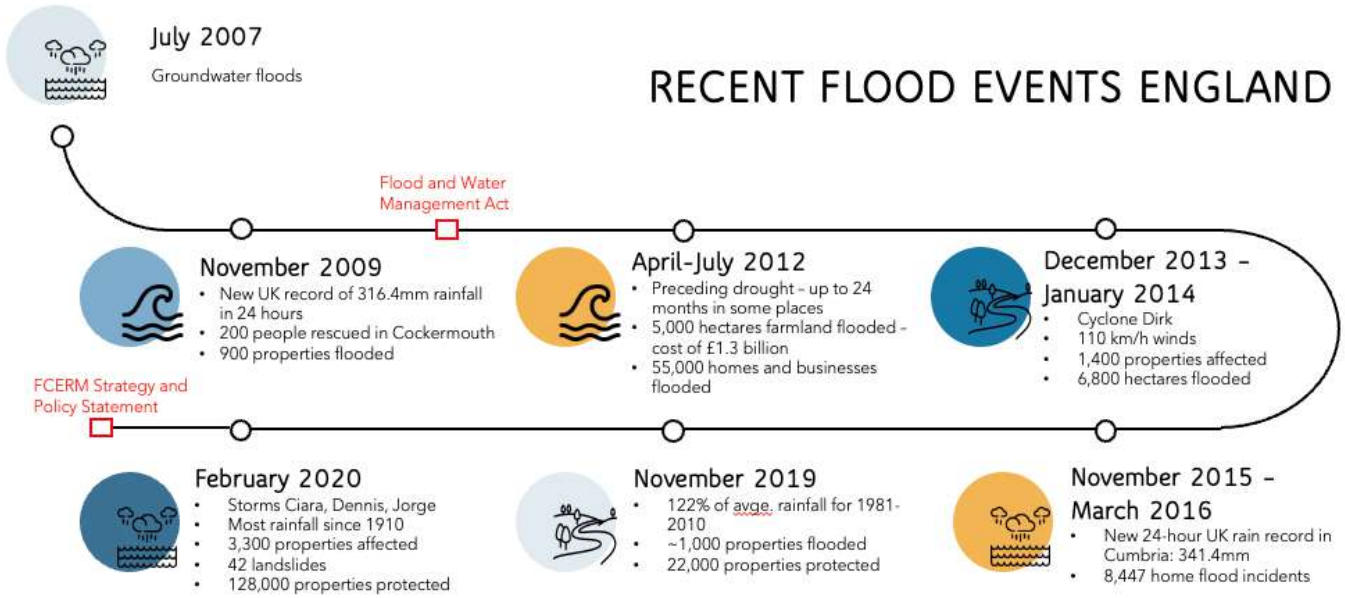

Figure 2: Timeline showing major flooding events affecting the UK since 2007.

Climate change and FRM policies

For the purposes of this SOLARIS research the policy landscape in England can be categorised into those dealing with climate change more generally (including mitigation and adaptation), and those more specifically guiding FRM. Both categories are introduced here. The two are linked through a diverse range of actions and policies but one common denominator is the planning system, as guided by the National Planning Policy Framework (NPPF). Most FRM initiatives and schemes require planning permission and sectoral adaptation plans also operate within broader development plan perimeters. English FRM is strongly dependent on planning (as well as financial mechanisms such as insurance), such as through efforts to limit development in high-risk areas.

[2] The word 'scheme' is commonly used by the Environment Agency in England. A scheme can essentially be understood as a project. A scheme might be made up of multiple FRM interventions.

Climate change policies

Climate change mitigation and adaptation actions are outlined and guided by a series of key documents:

- The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting – Making the country resilient to a changing climate (Defra, 2018)
- Independent Assessment of UK Climate Risk: Advice to Government For the UK's third Climate Change Risk Assessment (CCRA3) (Climate Change Committee, 2021)
- Climate Change Act 2008
- CCAP is also integrated into sectoral plans
- A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)
- National Planning Policy Framework (NPPF)

The first of these documents – the National Adaptation Programme (NAP) – emerged in response to the CCRA2 report of 2017 and is particularly relevant to SOLARIS as it sets out the Government's response to scientific climate change risk assessment reports that are produced by the Climate Change Committee (the CCRA reports). The NAP bridges CCAP and FRM policy in the UK. The NAP communicates specific actions to be taken by relevant actors across all sectors, including Government Departments, in response to a changing climate. Responsibility for the implementation of actions falls on various bodies and sectors. The 2018 NAP summarises the actions in an appendix with details of the objective, the CCRA risk addressed, the key actions and milestones, timing, monitoring and metrics, and, importantly, the owner. Owners (responsible bodies) include Natural England, the Environment Agency, DEFRA, the Forestry Commission, the Marine Management Organisation, the Department for Transport, National highways, Network Rail, etc.

It is interesting to note that the NAP 2018 leads with actions aimed at building ecological resilience on land, including in lakes and rivers, which also expands the objective set out in *A Green Future* of combining climate change adaptation with habitat preservation. Indeed, the NAP 2018 borrows from *A Green Future* for specific goals that link CCAP with FRM, in particular to "explore greater use of natural flood management techniques where these are appropriate" (p 22). The latest NAP was used to announce a "£2.6 billion six-year capital investment programme to reduce flood and coastal erosion risk", which is government money that provides "over £30 billion in economic benefits" (Defra, 2018: iii). As stipulated under the Climate Change Act 2008, NAPs are updated and released every 5 years. The latest CCRA (3, 2021) lays the foundation for the next NAP. The NAP of 2018 sets out its management approach to flooding and coastal erosion risk under five strategies:

- Prevention – working closely with Local Planning Authorities to minimise risk. 'Sequential tests' are used to steer development towards areas with the lowest risk of flooding. These tests consider data on the local flood risk with the characteristics and intended use of proposed development.
- Protection – defences and sea walls, also nature-based solutions and Sustainable drainage systems (SuDS).
- Adaptation – designing properties, infrastructure, and communities to withstand flooding and recover quickly.
- Response – flood forecasting and effective emergency response.
- Acceptance – manage flood plains well to temporarily store flood waters. Particularly at the coast this strategy ties into Shoreline Management Plans (SMPs) and the approach of 'managed realignment' and 'no active intervention'.

The 'Green Future' document works on the periphery of FRM by setting out ideas for how the environment can be improved more generally. As such, it is broad and covers a wide range of topics, with actions being categorised into these topic areas: including sustainable land management; enhancing the beauty of landscapes; connecting people with the environment; dealing with energy efficiency and waste and pollution issues; and protecting the seas. Whilst not specifically FRM-related, this plan underpins important socioecological principles that are important to our understanding of flood causes, risks, and management. However, the plan also includes three flood-specific action areas: expanding the use of natural flood management solutions; putting in place more sustainable drainage solutions (SuDS); and making 'at risk' properties more resilient to flooding.

The National Planning Policy Framework (NPPF) "sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced" (UK Government, 2021: 4). It sets out guidelines for how the strategic planning of new developments should reduce flood risk. This includes avoiding inappropriate developments in flood risk areas (current or future) though the use of sequential tests; developing policies on the basis of Environmental Impact Assessments; seeking opportunities to use nature-based solutions; exploring ways of relocating existing at-risk assets. There is also an 'exception test', which considers that the benefits of some developments might outweigh the risks from flooding. Planning and the NPPF form an important basis for FRM in England.

Flood risk management policies

Flood risk management policy at all levels in England is underpinned by two pieces of legislation: The Flood Risk Regulations (2009); and the Flood and Water Management Act (2010). The first of these helps implement the 2007 EU Floods Directive in the UK and define the roles and duties of the Environment Agency (EA) and the Lead Local Flood Authorities (LLFAs). Under these two pieces of legislation LLFAs are mandated to:

- Prepare Preliminary Flood Risk Assessment (PFRA) Report, including the identification of flood risk areas
- Prepare Flood Hazard Maps and Flood Risk Maps
- Contribute to the preparation of Flood Risk Management Plans (these cover river basins and are larger than the strategies (see next point): there are ten of these plans in England)
- Prepare Flood Risk Management Strategies
- Cooperate with the Environment Agency and other Lead Local Flood Authorities.

This research focuses primarily on the Flood Risk Management Strategies in the case study areas. In Section 9, the Flood and Water Management Act (2010) outlines what these strategies must specify:

> "(a) the risk management authorities in the authority's area,
>
> (b) the flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area,
>
> (c) the objectives for managing local flood risk (including any objectives included in the authority's flood risk management plan prepared in accordance with the Flood Risk Regulations 2009),
>
> (d) the measures proposed to achieve those objectives,
>
> (e) how and when the measures are expected to be implemented,
>
> (f) the costs and benefits of those measures, and how they are to be paid for,
>
> (g) the assessment of local flood risk for the purpose of the strategy,
>
> (h) how and when the strategy is to be reviewed, and
>
> (i) how the strategy contributes to the achievement of wider environmental objectives."

(HM Government, 2010: 8)

This legislation is supported in England by central FRM policy. The national approach is laid out by the Government's Department for Environment, Food & Rural Affairs (DEFRA) in the Flood and Coastal Erosion Risk Management Policy Statement (FCERM-PS) (Defra, 2020). It outlines 5 policy areas:

1. Upgrading and expanding our national flood defences and infrastructure
2. Managing the flow of water more effectively
3. Harnessing the power of nature to reduce flood and coastal erosion risk and achieve multiple benefits
4. Better preparing communities
5. Enabling more resilient places through a catchment-based approach

Under each of these 5 policies the Government uses the FCERM-PS to communicate a) progress so far, b) its vision for the future, and c) 'our actions' (intended). This form of communication appears to act both as a form of accountability to the people but also to clearly outline the ways that the government has helped and intends to help. One action, for example, is to double the above-mentioned capital investment to combat flood and coastal erosion risk to £5.2 billion over the six years starting in 2021 (Defra, 2020: 16). Further, Defra claim that this investment "will better protect 336,000 properties and is forecast to reduce national flood risk by up to 11% by 2027. It will help to avoid £32 billion of wider economic damages. The programme will invest in around 2,000 new defence schemes." (Defra, 2021: 4)

At a national policy level there is a strong emphasis on flood risk prevention through improved planning (SOLARIS interviews have revealed some concerns with this approach, which will be explored in the case study sections below), and on building resilience, such as through funding a 'Flood and Coastal Resilience Innovation Programme'. It is worth noting that resilience is not very well defined in an English policy context. Following the general trend towards the devolution of more FRM responsibilities to lower governance levels in England (see Wiering et al., 2017) the FCERM-PS stresses the importance of property level flood resilience. By 'harnessing the power of nature' the FCERM-PS also builds on themes in the CCAP documents outlined above by endeavouring to "double the number of government funded projects which include nature-based solutions to reduce flood and coastal erosion risk" (p 26). It is worth noting that the FCERM-PS does suggest that long term investment decisions should follow an adaptive approach and consider demographic changes in communities (as well as climate change). The aim of this is to allow more localised decision makers to "to identify the best combination of resilience actions and the right time to act and invest" (Defra, 2020: 15). However, the policy does not clearly define the demographic changes to be considered. Additionally, the FCERM-PS does not actually define resilience.

To better prepare communities, the FCERM-PS aims to focus more on planning systems, ensuring that flood risk areas are not built in, for example, and making sure that any advice given by the EA and LLFA advice is more transparent. In fact, almost all the actions listed under number 4 of the list above are technical fixes to the planning system, to property level measures, and to the FloodRe insurance scheme. They do not aim to incorporate more socioeconomic data, for example, except for better supporting the voluntary sector that supports communities in the event of floods, which it is implied will have a localised understanding of needs.

While the FCERM-PS sets out ambitions and actions, the implementation of these is guided by the Environment Agency's (EA) National Flood and Coastal Erosion Risk Management Strategy (FCERM-S) (Environment Agency, 2020b). This strategy outlines the current flood risk situation; the future risks and investment options; a vision for building 'climate resilient places'; and safeguarding today's growth opportunities and infrastructure. FCERM-S sets the context through which a wide range of funding streams can be mobilised for FRM actions (and actions on erosion). Flood and coastal erosion measures are implemented through Lead Local Flood Authorities (refer to Table 1 below).

The two FCERM policy documents are accompanied by an FCERM Strategy Roadmap, which outlines the actions to be taken to 2026. These actions centre on three ambitions: 1 climate resilient places; 2 growth and infrastructure; 3 a nation ready to respond and adapt to flooding and coastal change (Environment Agency, 2022b).

Flood Risk Management Strategies (FRMSs)	Flood Risk Management Measures (FRMMs)
Prevention This strategy aims to minimise people's *exposure* to flooding, this is achieved via measures that keep people and property away from water.	▪ Spatial planning to influence location and layout of future development. The *sequential test* is a mechanism to reduce development on the floodplain. ▪ Multi-functional land use *i.e.* space is designated for several purposes (*e.g.* a park may also function as a flood storage area and is expected to flood during heavy rainfall)
Defence This strategy aims to minimise the *likelihood and/or magnitude* of flooding, via measures that keep water away from people *i.e.* measures that act to *resist* water.	▪ Tidal surge Barriers and sluices ▪ Embankments ▪ Flood walls ▪ Conveyance engineering (*e.g.* dredging) ▪ Demountable defences
Mitigation This strategy aims to minimise the *likelihood and/or magnitude of flooding*, via measures that *accommodate* water.	▪ Flood storage areas / retention basins ▪ Natural flood management measures *e.g.* peatland restoration, wetland creation, tree planting and restoration of riverside corridors ▪ Managed realignment

	▪ Property *resistance* and *resilience* measures ▪ Green roofs ▪ Living walls ▪ Permeable pavements ▪ Designated floor heights above flood level
Preparation & Response This strategy aims to minimise the *consequences* of flooding via measures that strengthen societal capacity to prepare and respond to a flood event.	▪ Flood forecasting ▪ Range of communication methods for disseminating flood warnings (*e.g.*Floodline warnings Direct service; local flood wardens) ▪ Targeted flood warning service for infrastructure ▪ Emergency management ▪ Promoting risk awareness amongst organisations and the public ▪ Community flood action plans ▪ Promoting activities at the household scale (*e.g.* property *resistance* and *resilience* measures)
Recovery This strategy aims to minimise the *consequences* of flooding via measures that seek to strengthen societal capacity to recover from a flood event.	▪Private market insurance ▪Bellwin Scheme ▪Local Authority to support community recovery post-flood ▪Involvement of voluntary sector (*e.g.* National Flood Forum)

Table 1: Some of the current measures employed in FRM, England. Adopted from (Alexander et al., 2016, p iv-v)

Different FRM strategies can be employed under the 5 policy areas outlined in the FCERM-PS. Table 1 above outlines example measures under these strategies (which do not equate directly to the policy areas).

Governing FRM in England

In terms of policy implementation, and managing flood risk in England, there is not one organisation with overall responsibility. FRM is a shared approach between several different actors. The main ones are listed below in Table 2, along with their responsibilities:

Body	Responsibilities
NATIONAL	
Department for Environment, Food & and Rural Affairs (DEFRA)	National policy lead on flood and coastal erosion risk management, as well as emergency response and land use planning with other governmental departments.
Environment Agency	The national body responsible for implementing the Flood and Coastal Erosion Risk Management Strategy. Allocates funding for management schemes and

	actions, and can step in on e.g., riparian management, with the landowner covering the costs.
National highways	Same roles but for the major roads and motorways.
Insurance industry	The FloodRe scheme is the result of collaboration (since 2000) between the government and property insurance companies on ways to reduce (the increasing) flood risk to properties. It came into effect in 2016. Any company offering home building and contents insurance anywhere in the country is required to pay an extra fee into a shared 'pool'. This pool is then used to assist flood victims, and the insurance companies benefit from distributing the risk more widely across the industry. This scheme is designed to limit excess both the growth in the insurance premiums for individual homeowners, and the excess on claims. Discussions on how fair the system is are complex (see Penning-Rowsell, 2015).
REGIONAL	
Regional flood and coastal committees RFCCs	Twelve RFCCs across England help the Environment Agency and partners to understand local issues, and to balance local and national priorities. They were established under the Flood and Water Management Act 2010. Members are appointed by Lead Local Flood Authorities (LLFAs) and the Environment Agency.
County highways	Responsible for maintaining the drainage on the highways and roads within the county. Not responsible for roadside ditches; these are managed by the adjacent landowners.
County council*	Highest level of local government. They coordinate FRM from all sources of flood risk, mainly by identifying the responsible person/body (e.g. landowner).
Water and sewerage companies	Manage flood risk from sewers and water mains across their county (or counties). This includes managing water flows during a flood event. Sometimes remove flood water from properties through the public sewer system, where possible.
Internal Drainage Boards	Local public authority tasked with managing drainage and water levels in their region

Local	
Riparian owners	Duties to ensure that waterways of all sizes that run through or adjacent to the property, including the vegetation on the banks, are maintained, and kept flowing freely. Landowners can face legal action for any flood events resulting from – or exacerbated by – poorly maintained riparian areas.
District, borough, or city council	Next level (up) of local government. Review flood risk in planning applications. Power to carry out work on ordinary watercourses and fix local flood issues. Again, at the expense of the landowner.
Flood action groups	A core of local volunteers who represent the community on flood issues. Coordinated (and assisted) by the National Flood Forum. Also work on funding bids.
Town and Parish communities/ councils	Lowest level of local government in England. They can gather information on flood risk and report any flooding events. At risk communities and individuals should prepare community and household flood plans. Residents can become flood wardens to help prepare the community and bring people together in difficult times. These bodies also coordinate funding bids for FRM.
Coastal groups	Coastal Groups bring together a region's key partners in flood defence and coastal management – principally the coastal managers from maritime Local Authorities, Port Authorities and the Environment Agency. Other interested organisations, such as Natural England, English Heritage, landowners and Defra, will also be members[3].
Other non-governmental organisations (NGOs), community groups	A number of other NGOs and organisations coordinate action or awareness raising around flood risk and FRM. These may not be explicitly FRM-focused but include flood risk considerations.

Table 2: Actors contributing to FRM at various scales in England.

*In some parts of England there is only one tier of local authorities above the town and parish community councils. These are known as 'unitary authorities'.

[3] https://southerncoastalgroup-scopac.org.uk/coastal-groups-of-england/

A combination of some of the listed bodies make up Risk Management Authorities (RMAs) and Lead Local Flood Authorities (LLFAs) to actively manage flood risk, usually according to local Flood Risk Management Plans (FRMPs), which have been updated for the period 2021-2027 (UK Government online at: https://www.gov.uk/government/collections/flood-risk-management-plans-2021-to-2027#national-overview-documents).

Figure 3 below provides an overview of the Flood Risk Governance Arrangements (FRGA) in the context of the 5 FRM strategies proposed by (Hegger et al., 2014). Each sub-FRGA represents an arrangement of actors, rules, resources, and discourses related to key goals in FRM. The colours are not related to those in Table 1.

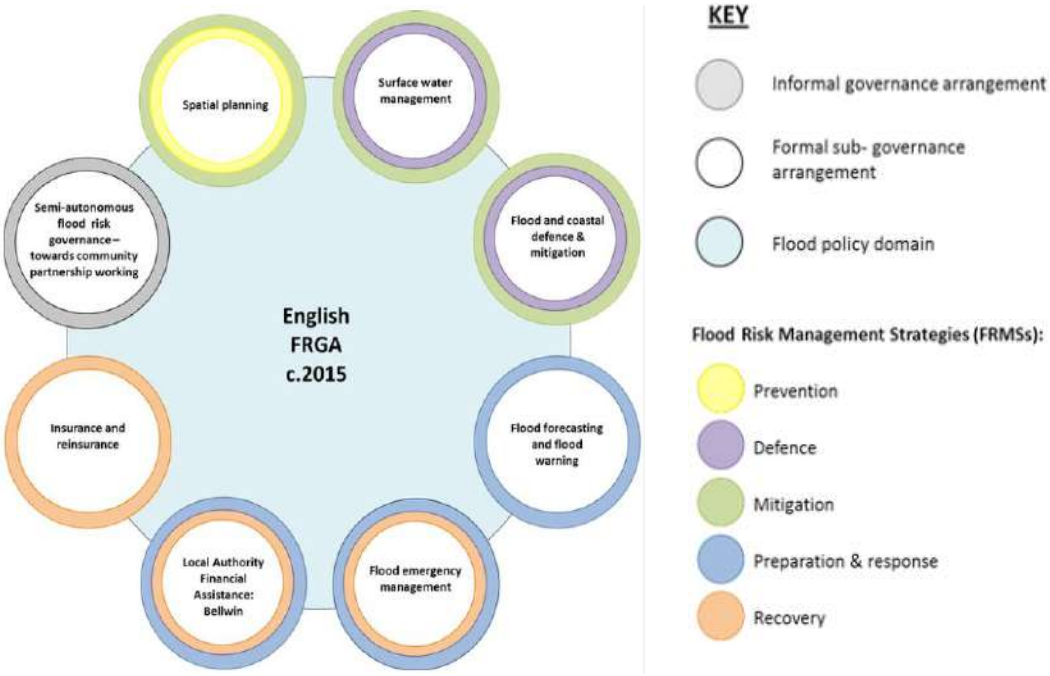

Figure 3: The National Flood Risk Governance Arrangements for England, 2015. Adopted from Alexander et al., (2016).

Alexander et al. (2016) provide a useful overview of the development of FRM in England:

> "Flood risk management has a long legacy in England and is characterised by long periods of stability and incremental change (rather than abrupt departures from the past). Significant changes in flood risk governance tend to be driven by exogenous factors, such as shifts in political ideology (e.g. centralisation, privatisation and localism). In contrast, factors leading to stability as well as incremental change are generally endogenous to the flood policy domain, such as so-called 'catalyst' flood events".

> "The dominance of incremental change is indicative of the way that flood risk management has developed in England over a long period of time and is seen as a fundamental strength of the approach,

providing the flexibility to respond quickly to challenges. As flood risk management in England has matured, the system has become highly stable and there has been a general formalisation of flood risk governance arrangements and increasing professionalism in FRM. Coupled with this, flood risk governance has become more complex, leading to greater overlaps with other policy domains, increasing number of rules and actors, leading to mixed modes of governance."

P. vii

National level results

RQ 1 – Justice and equality in non-FRM policy

Analysing the extent to which justice, fairness and inequality are considered across all public policy areas is beyond the scope of the SOLARIS project. However, it is worth pointing to some stand out areas under the present UK Government. The Institute for Government (IfG) is an independent think tank that monitors the performance of government through research and analysis. The IfG has a useful 'policy tracker', which provides an overview of progress by government on policy issues. The most recent update to the policy tracker was completed in January 2021 and can be used to quickly identify areas of the current Government's policies that are aimed at reducing inequality (or unfairness) in the United Kingdom (or in England, depending on the devolution of powers). Some examples include:

- Increased funding for the **National Health Service** (NHS) of 3.1% by 2024. This should benefit all citizens in need of healthcare.
- Increased funding for **social care** by 1bn per year for the tenure of this Government.
- An extra £4.3bn for **schools** by 2023/4 and better provision of **childcare services**.
- The Government ended the '**benefits** freeze' that were introduced in 2015. This freeze had meant that social benefits did not increase with the cost of living.
- Commitment to 1m **new houses** (all tenures).
- The minimum threshold at which 'national insurance' (income **tax**) contributions are taken was increased to £12,570 per annum. The tax will also not be increased.
- £3.6 billion Towns Fund for an initial 100 towns to improve their local economy
- Invest £4bn in **flood defences** (although not inherently just, equal, or fair)

It is worth noting that progress on these policy areas varies considerably, and in some cases work has yet to commence. To some extent, justice is tied in with the extent to which policy objectives on equality and fairness are being met, and the various barriers to this (to do with distribution, processes, or recognition). These instances will be explored in more depth for FRM below.

At the time of writing this report there are also some other factors impacting the extent to which the UK Government is focused on justice, inequality, and fairness. The cost of living has increased significantly in recent times, with inflation in the UK hitting 5.5% in February 2022 (BBC), and 10.5% in January 2023 (Bank of England). Food, electricity, and gas prices have all increased significantly, with the latter two pushing

average annual household energy prices up from £1,138 in the first half of 2021 to around £4,279 in February 2023 (The Guardian). Various causes have been attributed to this trend, with the most prominent in the UK being the trade implications of nation's exit from the European Union ('Brexit'), and the ongoing invasion of Ukraine by Russian forces, which has impacted the trade of food and fossil fuels on the continent. The UK economy has also been recovering from the impact of the Covid-19 pandemic, which saw people out of work for extended periods of time and which also impacted health and social care services.

These factors have all put equality and fairness firmly on the agenda because households throughout the country are struggling to meet the cost of living during a time of high inflation. Whilst prices have risen across the UK, the impacts have not been felt equally. The 'cost of living crisis' has had a comparably bigger impact on lower income households and those who might have already been struggling with their finances. There is a general north/south divide in England, with the south being more prosperous and arguably the target of greater government investment, although there are plenty of exceptions to this trend, and there are parts of London, for example, that suffer from severe poverty. Nevertheless, recent study found that the north-south divide in England (and Wales) had increased by 30% in the current crisis (The Guardian).

This last point sets the context for the most explicitly equality-focused area of current government policy, namely 'Levelling up'. This policy was released in February 2022 and there is also now a Government Department for Levelling Up, Housing and Communities. The Levelling Up policy is focused on investment in towns across the UK to "unleash their economic potential" (p. xiii). At its heart this policy is about achieving equality at a national scale, which follows the trend of the listed policy ideas above. Whilst there is a "£26bn of public capital investment for the green industrial revolution and transition to Net Zero" (ibid), the policy document does not focus on climate adaptation actions, including FRM. It does not explicitly acknowledge the potential uneven distribution of climate change impacts, or of the actions designed to manage these. In fact, more recent analysis has shown that the current UK Government is simultaneously cutting local authority (council) budgets. The Institute for Fiscal Studies found that "English councils' non-education spending per resident fell by almost a quarter in real terms between 2009–10 and 2019–20" (Institute for Fiscal Studies website here). So, it could be said that there is a trend in government rhetoric towards achieving more equality but firstly, its true impact might be varied, and secondly, one would be forgiven for scepticism on how well some poorly financed councils will be able to expand FRM activities to better include justice and equality measures.

Justice, fairness, and inequality in FRM policy

The issues of justice, fairness and equality are not explicitly dealt with in English FRM policy at present. The two key policy documents – the FCERM Policy Statement and Strategy – make passing references to topics

such as community, place, and public involvement in FRM. They provide examples of successful FRM initiatives where communities played a direct role in designing and even funding these, such as on the Norfolk coast (Defra, 2020). However, these often evolve in an ad-hoc manner and are community driven, and the policies provide little guidance on how they might be replicated in other regions. Overall, there is more rhetoric than action and a lack of guidance on exactly how to place local people and partners "at the heart of making local choices about the best combination of resilience actions for achieving greater flood and coastal resilience in the places in which they live and work." (Environment Agency, 2020b: 47). Details still lack on how local actors will be brought closer to the decision-making process. At the national level this will be more difficult to achieve, where the Environment Agency and DEFRA conduct consultations with key stakeholders on high level policy. These will be considered in the next section on research question 2 (on participation).

Some criticisms of the implementation of the plans in the FCERM Policy Statement have come from the National Infrastructure Commission (NIC)[4]. It states:

> "In the *Flood and coastal erosion risk management: policy statement*, the government set out how it plans to make the nation more resilient to floods, including delivering nationwide resilience, using green and grey infrastructure, and delivering resilience measures at the property level, as recommended by the Commission.
>
> However, government did not set national standards of flooding resilience, or a clear long term objective for what it is trying to achieve. The government argued that developing national standards would be complicated and resource intensive, and that differing levels of current flood resilience require a more tailored local approach."
>
> (NIC, 2022: 31)

The absence of well-defined standards for flooding resilience and of specific long-term objectives might make it more difficult to hold Government – and bodies such as the EA – to account.

Contributing factors in funding mechanisms

In England there is a well-developed cost benefit analysis approach to raising the necessary funds to implement FRM measures (or 'schemes'). Under FCERM the Grant in Aid (GIA) funding calculator can be used by local risk management authorities and their partners (from business or civil society) to demonstrate the added benefit of a flood scheme in their area. This is a 'partnership funding' model that was introduced in

[4] The NIC provides "expert, impartial advice to the government on infrastructure, shape and develop the national infrastructure assessment and specific studies" (https://nic.org.uk/about/the-commission/

2012 as a move away from majority central government funding (which now has a limit defined in pence per pound sterling depending on the calculation outcomes, with the rest to be funded locally). At the simplest level the calculation considers the benefit of the flood scheme over its lifetime, compared to the cost of the flood scheme, including maintenance. A large range of variables can then be considered by local partners to help sway this calculation in favour of the scheme being funded. These include 'people-related' benefits, levels of multiple deprivation among households in the area, average costs to houses per flood event, etc. In the case of the more deprived areas, the top 20% most deprived households according to the index of multiple deprivation do receive a greater 'scaling factor'.

Whilst this mechanism does support fairness in the distribution of FRM funding, there are a range of factors that are central to the SOLARIS project which are not explicitly considered. The people-related benefits mentioned above do include risk to life, stress and health, mental health, vehicle damages avoided, and residential evacuation costs caused by flood events. However, factors such as mobility, disabilities, age, health, language, culture, etc. do not feature. The index of multiple deprivation in England considers income, employment, education, health, rime, barriers to housing and services, and living environment. It is impressive that these things are considered in the distribution of funding, but they could perhaps be more nuanced, and some factors of inequality are difficult to quantify. It is also conceivable that a more deprived community would face greater barriers – also in terms of social capital – in carrying out the necessary work required to attract local funding, even with the support of the risk management authorities and the National Flood Forum.

This problem of funding allocation is arguably rooted in a previous step in the process, namely that of identifying at-risk areas, which is a problem of recognition. As outline in one interview:

> "We have had the problem as well, haven't we [name]?, with people that regularly flood but their events have not been considered national or large-scale events, not relevant, not able to apply, and then 5 miles down the road they just happen to flood for the first time but because it happens to a large number of properties, they are eligible for the scheme. So, as you can imagine, that causes quite a lot of contention."
>
> Interview, 23/05/2022.

As a single house owner, it could conceivably be difficult to accept that your property will not receive funding because it is not surrounded by many affected properties.

National reporting on flood risk and social deprivation

The role of inequalities (and potentially of justice) in FRM in England is receiving more analytical attention at the national level. The EA updated their report *Social deprivation and the likelihood of flooding*, in April 2022 (Environment Agency, 2022a). This series of reports focuses on the numbers of deprived households that have moved from "very significant or significant risk bands to the moderate or low risk bands" due to flood defence measures funded by the FCERM capital investment programme (p.1). Deprived households are defined according to three sets of data, Including the index of Multiple Deprivation, which considers data on income deprivation, employment deprivation, health deprivation and disability, education skills and training deprivation, barriers to housing services, living environment deprivation, and crime. The National Flood Risk Assessment (NaFRA) uses the following flood risk exposure categories:

- High: each year, there is a chance of flooding of greater than 1 in 30 (3.3%)
- Medium: each year, there is a chance of flooding of between 1 in 30 (3.3%) and 1 in 100 (1%)
- Low: each year, there is a chance of flooding of between 1 in 100 (1%) and 1 in 1,000 (0.1%)
- Very Low: each year, there is a chance of flooding of less than 1 in 1,000 (0.1%)

Figure 5 below shows some of the results from the analysis. They suggest that protection for households in the 20% most deprived areas improved between 2011 and 2015, but that there has been a general decline in these protections since, except for the most recent year on record.

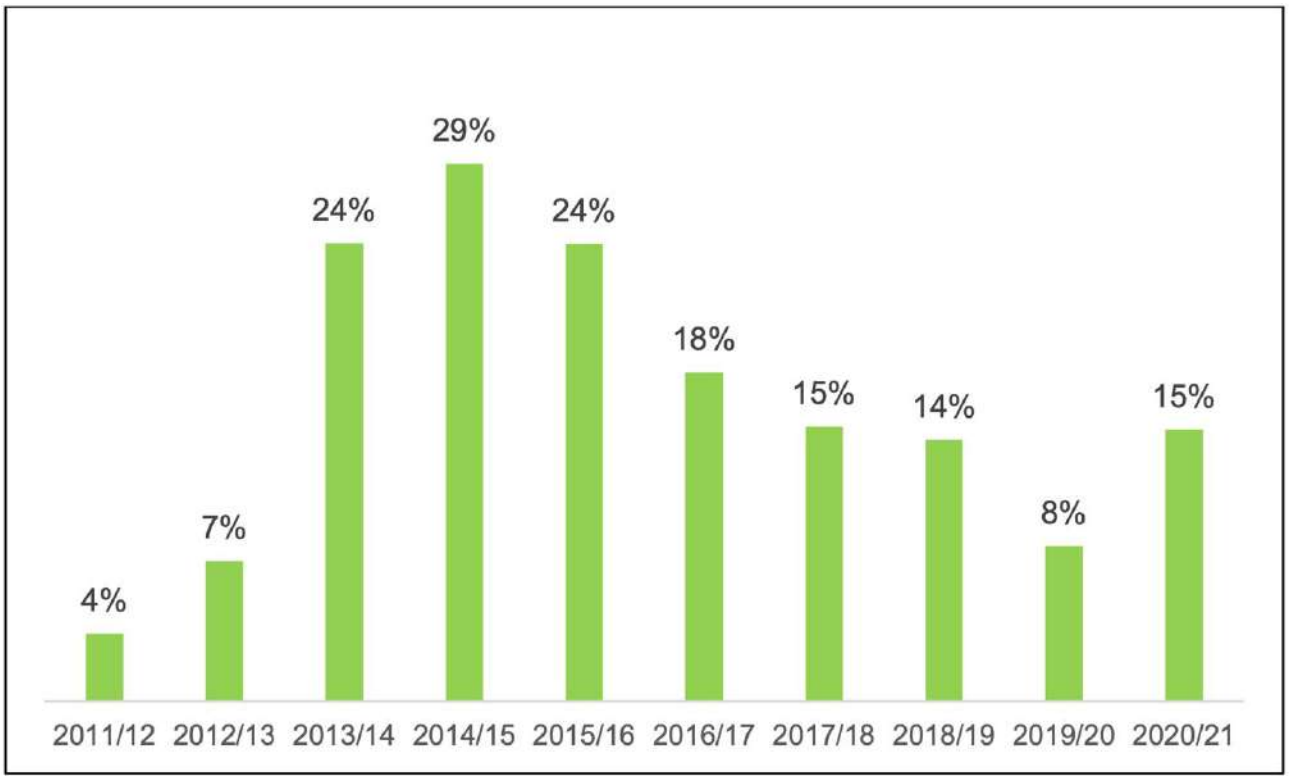

Figure 4: Percentage of households within the 20% most deprived areas as measured by OM2c compared to all houses better protected measure OM2. (Environment Agency, 2022a: 2).

OM2c is the number of households moved from the very significant or significant risk bands to the moderate or low risks bands in the 20% most deprived areas. The impressive figures between 2011 and 2015 can be mainly attributed to a series of coastal defence schemes funded through the capital investment programme (18,200 houses protected through 6 schemes). Although it is not clear yet how these studies will inform FRM practice, a focus on this data is encouraging. There is no clear reason given in the report for this, which simply concludes:

> "The number of households in the 20% most deprived areas protected by new flood schemes grew significantly between 2010 and 2015, especially in coastal areas. But more recent years have seen a decline. Thus the pattern of new capital schemes in deprived communities remains a complicated situation to analyse." (P. 20).

Bringing society closer to climate change reporting

Climate change and its impacts are being reported in a more holistic manner by the Climate Change Committee than they have been in the past, and this provides some hope that FRM policy might take justice, fairness, and equality into account more comprehensively in the future. These factors appear to be featuring more frequently in the scientific reporting upon which FRM is based in the UK (such as through the NAPs). One reason for this trend is the wider recognition that climate change will exacerbate flood risk and more

people and properties will be impacted overall (Kay et al., 2020; Met Office Hadley Centre, 2021). More frequent and intense winter storms are a particular threat, with storms occurring in quick succession also hampering the recovery efforts, leading to "even greater human health, environmental and economic impacts" (Climate Change Committee, 2021: 51).

In the same CCRA3 report rhetoric appears to be shifting towards the impact that flooding (and other climate change processes) will have on the key 'societal goals' referred to Government policy and in the United Nations Sustainable Development Goals (SDGs). For example, flooding is highlighted as a particular risk to multiple 'physical infrastructure assets and services' necessary for achieving these goals, such as energy and fresh water supplies, telecommunications, reliable transport, natural and cultural heritage, and sustainable businesses (for this last category it is expected that flooding to non-residential buildings will increase by 30% to 2050 in a 2C climate change scenario (Climate Change Committee, 2021: 70)). Attention is being paid to the impacts on livelihoods and people's ability to thrive, i.e., community resilience. Community resilience in this context is supported by a very wide range of factors, from resilient infrastructure; to green spaces and nature-based solutions; to public awareness raising; and insurance for climate change-related losses.

If flood risk negatively impacts livelihoods and people's ability to thrive then it follows that it would also impact efforts to reduce inequalities. Several interviewees for SOLARIS gave a clearer indication of what resilience might entail in this context. One linked community resilience to 'community viability'. This is a useful term as it draws on the range of factors that allow a community to exist – and make choices about the nature of this existence – in each area. Simply investing money in that area, for example through new sports facilities (which has happened in several locations through Levelling Up funding), might be popular, and welcomed, but might not necessarily make that community more viable. Another interviewee (an FRM expert) developed this idea further in a flood risk context:

> "…and the bit that I always go on about in relation to this is not just the individual business, it's what I call "community economic resilience". So, in other words, a flood will affect different places differentially, and that is, in part, dependent on how money circulates in that local community. What the linkages are in the community, the networks, the stakeholders, the essential linkages, how that all operates. And also the linkages to outside. I remember talking to somebody and the options – the two resilience actions were – I am going to build my supply and demand networks away from this valley, that's my resilience option. Or, I build, I bring in my supply and demand networks into the valley, because doing so helps me build overall community resilience. And both are right, and both are wrong."

This example demonstrates the direct link between community viability and its vulnerability to flood risk. It clearly shows that the Government's desire to 'unleash the economic potential' (Levelling Up) of communities must also be intricately linked to FRM policy.

Crucially, the CCRA3 report goes beyond a focus on the net increased impact on societal goals, or on specific sectors, by acknowledging the unequal distributional impacts that climate change will have (as is being reported internationally (see, for example, IPCC, 2022)). Whilst these impacts are not restricted to flooding, this does demonstrate a high-level understanding in the UK that different people are likely to be impacted in different ways and to different extents. It is also noteworthy that the concept of 'place' has been integrated into FCERM from the recent EA strategy, which aims to build 'climate resilient places' (Environment Agency, 2020b). By focusing on building better places, the Government is potentially unlocking important links between FRM policy, CCAP, and general policies that improve the wellbeing and services for communities.

The graphic below in figure 4 is taken from the CCRA3 report and includes a consideration of some factors discussed in the SOLARIS project relating to income and assets, access to resources, and demographics in the context of risks to – and the viability of – coastal communities.

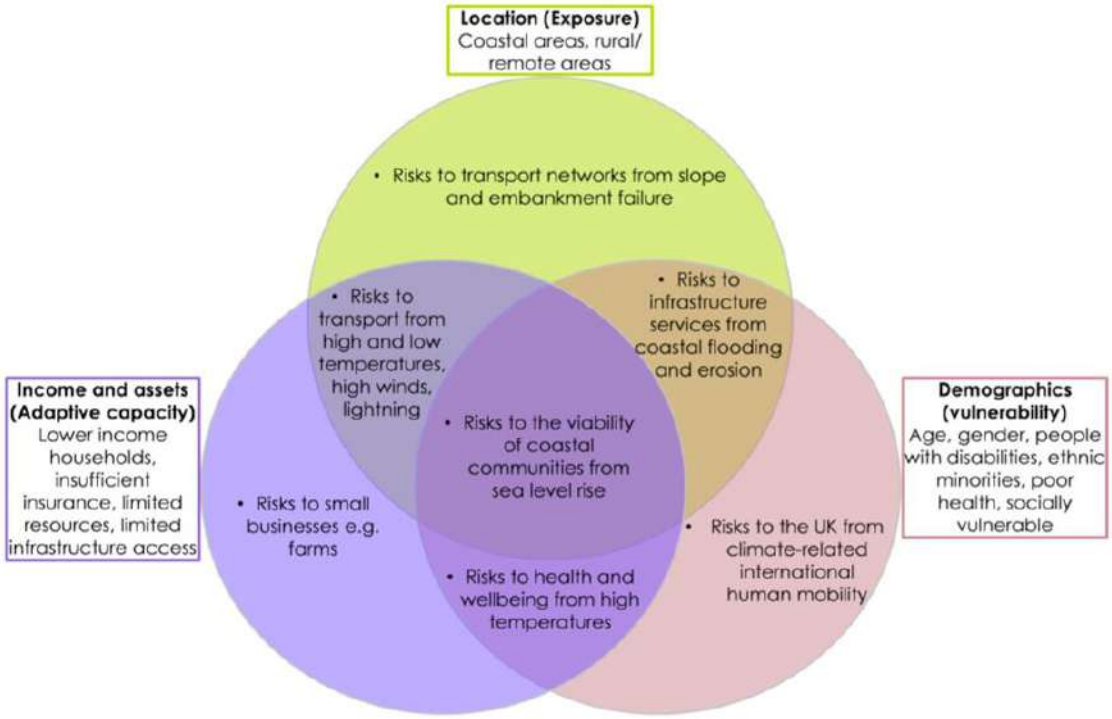

Figure 5: Venn diagram with examples of risks which are increased by one or more distributional effects in the UK, with a focus on coastal communities. Adopted from Climate Change Committee (2021: 100).

These considerations pave the way for a broader understanding of vulnerability to flooding and of managing risk, as reflected in the observation: that "[s]everal years after the 2007 floods, those on the lowest incomes were eight times more likely to report severe mental health deterioration than those on the highest incomes"

(Ibid.: 99). CCRA reports directly inform UK policy, so these trends are encouraging. It is worth noting, however, that this CCRA3 is a very recent publication that is not yet reflected in FRM policy in England.

As shown in table 1 above, a lot of responsibilities for FRM defence and mitigation measures fall to property- and landowners. Riparian owners in particular carry responsibilities to ensure that waterways of all kinds are kept free of obstructions and can flow well. This is an effective way to share responsibilities as bigger scale flood prevention and mitigation is a sum of these collective parts. However, the policy does not consider the capacity and knowledge of individual landowners to carry out the necessary works. Although the Environment Agency or Local Councils can step in as a last resort, this comes at a cost to the landowner that may be higher than it would have been had they been able to carry out the work themselves. Questions over the fairness of this system may be raised if the limitations on landowners' capacitates are considered.

Interview participants for SOLARIS have so far been positive about the FRM response and recovery mechanisms in place. The former of these is defined, in part, by the National Risk Register (2020). This register charts all major risks to the UK, ranging from malicious attacks to environmental hazards and serious organised crime. It charts the risk of both coastal and river flooding at a likelihood of occurring at 5-25 in 500, and Category D (A-E, with E being the highest) defined as a £1bn - £10bn economic impact, 201 – 1000 deaths, 20000 people evacuated for over 3 days, and five further categories. These risks are then translated down to Community Risk Registers, which are used by County Resilience Forum to develop their emergency plans. These are multi-agency plans involving all 'blue light' (emergency service) responders. The Environment Agency are responsible for incident response across the country. This mechanism is well set out and interviewees have been generally positive about its application. However, coastal erosion is not addressed in the National Risk Register because it does not affect the same number of people or properties in one incident. It follows that there is no coherent way for local communities to deal with erosion risks. Properties can also not be insured for coastal erosion. So, the largely praised national FloodRe scheme (recovery) does not cover this type of risk (see Table X). There is evidence from the West Sussex case study that premiums are indeed rising considerably at the coast, due to the extra flood risk associated with coastal erosion. It is likely that emerging FRM policy will need to address this situation.

RQ 2 - The role of participation

The role of participation in FRM decision making is a relevant consideration for procedural justice. The main mechanism for public participation in policy and planning in England occurs through public 'consultations'. These can be used (or are required to be used) under several circumstances, for example:

- 21-day opportunities for locals to respond to specific plans, such as for home extensions, or work on infrastructure and services
- Local consultation on local level plans and neighbourhood plans
- 'White Papers' published by the Government as a pretext for a Bill (draft Act), which can then eventually be passed by the two Houses of Parliament as an Act (law)
- Government Departments also conduct consultations on the drafts of specific plans or strategies, such as was done for the FCERM Strategy

The benefits of public input into policy making are well understood at the highest level in the UK. In 2013-14 a House of Commons Select Committee reviewed the recently implemented plan for Civil Service Reform (2012), which had introduced "open policy-making" and a more prominent role for the citizen. The report of the review states:

> "When done well, public engagement can have a number of advantages for policy-making, including strengthening the democratic legitimacy of policy, by ensuring that citizens are able to take and influence the decisions that affect their lives; increasing the accountability of government, by ensuring that citizens are aware and can respond to the decisions that government takes; and improving the quality of policy, by ensuring as broad a range of knowledge, views and values as possible are present in the process and ensuring that policy goes with the grain of public values."
>
> (House of Commons, 2012: 7)

Despite the clear benefits of well-executed public engagement for policy making, the Select Committee evidence from a range of experts and stakeholders pointed to many flaws in the process. Evidence suggested fact that "many people see policy-making as happening behind closed doors and as something they can't influence" (Ibid.: 8) and that and that "[p]olicy making can be too often lacking in transparency, not engaging the right citizens and consulting too narrowly" (Ibid.: ev79). Public engagement is time and resource intense, and "Government policy-making processes typically treat public engagement as a nuisance at worst and an optional extra or nice-to-have at best." (p. 8). There is often a feeling that public engagement or consultation is used to seek public approval for a policy that has already been largely designed and decided on already by government.

A considerable public consultation was run for the FCERM Strategy in 2020. This began with three phases before a document was ready for public consultation: twelve interviews from the EA and other organisations to explore topic areas in the previous strategy that needed attention; three workshops with a wide range of

sectors to assess what was working and what needed improvement in FRM; and five working groups to consider ambition, protection and funding, water related decision making, communities and business, and roles and responsibilities. This all formed the basis for a public consultation period that ran for 8 weeks from May 2020. It attracted over 400 responses, 345 of which were from external stakeholders (outside of the EA). The consultation response document outlines how the EA responded to the feedback, question-by-question (Environment Agency, 2020a). It is worth noting that nature-based solutions was a popular topic that respondents demanded greater attention for, and this was further integrated into the document as a result.

Interview data collected for SOLARIS has pointed to instances where public engagement in FRM policy making also fell short of expectations, and of its potential. For example, the National Flood Forum was involved in gathering input from its Flood Action Groups around the country for the above consultation.

> "The FCERM Strategy was developed collaboratively, and we were one of the collaborators, over a couple of years. But the final draft that communities were involved in – and I helped organise the community involvement – and what came back out of DEFRA are two rather different things. In two main ways. Firstly, the level of ambition is not there…And the second thing was that it got rewritten. So, the language got changed from being collaborative and more sympathetic, to being very ministerial and top-down."
>
> Interview, 30/03/2022.

Responding to consultations, or helping groups coordinate their responses, takes a lot of time and effort, and some stakeholders might not have the capacity to do this. If there is any suggestion that recommendations and feedback are consistently unrepresented in the final policy then trust in the process may be affected, as could the motivation to participate in future.

In the list of consultation circumstances at the beginning of this section, it is important to distinguish between consultation on plan/strategy making, and consultation on planning itself. The latter refers to specific projects, such as planning for housing or infrastructure development, or for FRM interventions, etc. The Environment Agency is a 'statutory consultee' on the latter. This means that by law they must be consulted in planning applications. This way they continue to play "a key role […] in advising planners and developers to avoid inappropriate development in flood risk areas and to enable climate resilient development" (FCERM S: 72). Lead Local Flood Authorities are statutory consultees "for major planning applications with surface water drainage implications" (Ibid). Improving public participation in FRM might involve a focus on the day-to-day decision-making processes, rather than just the plan-making processes.

However, interviews conducted for SOLARIS show that one major constraint on consultation for active planning and for the review of FRM options is that there are no dedicated FCERM funds for engagement. For

example, local coastal protection engineers often have informal interactions with people living at the coast while they spend time on the beach inspecting, upgrading, or planning sea defences. Very often these interactions come in the form of curiosity, anger at a perceived lack of action, or a demand to know how the Council is tackling risks. On some parts of the coast the EA and County Council are seriously considering 'roll back', whereby land is given up to the sea. This can occur through 'managed retreat' or 'no active intervention'. This is problematic for two main reasons. Firstly, central government seem unwilling to plan how this might be managed. And secondly, there is no dedicated funding for the responsible bodies to engage with local stakeholders on how this process could be managed. If local authorities were to engage more comprehensively with local communities, they would require significantly more personnel. Large stretches of the English coastline fall under the remit of very small teams, or even individuals. Contact between local coastal communities and authorities responsible for managing risk from erosion and/or flooding is "ad hoc at the moment. It isn't particularly planned" (coastal management practitioner, 10/08/2022).

It should be noted that the EA is investing considerable resources in improving its engagement capacities, such as through specialised internal training:

> "…but now we're thinking and aiming for this engagement training and that sort of thing to become a lot more external facing…"
>
> "…alongside that, there's also, umm, then this new training is still being developed, umm, by the Community Resilience Team, which includes modules like dealing with change and uncertainty…"
>
> Interview – 13/06/2023.

The EA is sometimes hampered by its large size and by the lack of clear adaptation planning generally in face of the sheer pace of climate change:

> "I guess there's something about having trusted people as well, and the Environment Agency and the local authorities often aren't those trusted voices…You need someone who can link in with the community."
>
> "So I think at the minute most of the sort of options [for adaptation] are being pioneered by individual local authorities."
>
> "But actually, we're increasingly recognising, but in, you know, particularly with climate change. Umm, we're not going to be able to build flood defence schemes everywhere."

> "I mean, you know, we obviously already seeing places where some sort of adaptation is going to be needed and I'm not sure anyone's quite worked out what that will look like."
>
> Interview - 13/06/2023.

Begg et al. (2015) explain how a lack of resources at the local level impede planning processes in general. As the lowest form of government in England – local parish councils – are responsible for formulating Neighbourhood Development Plans and Neighbourhood Development Orders. The first of these outlines the vision for an area, whilst the second can be used to grant permission on specific developments. After external inspection, these require the backing of 50% of the local parish council. Through their interview data, the authors find that:

> "it was argued that greater support is needed from central government to improve the skills of local government actors to be able to better deal with their new responsibilities (interviewees 1, 3, 5, and 6). In practice, though, it was felt that little has been done to empower or enhance the capacities of local actors so that the new opportunities of neighbourhood planning could be properly taken up (interviewees 5, 6, and 8). Nearly all interviewees emphasised that it takes time, resources, and skills to be able to work effectively with diverse local actors."
>
> (Begg et al., 2015: 692)

These research findings relate closely to the next section on knowledge and capacity building.

RQ 3 - Knowledge and capacity-building on social inequalities

Incorporating social inequalities in FRM also requires the right knowledge and capacity. Interviews suggest that the constraints on these are significant, and they often relate to the availability of resources, the complexity of governance for FRM, and issues of scale. Perhaps most notably, there is a severe strain on practitioners in FRM (and erosion) in England. One interviewee highlighted the problems that can emerge as a result, for example, at the coast:

> "…some local authorities have better expertise than others, or more weight on the importance of managing their coast. Some local authorities – I mean the whole country wide but also within our partnership – have a lot more resourcing for their coastal management teams and associated activities, but some don't. Like, in Great Yarmouth we have had just one person for years. And then he retired and there was nobody. There is a new recruit now come in but it used to be a team of, like, four or five, back in the day, um, engineers."
>
> Interview, 21/04/2022.

FRM experts and practitioners are primarily engaged with technical tasks: managing shorelines; maintaining defences; monitoring water flows, etc. In many cases the capacity simply doesn't exist to expand into justice and equality considerations, even in instances where they might be brought up in consultation with the public, and one retirement can have a significant impact on the effectiveness of responsible authorities. One coastal manager who works largely alone claimed that their community engagement occurred almost exclusively when they were out checking the groynes on the beach. They were also very modest about their ability to address justice and equality concerns, as that was not what they were trained to do. When questioned about more formal channels for this, they named time constraints, saying it simply wasn't feasible. In most cases either key lines of communication between communities and FRM practitioners and authorities do not exist, or that they have broken down. This communication could be beneficial both ways: for residents to understand FRM measures and their objectives; and for authorities to better understand FRM needs, including the more social and demographic factors. One additional problem that was reported was that even within a single partnership of authorities, all would log into and use different Information Technology systems at work. This made the sharing of even the most fundamental planning documents difficult. Such administrative complications can add extra pressure to the partnership system that supports FRM actions across the country at different governance levels.

There was little evidence locally that the relatively rich data that exists at the national level in England on inequality, such as the Indices of Multiple Deprivation (available here), are being used to guide FRM decisions. Even though systems have been explicitly designed for this purpose, such as the Neighbourhood Flood Vulnerability Index and the ClimateJust maps, the uptake of these data seems relatively low. In the national FRM policy analysed above, there is a missed opportunity to make this explicit link. It follows that there is no obligation to use this data at the local level. Once again, the cost-benefit analysis measures (such as FCERM Grant in Aid) represent the most comprehensive consideration of local inequality in FRM spending. This mechanism considers a narrower set of data to help decide on funding outcomes, such as the longevity of the project and number of houses protected. It does not engage with the social, cultural, health or capacity characteristics of the residents in those houses. In SOLARIS we have more work to do to identify any specific issues relating to scale and the fit of nationally aggregated data, locally.

Case study 1 - Chichester and Arun District Councils – Flood risk management in West Sussex

Introduction

This coastal case study covers the administrative areas of Chichester District and Arun District within the county of West Sussex. The Office of National Statistics estimates a population for Chichester District of 120,192 and of around 159,827 for Arun District. The main coastal towns and cities across the two districts are Chichester and Selsey (Chichester District Council) and Bognor Regis and Littlehampton (Arun District Council). The map in Figure 6 below shows the location of West Sussex, including the District Council borders of Chichester and Arun, and several other locations and features referred to in this report. English rock band The Cure originated from Crawley, West Sussex.

Figure 6: Map showing the location of West Sussex and the key sites named in this report. Adapted from Wikipedia (open-source Ordnance Survey data).

The biggest river in the area is the River Arun, and the Arun and Western Streams Management Catchment covers an area of 1,490 km^2 (this also includes the River Rother, which mouths on Rye Bay in East Sussex).

The districts of Chichester and Arun are relatively flat and include extensive wetland areas. According to the Sussex Wildlife Trust, 50% of the surface area of East Sussex (the next county to the East) and West Sussex combined are made up of rivers (10,000 km) and wetlands (384,000 hectares). Rifes (a local name meaning stream) make up the main drainage system across the Manhood Peninsula (CH2M Engineering Consultants, 2015).

Much of the surface area of West and East Sussex is made up of the South Downs National Park ('South Downs'). This has several key implications for the pattern and extent of flooding in West Sussex, as well as for FRM. Firstly, the soft, chalk-based geology of the South Downs means that groundwater levels and 'soakaway' processes need to be carefully considered in both development and FRM, given the ease at which this rock is dissolved and the risk of sinkholes forming. Developers wishing to build on this land often need to drill exploratory boreholes to assess the stability of the ground and the ability of water to drain sufficiently. Secondly, there are strict limitations on the number of houses (and other developments) that can be built on the South Downs. The ambitions for house building in the area centre on moderately expanding existing settlements between 2014 and 2033 and respecting the overall purpose of the park (South Downs National Park Authority, 2019). There are also various nature conservation designations across the South Downs, in line with international and national agreements. These include Special Protection Areas (SPAs), Special Areas of Conservation (SACs), RAMSAR sites, Sites of Special Scientific Interest (SSSIs), etc. These areas are subject to more stringent impact assessments for development and the result is that more developments are 'squeezed' into non-park areas, often towards the coast.

Much of the case study work is focused on the Manhood Peninsula and Bognor Regis. These are interesting sites in terms of the flood risks that they face (including pressures from erosion, especially on the peninsula), as well as the contrasting socioeconomic dynamics, both between the two, and within them.

Socioeconomics in the study site

In terms of local economics, Chichester and Arun District Council areas are both relatively affluent but there are some interesting outliers. The proportion of people who are 'Economically Active' in Chichester stands at 73.9%, which is markedly below the national average of 78.4%, but the number of self-employed is significantly higher than the national average (16.3% and 9.3%, respectively). This suggests that there is a higher-than-average entrepreneurial spirit in this area. In fact, the number of businesses categorised as small (10-49 employees) stands above the average for the South East (8.2% and 7.9%, respectively). Educational levels are also relatively high, with 45.6% of residents having an 'NVQ4 and above' qualification, which is the equivalent to undergraduate level, and compares favourably to the average for the South East of England (45.1%) and the UK (43.5%). Full time workers receive a significantly higher weekly gross pay than the national

average (£651.5 compared to £613.1), although there is an obvious gender pay gap, in line with national averages. Chichester also has a comparatively old population. According to the Chichester Local Plan: Key policies 2014-29, "of the population in the 15-44 age range, Chichester District is below the national average of 40.5% with 32.2%. This contrasts with those over the age of 65, which stands at 24.4%, compared to the national average of 16.6%" (Office for National Statistics)[5].

The proportion of people who are 'Economically Actively' in Arun stands at 82% which is markedly above the national average of 78.4%, and the number of self-employed is marginally higher than the national average (11.7% and 9.3%, respectively). This suggests that there is also a higher-than-average entrepreneurial spirit in this area. In fact, the number of businesses categorised as small (10-49 employees) stands above the average for the South East (8.2% and 7.9%, respectively). Educational levels are also much lower than in Chichester, with 36.7% of residents having an 'NVQ4 and above' qualification, and compares unfavourably to the average for the Southeast of England (45.1%) and the UK (43.5%). Full time workers receive a significantly lower weekly gross pay than the national average (£575.9 compared to £613.1), although the gender pay gap is less pronounced than in Chichester.

A range of other factors beyond income and education help determine flood vulnerability. These are explored for Chichester and Arun below, in the context of the Neighbourhood Flood Vulnerability Index (NFVI). First, we present information on local flood risk and recent flood events.

Flood Risk and recent events

According to the Local Flood Risk Management Strategy 1 (LFRMS 1), "West Sussex has a history of fluvial, coastal, surface water and groundwater flooding. There are records that extend back hundreds of years" on flood events (p.18). Surface water flooding poses the largest risk in West Sussex, with 91,200 properties at risk at the time of the report (compared with sea and river risk: 12,500, and 5,500 at risk from all sources combined). The chalk bedrock of the South Downs makes groundwater movements more difficult to monitor. The area is also susceptible to coastal erosion and flood risk, both of which are managed primarily through groynes (wooden structures designed to accumulate protective levels of sediment), rock armour made up of large boulders to strengthen the shoreline, and sea walls.

[5] https://www.nomisweb.co.uk/reports/lmp/la/contents.aspx

Figure 7: Groynes and rock armour along the beach in Bognor Regis. Source: author's collection.

The LFRMS 1 document presents several key events that are selected based on the number of properties that are flooded. This comes with the disclaimer that landscapes and building patterns have changed and so the impact measured in these terms also will have. Figure 8 below is taken from the LFRMS 1 and provides and overview of key flooding events that occurred until its publication in 2013:

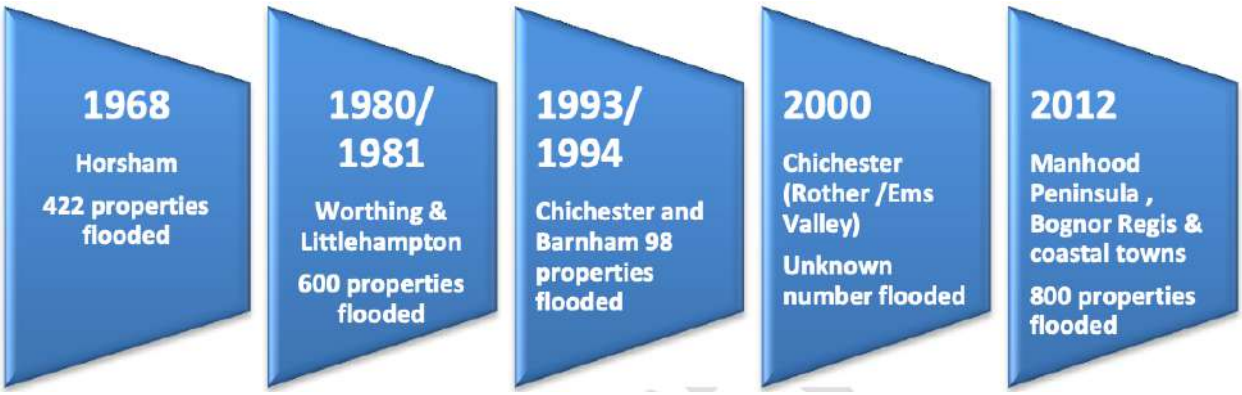

Figure 8: Timeline of the most serious flooding events in West Sussex. Adopted from the LFRMS 1.

The floods of 2012 were those most frequently cited by SOLARIS interview respondents. They had major impacts in West Sussex and gave extra impetus to FRM strategies in the county, especially through the LFRMS 1 released the following year. A sequence of extraordinary meteorological conditions caused this severe flooding. The winters of 2010-11 and 2011-12 were uncharacteristically dry. Such dry conditions often leave the ground less permeable, increasing surface runoff. In April 2012 a 'hosepipe ban' was brought into effect by seven water companies across the southern and eastern regions of England (hosepipe bans with fines of up to £1,000 are one measure used in England to reduce domestic water use and preserve supplies). Shortly after this announcement, however, West Sussex recorded 200% of its average monthly rainfall for April. Rain continued to fall heavily for the entire summer, recorded at a level of 192% above average for April-September (and at 430% of the average for June in Bognor Regis). This was the wettest summer on record since 1912.

Although the rainfall was record-breaking, there were other failures identified that exacerbated the flood impact. In the subsequent investigations and reports[6], eleven 'cluster' areas were identified where the flooding was most severe. Common contributing factors to the extent of flooding included: riparian owner negligence on watercourses leading to overgrown ditches; private property development encroaching into watercourses; and the inadequate capacity of road drainage systems. Publicly maintained foul drainage systems were found to have performed adequately in almost all areas. It is also notable that "the study area is bounded to the south by the English Channel and as such there is a tidal flood risk along the coastline. Additionally, the combination of high tides and high river levels can result in tidal locking, particularly in the Rifes [streams], as the rivers are unable to discharge effectively" (JBA Consulting, 2022: V).

Figure 9: Scenes of localised flooding during the 2012 event (West Sussex County Council, 2012).

[6] Lead Local Flood Authorities have a duty to investigate significant flood events.

FRM governance in West Sussex

The Flood and Water Management Act 2010 created the role of Lead Local Flood Authority (LLFA) in England. This transferred more powers for FRM to Local Authority level – most commonly to County Councils – as well as to the Environment Agency and Water Companies. West Sussex County Council (WSCC) is the LLFA for this case study. As with other areas of England, there is not one authority responsible for FRM, so the LLFA coordinates work between a series of other actors. Some key responsibilities of West Sussex County Council as the LLFA are to:

- Provide leadership of local flood risk management authorities;
- Develop, maintain, apply and monitor a strategy for local flood risk;
- Permissive power to do works to manage flood risk from surface water runoff or groundwater;
- Permissive power to request information from any person in connection with the authorities flood risk management functions;
- A duty to investigate and publish reports on flood incidents in West Sussex;
- Responsibility (once enacted) for the sustainable drainage systems approving body with responsibility for approval, adoption, inspection and maintenance of new sustainable drainage systems;

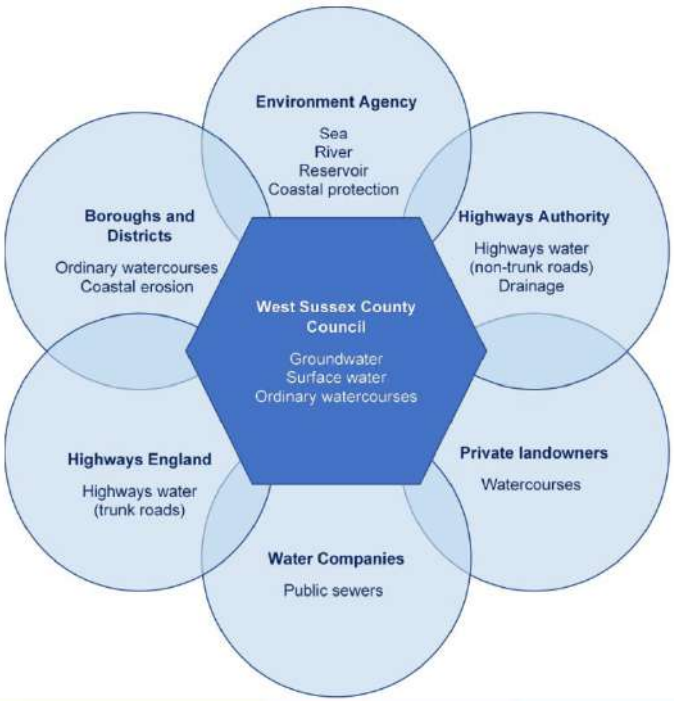

Figure 10: Roles and responsibilities for FRM in West Sussex (West Sussex County Council, 2021).

Figure 10 above provides an overview of the roles and responsibilities of various actors for FRM in West Sussex. It should be noted that the South Downs National Park Authority shares planning responsibilities with West Sussex County Council. As such it does carry some FRM responsibilities.

Figure 11 is representative of the fact that WSCC works in partnership with the six surrounding bodies in FRM and that they all collaborate. The diagram is not weighted, so this partnership work is not exactly even between the actors represented here. To give an example, the EA and WSCC work together on coastal FRM and coastal erosion activities, depending on beach ownership (which can involve other landowners too). Management responsibilities of the Elmer Rock Islands east of Bognor Regis are shared between WSCC and the EA: two by the former and six by the latter. This co-management demands close partnership work.

Figure 11: Google satellite image showing the eight Elmer Rock Islands.

Partnership working is essential to FRM delivery by LLFAs in England. According to the LFRMS 1, while the Flood and Water Management Act 2010 helped clarify roles and responsibilities, these have not been strictly divided, and still span several organisations and groups for specific actions. On a very practical level this is also because the main sources of funding, such as the Flood and Coastal Erosion Risk Management Grant in Aid (FCERM GiA), carry a limited number of financial resources, for which there is strong competition. Partnership working is seen as essential in FRM. As stated in the LFRMS 1:

> "Partnership working is therefore extremely important to flood risk management. If people are pro-active and are regularly communicating then delivery and progress is more likely to be effective. By working together we can avoid duplication, maximise available resources and funding opportunities, and share best practice, skills and expertise."
>
> (West Sussex County Council, 2014: 57)

Outside of the statutory responsibilities set out by the Flood and Water Management Act 2010, several other actors play more informal – but still essential – roles in FRM in West Sussex. These include:

- **Flood Action Groups**. Coordinate by the National Flood Forum, these represent community members to help understand and communicate the risks they might face and help prepare funding bids for FRM projects.
- **Parish and town councils**. This is often the first point of contact for people who are interested in flood risk matters.
- **Community and economic development teams**. These coordinate work for the socioeconomic development of an area. They encourage 'contribution work' by citizens. There are three such teams in West Sussex.

Aside from specific FRM responsibilities, it is worth noting that land use planning plays a significant role in flood risk mitigation in England. Planning authorities carry responsibilities for this. In West Sussex these responsibilities are divided in the following ways:

West Sussex County Council:

- Deal with planning applications for minerals, waste and the Council's own development, minerals and waste policy, and transport planning.

South Downs National Park Authority:

- Responsible for planning within the national park boundaries.

District and borough councils (in this case Chichester and Arun):

- These deal with all other planning applications: building regulations and building control; listed buildings; conservation areas; tree preservation orders; local planning policy; community infrastructure levy (CIL) and neighbourhood plans.

(West Sussex County Council Website at https://www.westsussex.gov.uk/planning/planning-who-does-what/)

Planning happens in accordance with the National Planning Policy Framework (NPPF) and Sequential Tests are used to guide planned developments away from the highest flood risk areas. "The NPPF classifies flood risk into four different zones of probability (flood zone 1 (low probability), flood zone 2 (medium probability), flood zone 3a (high probability) and flood zone 3b (functional floodplain))" (LFRMS 1: 54).

More specifically for FRM, there are several local policy documents that are directly and indirectly related to FRM in West Sussex. These include:

- **West Sussex Local Flood Risk Management Strategy 2013-2018** (LFRMS 1). This policy document is currently under review in preparation for LFRMS 2.
- West Sussex **Local Flood Risk Management Strategy Strategic Environmental Assessment (SEA)**. According to the Environment Assessment of Plans and Programmes Regulations in 2004 (transposed into English legislation from the European Directive 2001/42/ED (The "SEA Directive")), all plans and programmes that are to be adopted by an authority at national, regional, or local level must be supported by an SEA.
- **Arun and Western Streams Catchment Flood Management Plan – Summary Report 2009**. Prepared to help "understand the scale and extent of flooding now and in the future, and set policies for managing flood risk within the catchment." (p. 5). This plan is intended for use by the EA, regional planning bodies, internal drainage boards, water companies, transportation planners, land owners, farmers, land managers, and the general public.
- **West Sussex LLFA Policy for the Management of Surface Water, 2018**. This policy statement sets out how West Sussex LLFA, as a statutory consultee, will review drainage strategies and surface water management provisions associated with applications for development.
- **Shoreline Management Plan (SMP)**. Written by coastal groups with members mainly from the EA and local councils. These plans are designed to deal with coastal change and identify the most sustainable approach to managing flood and coastal erosion risk in the short term (0-20 years), the medium term (20-50 years), and the long term (50-100 years). The case study area plan is SMP 12: Beachy Head to Selsey Bill and is led by Arun District Council. The Medmerry Park area falls under SMP 13.
- **South Downs Local Plan** – Drawn up by the South Downs National Park Authority. This "landscape led Local Plan" contains core policies centred on sustainable development, ecosystem services, and major development.
- **Chichester Local Plan: Key Policies 2014-2029**. This broad framework document "is designed to provide the vision and framework that will shape the future of Chichester District outside the South Downs National Park area" (p. 1). The policies cover the economy, housing and neighbourhoods, transport, access and communications, strategic infrastructure, and the environment. Chichester District Council is behind schedule on approving an actual plan based on this document.

- **Neighbourhood Plans**. These plans are prepared by local Parishes and should reflect the Chichester Local Plan. The delays are causing problems here as Parishes must make changes to any Neighbourhood Plans that they make if these do not align with the Chichester Local Plan when it has been approved. There are 67 Civil Parishes in Chichester District, and 31 in Arun District.

The LFRMS is currently under review and the new version will cover the period of 2021-2026. One thing that has improved greatly for the upcoming second instalment of the LFRMS is the accuracy of risk mapping due to technological improvements. The map in Figure 12 shows the 'wet spots' identified in the LFRMS 1 and Figure 13 gives an indication of how this has been improved on for the upcoming LFRMS 2. The improved level of detail has now allowed authorities to identify 25 'priority areas' where FRM measures will be concentrated in West Sussex. The previous strategy was based on 1 in 200-year (0.5% AEP) storm event, whereas this is based on 1 in 30-year (3.3% AEP), the 1 in 100-year (1% AEP), and 1 in 1,000-year (0.1% AEP) storm events (AEP = annual exceedance probability). The methods used to assess the risk for this map are those used nationally for long-term flood risk assessments in England. The map below in figure 10 has been approved by all local parishes in West Sussex (the lowest from of government).

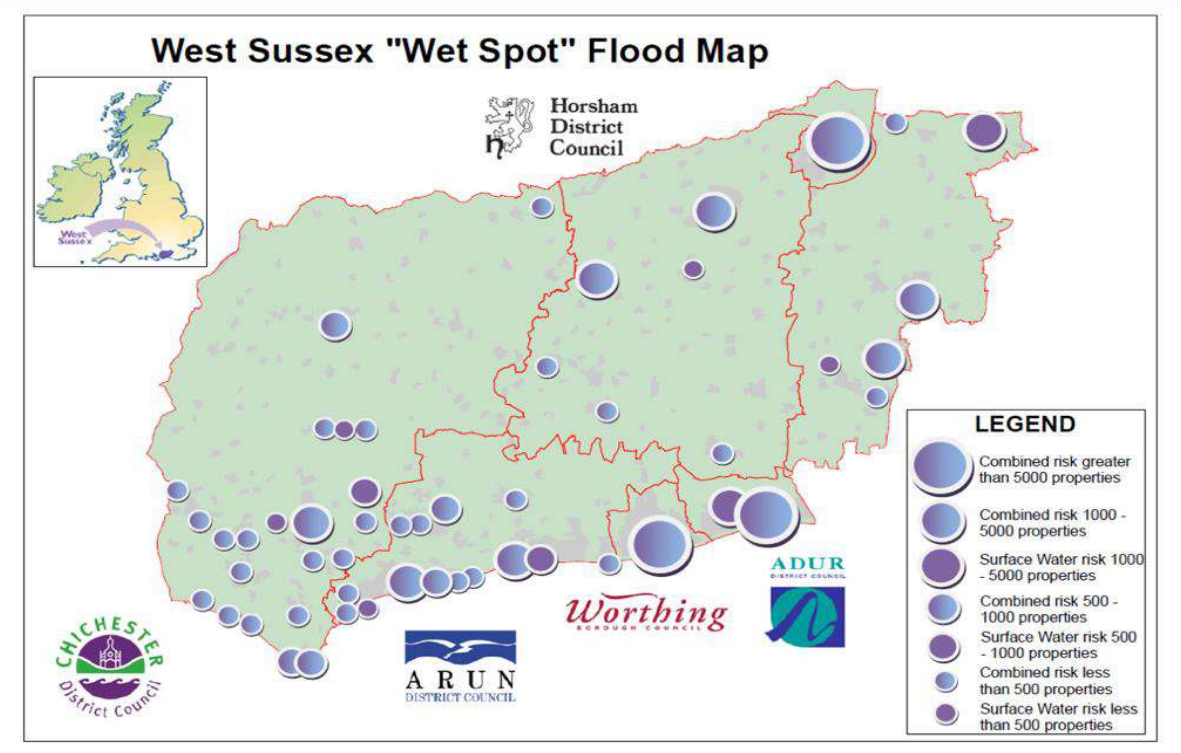

Figure 12: Wet spots as presented in the LFRMS 1 for West Sussex.

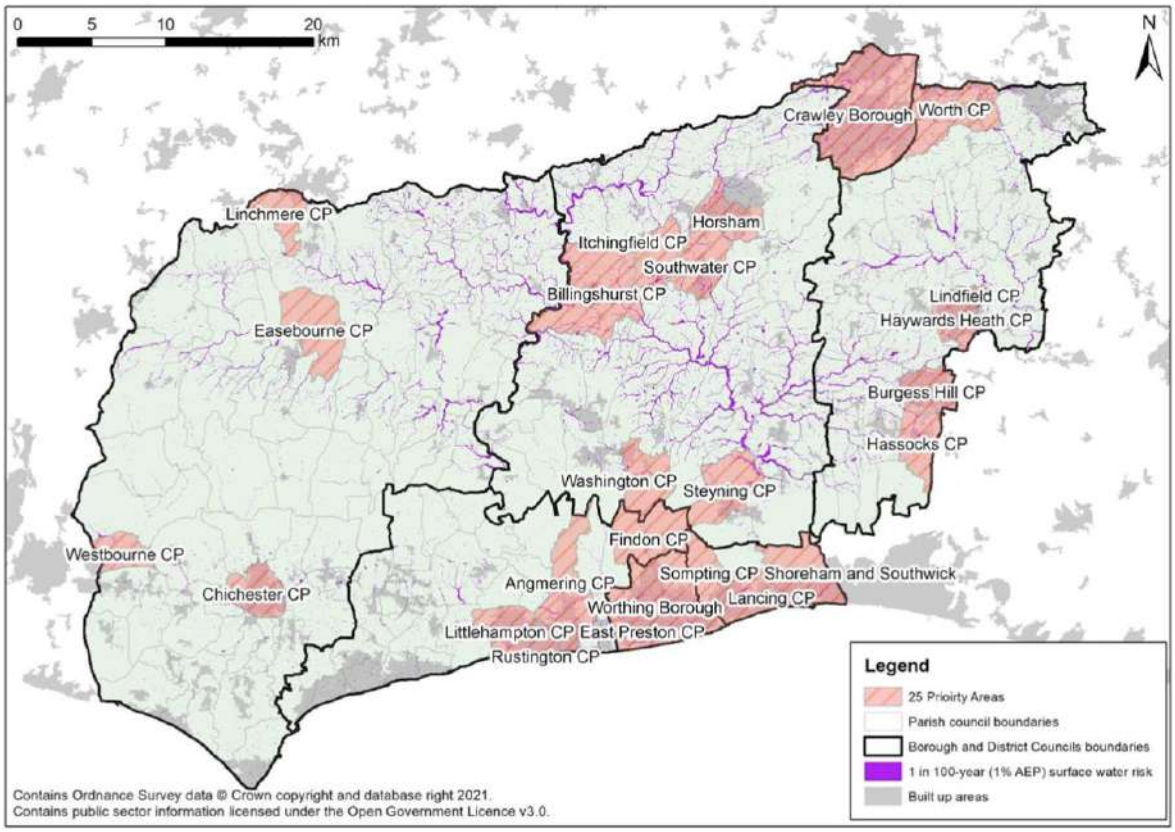

Figure 13: FRM priority areas as they will likely be presented in LFRMS 2 for West Sussex, based on improved data and parameters.

Based on the new assessment of risk in West Sussex, the LFMRS 2 will set out the following local objectives, which are also designed to reflect central Government's strategic objectives:

1. **Adaptation**: work with communities to implement adaptive approaches to enhance the natural and built environment
2. **Resilience**: support communities to help them to become more resilient to future flood risk
3. **Collaboration**: work with all Risk Management Authorities and stakeholders to achieve a consistent, co-ordinated and risk-based approach to flood risk management
4. **Opportunities**: Seek opportunities (including funding and research and development) from existing and new sources to invest in making communities resilient to flooding
5. **Evidence**: develop a strategic understanding of flood risk from all sources
6. **Sustainability**: contribute positively to sustainable growth and support environmental net gain by influencing wider development, redevelopment and regeneration plans to deliver flood risk benefits

Communities feature prominently in these objectives. This partly reflects the value put on 'place making' in national policies. However, it is also a product of FRM responsibilities being so devolved to the community and individual citizen level. The overall rhetoric in FRM is helping people to help themselves (e.g., point 2 above).

These 25 priority areas will form the basis of the work to be conducted under LFRMS 2. WSCC and its collaborating risk management authorities will work to address flood risk in five of these priority areas every year, in order of urgency. This means that flood risk will be tackled in clusters of five areas for each of the five years of the timespan of the plan (2021-2026)[7]. The overarching flood risk strategy for West Sussex is to develop and maintain sustainable drainage systems (SuDs) to prevent floods. Table 3 below outlines how an action plan can be designed around the stated objectives, in this case Objective 1 from the list above. The table outlines four actions related to this objective and provides details on the partners involved, and the time and funding sources needed to complete the work.

The Strategy Action Plan

Actions	Delivery Partner(s)	Other Partner(s)	Timescale	Funding source(s)
Partners:	**Funding sources:**			
B+Ds: Borough and Districts	B+Ds: Borough and Districts			
EA: Environment Agency	DWMP: Drainage and Wastewater Management Plan (Southern Water)			
SDPNA: South Downs National Park Authority	FDGiA: Flood Defence Grant in Aid			
SRF: Sussex Resilience Forum	LL: Local Levy			
TC/PC: Town Council / Parish Council	WaSC: Water and Sewerage Companies			
WaSC: Water and Sewerage Companies	WSCC: West Sussex County Council			
WSCC: West Sussex County Council				
Objective 1 – Adaptation: Work with communities to implement adaptive approaches to enhance the natural and built environment				
1A - Take the lead on improving the awareness and understanding of using natural processes to manage local flood risk in West Sussex	WSCC, EA	B+Ds, SDNPA, TC/PC, Local Flood Groups	Ongoing	WSCC
1B - Explore the feasibility and benefits of diverting rooftop drainage over the sea wall for waterfront developments	WSCC	WaSC	2021	WSCC, LL
1C - Continue to assess and identify the risk and work with highways and RMAs towards the overall improvement of surface water drainage risk across the county	WSCC	WaSC, B+Ds, SDNPA	Ongoing	WSCC
1D - Raise community awareness of local drainage assets and encourage communities to take a more pro-active role in flood monitoring and maintenance work	WSCC	B+Ds, SDNPA, TC/PC, Local Flood Groups	Ongoing	WSCC, B&D

Table 3: An example Strategy Action Plan presented by WSCC.

[7] It is interesting to note that DEFRA is currently assessing the frequency of FRM plan reviews. Opinion seems to largely favour a set timeframe for assessment (such as every 5 years) but with the caveat that 'trigger points' should be observed. These might be flood events or other significant changes in local flood risk that would demand a review of the plan. Also, it has been suggested that FRM plan reviews to be taken out of synchronisation with electoral cycles, so that they do not become supporting documents for political election campaigns.

Results

RQ 1 - Justice and equality in FRM

In this section we present the results of the analysis of four key policy documents listed above in, with respect to what they contain about justice and equality in FRM in West Sussex. Overall, it can be said that justice and equality aspects are not particularly forthcoming in the FRM policy documents. This section also concludes with interview data relating to the role of justice and equality in FRM.

West Sussex Local Flood Risk Management Strategy 2013-2018

The LFRMS is written in a relatively informal style but mostly focuses on the technical aspects of flood risk and of managing this risk in West Sussex. A large portion of the document is used to explain how the risks manifest themselves in the area and the various bodies and partnerships responsible for addressing this risk. Given that the main risk in West Sussex comes from surface water flooding, there is an emphasis on riparian owner responsibilities for keeping watercourses clear of obstruction. These landowners can access public information on current flood risk from rivers, the sea, and from groundwater, and contact local authorities for the latest information on surface water flooding. However, there is very little information provided about what support might be available to landowners if they do not have the financial resources or knowledge required to carry out the necessary work to clear water ways on their land. They are directed to Environment Agency documents that provide further information. The document does not address the range of citizen and community capabilities to manage water courses. The same applies to property level protection, which is addressed in a very short paragraph (p. 49). Enforcement of riparian owner responsibilities is carried out by the District and Borough Councils, supported by the West Sussex County Council legal team (p. 53). The LFRMS 1 also claims to support Defra's guidance on sustainable development by "promot[ing] fairness in improving the wellbeing of communities". There is no information provided on how this will be achieved.

West Sussex County Council, in partnership with the Districts and Boroughs, have agreed on the following four objectives to support some national Government strategic objectives:

- Understand the areas that flood
- Manage the flood risk in West Sussex
- Enable people, communities, business and public bodies to work together more effectively
- Put communities at the heart of what we do and help West Sussex residents during flood events, and recover as quickly as possible after incidents

(West Sussex County Council, 2014: 62)

All FRMAs in West Sussex will need to prove the value of any work undertaken against at least one of these four objectives. The last two of these objectives are most specifically targeted at communities and the LFRMS 1 provides appendix material on how they will be met. The actions revolve around providing information, improving communication, and improving partnership work.

It should be noted that each new LFRMS is based on a strategic environmental assessment (SEA). The current SEA for West Sussex does include baseline data on the local population and human health. However, this data is not particularly well integrated beyond acknowledging a "relationship between population, human health and flood risk management and so this theme has been scoped into the SEA assessment" (SEA p. 21).

Arun and Western Streams Catchment Flood Management Plan – Summary Report 2009

This plan is set out in a technical, risk-based format. The main aspects considered are the number of properties at risk (with and without current flood defences considered), the critical infrastructure at risk, and designated sites at risk (e.g., conservation sites). These at-risk assets are defined in the context of a 1% annual probability river flood (1 in 100 years). The report also considers the likely impact on farming in the catchment area. Based on this information, the whole catchment has been separated into sub-areas and each of these has been assigned one of six FRM policies. The report does not evidence if or how social justice and equality factors were considered when deciding on policy designation.

Chichester Local Plan: Key Policies 2014-2029

This document provides the basis for the Chichester District Council to publish a Local Plan. The document centres on the notion of place making and sets out a vision for making Chichester a place where people can find jobs at the right pay level, use their entrepreneurial flair, lead socially responsible and environmentally friendly lives, and feel safe and secure, among other things (p 21). Objectives for the Manhood Peninsula, for example, focus on the provision of more housing and workplaces to make the town of Selsey less dependent on the city of Chichester to the north. This will be done in a way that is mindful of the delicate natural habitats of the Medmerry realignment scheme and Pagham Harbour.

In relation to flood risk and water management, the Key Policies document reiterates the importance of strict planning measures to "avoid inappropriate development in areas at current or future risk, and to direct development away from areas of highest risk" (p 183). New development should also not increase risk elsewhere, such as through increased run off, and should also reduce coastal squeeze. This last point is important in West Sussex given the planning restrictions in the South Downs.

As outlined below in the results section, CDC's delay in producing a new Local Plan is proving problematic for FRM in the area. Improving the self-sufficiency of Selsey (and thus maintaining a viable community there) is also challenging.

West Sussex LLFA Policy for the Management of Surface Water

This policy is designed to be used by several stakeholders when considering a range of developments and the submission of planning applications, to ensure that Sustainable Drainage Solutions (SuDs) are incorporated into these. Named stakeholders include developers, homeowners, professionals in charge of drainage schemes, and local authorities. The document outlines the relevance of key legislations and Acts, explains the planning process in more detail, and runs through the existing SuDs policies. These ten SuDs policies cover approaches such as managing risk through design, designing to be maintainable, and enhancing biodiversity. Three pages towards the end of the document cover specific property alterations that a homeowner may consider, and how these might affect flood risk (p 33-35). Overall, this technical document does not engage with the topics of justice and equality in FRM.

Planning and place making

Including localised case studies in the SOLARIS project also allows for the links between national policy and local processes to be examined. In the case of West Sussex a clear justice issue emerges here and it relates to the national objectives of place making and community viability. It was particularly prevalent for the town of Selsey on the Manhood Peninsula. Interviewees pointed to the fact that the local economy was heavily reliant on tourism (a fact that was quite evident whilst booking the fieldwork and spending time on site, as tourists would also typically do), which was bolstered by the creation of the Medmerry nature reserve. Although the town has grown significantly in size in recent decades, there is little to keep young people in the area or to attract non-tourism related investment:

> "Over the years Selsey has grown from being a tiny fishing village to becoming half the size of Chichester, literally half the size of Chichester. And it has got no employment down there, other than tourism related, and when companies do start up down there, they move inland when they get big because they can't cope stuck on the peninsula… So, there are big issues on the coast before you even factor in the flood thing." Interview, 19/05/2022.

The national FCERM strategy aims to build 'climate resilient places' and in the local context we are reminded that places must first (or concurrently) be built to be socioeconomically resilient, or viable. These are the same pressures that are faced by more remote locations around the country.

Selsey also faces a more physically existential threat to its viability in the context of sea level rise. This predicament is outlined on the map below in Figure 14, where the solid blue line indicates existing waterways, and the dashed blue line shows the potential for these to merge on a more permanent basis.

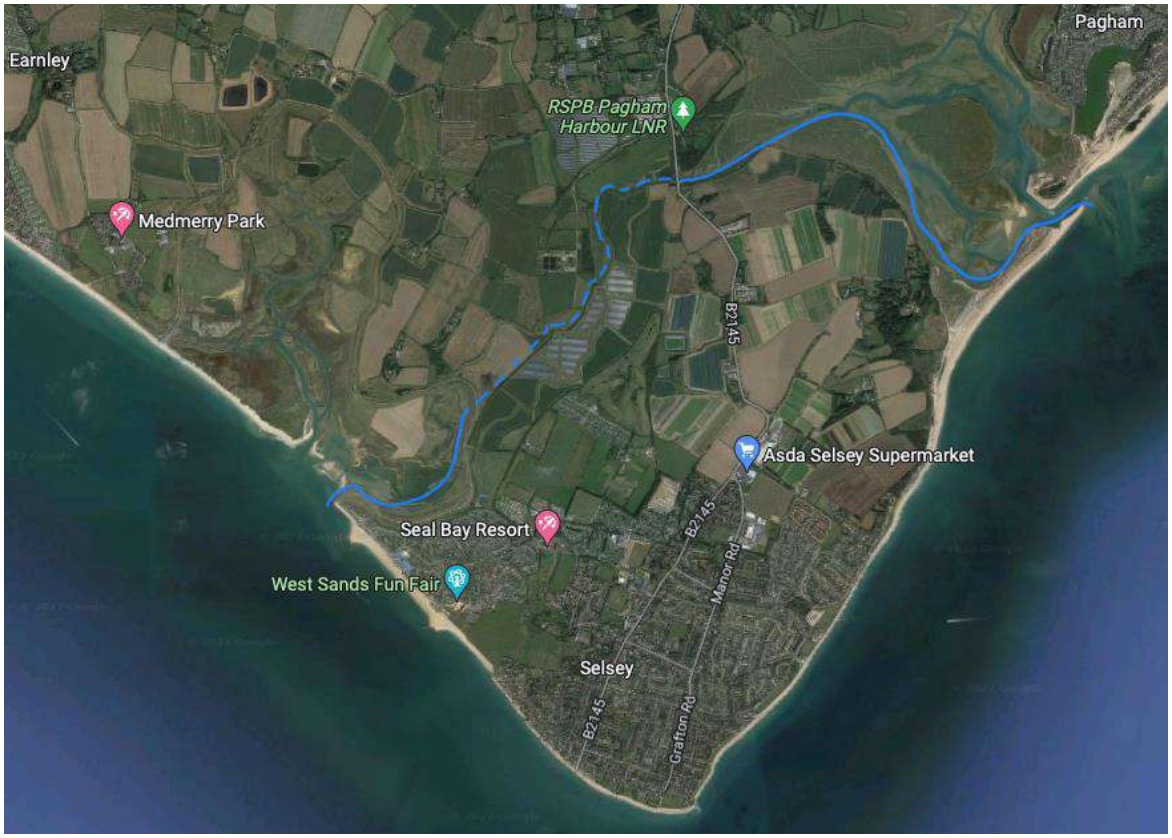

Figure 14: Map indicating the potential for seawater inundation at two wetland areas to isolate Selsey from the mainland.

The wetland systems of Medmerry and Pagham Harbour encroach from the West and the East (respectively) to the north of the town of Selsey. In the short term this poses a flood risk to infrastructure (for example, to the B2145 road that connects the town to the rest of the county), which could leave the town isolated in the event of a coastal/fluvial (combination) flood. In the longer-term stakeholders have informed the SOLARIS project that there is a relatively high likelihood that Selsey becomes an island, permanently cut off from the mainland. This links the town closely to community viability discussions that are happening in coastal locations around the country. From a coastal erosion perspective, the Shoreline Management Plans employ four broad strategies:

1. Advance the Line - The coastline is built seawards of the current defence in order to reclaim land along the coast.
2. Hold the Line - The current alignment of the defence is maintained with no movement seawards or landwards.

3. Managed Realignment - This allows the shoreline to move seawards or landwards naturally with management to control or limit movement.
4. No Active Intervention (Do Nothing) - No investment in coastal defences or operations.

The Medmerry managed realignment scheme was deemed a necessary FRM strategy at the time of creation, and an important nature-based flood defence (especially inland towards Chichester), but one result is that it becomes unfeasible to defend Selsey in the future. Justice questions arise here as to the distribution of goods and bads in natural resource management, especially in the context of place making. Bigger and more challenging questions emerge here about the amount of human and financial resources that are invested in at-risk (coastal) zones and their communities. There is great overlap between this question of justice and the mechanics of engagement and public participation: how do we acknowledge and integrate the views of people living in these at-risk areas? This question is explored in the next section below.

However, it is important to also address the role of spatial planning in delivering any justice in FRM. The planning system is central to the ability of District Councils such as Chichester and Arun (including the role of planning in the South Downs) to mitigate future flood risks. Interviewees with knowledge of the local area consistently referred to failures in the system that have hampered these mitigation efforts. This begins with the fact that Chichester District Council has been unable to prepare a Local Plan in time to take over from the previous one. It was noted that:

> Interviewer: "It seems there are a few houses planned that they [the Manhood Peninsula Action Group] are not happy with for various reasons."
>
> Respondent: "Oh yeah, loads. That's the thing, because CDC [Chichester District Council], along with loads of other local authorities, doesn't have a local plan in place at the moment, it's got safe policies, but what is starting to happen now is developers who have been racking and stacking…it's like looking at planes coming in to land, it really is. They have been doing it over the last five years waiting to see what is happening with the local plan, and unfortunately because that has not materialised yet because there have been arguments about housing numbers and all sorts of other things that I don't know the details of it hasn't actually materialised. And now there is a big loophole, and they are starting to land basically."
>
> Interview, 04/05/2022

One of the main problems with this in places like the Manhood Peninsula is that critical infrastructure will struggle to cope with the extra pressures that these developments will bring. There is only one main road that connects Selsey to inland areas, and to the city of Chichester, for example. The sewer system is also

under significant pressure at present and major upgrades would be required to accommodate the demand of new housing. According to another local resident the lack of a Local Plan is very problematic for FRM:

> "The trouble is, their [Chichester District Council] current one has run out, they haven't got a new one, and when you haven't got a local plan, you can't strategically say 'you shouldn't be building here, you shouldn't be building there' and so developers come in. And development now is so much in favour of development."
>
> "There is still no long term, cohesive planning that allows the Environment Agency, the planning authorities, the flood authorities, and the local communities to properly work together to address long-term risks."
>
> Interview, 19/05/2022.

Although the old Local plan remains active until a new one is in place, the council has already set out a new vision through its Chichester Local Plan: Key Policies 2014-2029. Actors will be receiving mixed messages about following new key policies but under and active, old plan. As a result of this lack of strategic guidance (and the prioritisation of house building under the current UK Government), planning permission for houses is too often granted on low-lying land in the area. Perhaps of more concern is that despite the relative rigorousness of planning regulations for flood risks (e.g., through the Sequential Tests), there appear to be instances where permission is granted through questionable sets of circumstances. The same interviewee was informed by a Dutch spatial planner that:

> "…permission would never be granted in the Netherlands to build new, low-cost housing on what is essentially a flood plain – behind a shingle bank – that is below sea level [the flood plain]".
>
> Ibid.

Recent events on the West Sussex coast call further into question the reliance on the planning system to halt developments in at-risk areas. The problem here centres around the definitions of flood risk. Chichester District Council's Flood Risk Assessment set out a 'worst-case scenario' for tidal inundation around East Wittering, West of Selsey. Large areas are at risk of increased tidal inundation by 2070 or 2100. Communicating this risk is important in the context of sea level rise and increased storm frequency and intensity. On September 27th local councillors refused an application by a developer to build 280 houses, partly in response to this risk. On the evening of the vote the developer contacted councillors with their interpretation of local risks, including some misleading claims:

- Accepting the seawater inundation predictions means that the existing 10,000 residents and £2.6 bn of properties were being abandoned. This is not true as long as the 'hold the line' policy is maintained in the Shoreline Management Plan.
- Tidal inundation (future risk) does not affect the flood risk management zoning (1, 2, 3, 3b), which represents current risk. Again, the existing housing stock will not be abandoned.
- Any houses built before 2009 (much of the existing stock) will continue to be eligible for insurance cover under FloodRe.

These events seem to amount to a threat by developers to a local council to influence a planning application outcome. As outlined by the research participant, "[t]his is a very worrying turn of events and it demonstrates the difficulty faced by local authorities in minimising future risk" (12/10/2023). Another local resident suggested that "planning policy has basically been hijacked as housing policy" (Interview 18/07/2022).

The problematic planning and housing demand situation in West Sussex, as demonstrated in the case of Chichester District, is only a problem for FRM in part. More broadly, it is representative of equity problems in England, even before flooding is considered. Access to affordable housing might represent the first challenge that needs to be met, as outlined by the same interviewee:

> "And my argument is that actually we do need affordable housing in our area, we need affordable housing that will stay affordable housing, and affordable housing for local people. But the way the whole government housing is fulfilled is you have to build – whatever the number is – 70 houses to provide 35 affordable houses, of which actually in terms of affordability, most of those houses are 80% of market price, which is still not affordable to local people. So, probably out of 80 houses you build there are probably only 5-10 are – what in the old days was called, or still is just about, social housing – which is really affordable housing for local people."
>
> Interview, 19/05/2022.

This is a difficult balancing act between using the limited space left available by the National Park and flood risk areas (notwithstanding the means through which flood risk areas are sometimes redefined) and meeting the objectives for place making and community viability.

RQ 2 – The role of participation

There are four main channels for public input into FRM in a county such as West Sussex. The first is through public consultation on policies; most notably the LFRMS and Local Plans (or the 'Key Policies' document upon which the Local Plan will be based), which guide the overall use of space and resources in the region. The second is through public consultations in specific development plans, such as for housing developments, house extensions, flood risk management measures, community centres, shopping malls, schools, roads, etc. The third common route is through the establishment of a Flood Action Group (FAG), with support from the NFF. The NFF can then assist the FAG in identifying the correct authorities with which to raise concerns or have flood risks assessed and addressed. Finally, individuals are encouraged to contact their parish, city, or county councils with any flooding concerns that they may have.

Two main interesting findings emerged from the case study. The first is in relation to the development of the LFRMS. There was an extensive consultation process for this, which received 250 individual comments from 68 groups and individuals. Several comments relate specifically to the involvement – or role – of communities, two of which are presented in Table 4 below. Next to both comments there is an indication as to whether the table was changed and what the specific response was from the LFRMS team, if one was given.

Comment	**LFRMS changed? Y or N**	**Response**
"Is there anything missing?" 1) On several occasions throughout the document reference is made to working with individuals and local groups. It would be helpful if there was an indication of how these people can provide inputs.	Y	The access to risk management authorities could be made clearer. Practical information on this link between the public and the decision makers is now included. A separate section is now included on communities and the public.
Community Engagement: The document makes a number of statements about involving local communities … the document does not set out how this community	Y	This will be made this clearer in the document. Improved the section on community involvement, and, added a separate section on community and public involvement. The main routes in are through the National Flood Forum, to check

engagement will operate. This should be included within the document.		if a Local Flood Action Group existing in the area, contact the Communities and Economic Development Teams within West Sussex County Council, or, contact your local Parish Council to offer ideas or your services.

Table 4: Example responses for the LFRMS consultation and action taken[8].

The responses from the FRM practitioners in both cases are encouraging. The LFRMS was altered to clarify the links between community members and decision/policy makers for FRM. Overall, it appears that good efforts were made to ensure that people are aware of whom they can contact with concerns or suggestions. Despite these clarifications, concerns do remain over the impact that citizens can have on policy. An interviewee involved in community engagement around similar processes elsewhere in England reflected that communities deserve more active engagement on such difficult decisions:

> "…working from a bottom-up approach to take forward the EA's work on readiness but actually working with the community to say from your perspective where you are at, what would you want to know, how would you want to find it out, how can we start developing toolkits to enable communities some empowerment in informing themselves and almost co-leading some engagement with the councils and with the EA so that it doesn't always come from top-down and it is not always about here are some options, what do you think? That doesn't work. We know that that doesn't work in the place making sense. It has got to be much more about…I think what we are learning is that resilience isn't about risk management, it is about viability."
>
> Interview, 21/04/2022.

It seems that community viability is largely defined by opportunities for local input into what that viability looks like.

There are unique land ownership constellations in England that can also impact the extent to which residents can or cannot participate in decision-making processes. The West Sussex case study is unique in terms of the number of privately-owned housing estates, many of which are situated on the coast. These private estates are collectively owned, so each house owner owns a share in the land. There is often a board of directors for the estate (about eight people for an estate of 350 houses near Bognor Regis) and a series of committees and sub-committees to help manage various aspects of the area. Participation of these estates in FCERM

[8] https://www.westsussex.gov.uk/media/1597/wscc_work_programme_consultation.pdf

matters is often more active for various reasons. Firstly, community management is more formalised than it often is between households in non-private estates, with the latter often not having boards and committees. Secondly, the social networks that constitute a significant part of social capital are often much larger and reach more influential people. On the estate we visited the coastal properties are valued at an average of £750,000 and are owned by well-educated, 'successful' people. Participation in the management of coastal defences, for example, might be easier for such households, and their voice might carry more weight in local government.

RQ 3 – The role of knowledge

In analysing the type of knowledge in FRM in the West Sussex case – particularly for the potential role of justice and equality – it is useful to consider the sharing of responsibilities. The sharing of responsibilities for FRM can be an effective way of pooling resources and ensuring that all relevant sectors are consulted on – or involved with – any necessary actions. However, in some instances it can be unclear when an actor should act. As set out in section 2.3 of the country profile above, responsibilities for emergency response to flooding are clearly defined. However, as the excerpt below from the LFRMS 1 indicates, the powers to manage flood risk are open to broader interpretation:

> "West Sussex County Council, similarly to the Environment Agency and the District and Borough Councils, have permissive powers to construct works to protect people and property where these are economically justified. These West Sussex County Council powers are not a legal obligation, but indicate the authority to manage flood risk from surface water, groundwater and ordinary watercourses if desired. In a similar way the Environment Agency has powers but not a legal obligation to manage main rivers and the coast. There is no right to flood or erosion protection, except in very limited circumstances.
>
> The term 'permissive powers' relates to certain legal powers. A risk management authority may choose to intervene in the public interest, where they believe works would be beneficial and / or economically viable, but has legal duty to do so. This recognises that risk management authorities have finite resources and so must prioritise how to use them."
>
> (West Sussex County Council, 2014: 50)

On the one hand, the responsibilities are well defined by the obligations of riparian owners to manage watercourses. However, the point at which authorities such as the County Council or the Environment Agency intervene is less well defined and appears to partly rest on the 'desire' of these two to act. The language of this excerpt appears to leave room for interpretation on a case-by-case basis, using phrases such as 'powers

but no legal obligation' and 'may choose to intervene'. Ambiguities like this in key documents could create opportunities for blame to be shifted following a serious flood event. A lack of clarity on FRM responsibilities is not a stable basis for tackling any injustice or inequality issues.

It is clear in England that riparian owners carry significant responsibilities in for FRM. However, these responsibilities are highly dependent on the capacity of these to manage the assets that they own. This can relate to financial and human resources, time constraints, or knowledge and expertise. The West Sussex Flood Action Group has raised these concerns in evidence to the UK Parliament:

> "We believe that the effectiveness of these laws need to be re-examined. Even the smallest section of a watercourse can have two riparian owners where the watercourse forms the boundary. It only requires one or two owners to be uncooperative to undermine all our efforts."
>
> (West Sussex Flood Action Group, 2016: 2)

Living on eroding coastlines also requires a form of knowledge that newcomers might not have:

> "I think it is one of those dilemmas of coastal communities is that you want people to come in because you don't want an area to stagnate, but then again the people who come in are not necessarily the people who know anything about the coast and know how to react to it."
>
> Interview, 04/05/2022.

In all instances, landowners will need to know how to manage their properties. This can be complicated further in instances where tenants in rented accommodation are not aware of unmaintained watercourses on the property. As shown in Figure 15 below, this could be an issue in the larger coastal urban areas of Bognor Regis and Littlehampton in West Sussex where there is a 'relatively high' or 'very high' flood risk vulnerability based on property tenure. Unfortunately, this kind of data has yet to be integrated into localised decision making on FRM and is only actively used for research purposes. We found little evidence that residents are engaging with this data. In fact, public awareness is a problem for many organisations:

> "…each one of the coastal groups has got a website and each one of those links to the national website… But really getting the public linked in with that is difficult. [Communications] still remains our weakest link."
>
> Interview 28/06/2022.

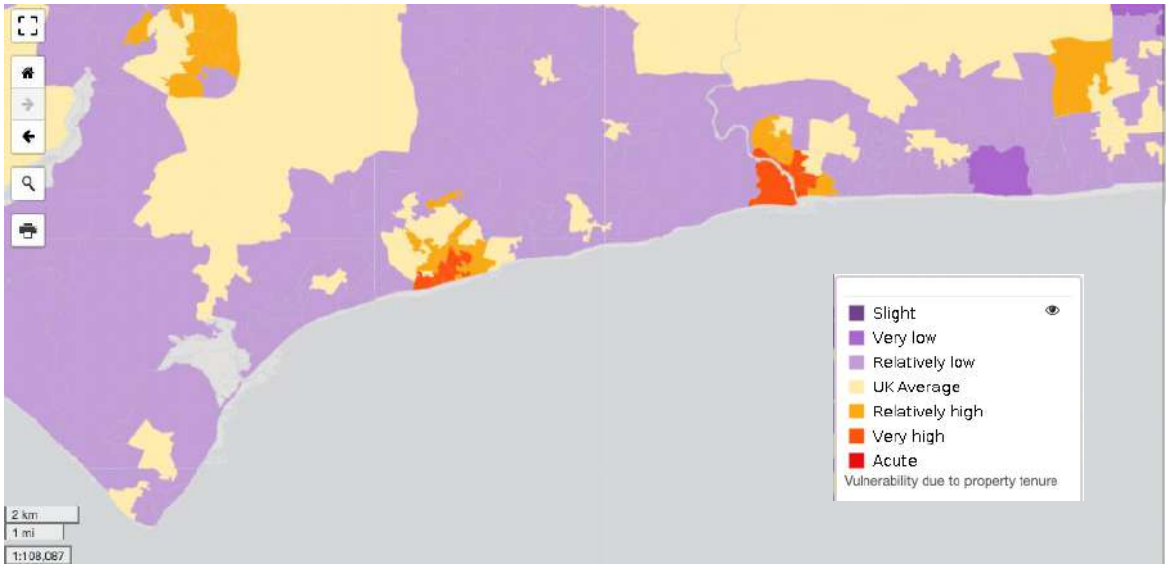

Figure 15: Data taken from the NFVI showing flood vulnerability due to property tenure in the study area. The vulnerability in Selsey on the Manhood Peninsula is relatively low. Adapted from https://www.climatejust.org.uk.

The availability of knowledge within Lead Local Flood Authorities is also dependent on the human resources within these. Some of these authorities have dedicated experts to work on FRM, while others are more limited. In the case of surface water management, WSCC has previously acknowledged its fortunate position in this regard:

> "Inconsistency by central government, relating to the implementation of Schedule 3 of the Flood and Water Management Act (2010), has meant that different Lead Local Flood Authorities are organised differently for the discharge of their responsibilities. West Sussex is fortunate to have retained drainage engineers within the District and Borough councils who provide technical review of drainage to support development applications."
>
> (WSCC, 2017: 2)

A consistent theme in our research was that some local authorities lack the expertise (and/or staff numbers) to address the technical aspects of managing flood risk. With this limitation in mind, the integration of justice and equality factors into the technical aspects of FRM seems inconceivable.

Conclusions

The West Sussex case study is characterised by coastal seawater inundation and inland flooding (mainly from surface runoff). Potential development 'real estate' is limited due, in part, to the strict planning restrictions in the South Downs National Park. This has led to a coastal squeeze and occasionally to controversial building projects on low-lying land.

The local FRM policies focus on technical approaches to reducing the risks from surface water flooding, including landowner (riparian owner) responsibilities. There is a lack of guidance for these riparian owners, or details of how they might overcome financial/knowledge/time deficiencies for work required. Overall, there is almost no mention in the policies of the complex socioeconomic factors that also contribute to flood vulnerability.

This case study also highlights the lack of holistic planning in England to help alleviate flood and coastal erosion risk. The planning system is relied upon to avoid development in at-risk areas, but construction pressures are high here (as they are nationally). In the context of place making, Selsey lies between two wetland areas and there are concerns that it might be cut off from the mainland, at least temporarily by the impact of flooding on transport links. Even where Shoreline Management Plans exist, there are questions relating to the feasibility of maintaining policies such as 'hold the line' in the context of climate change and unsecured funding streams.

Efforts are being made to incorporate more local views and knowledge in FRM, such as through changes to the Local Flood Risk Management Strategy resulting from consultations. However, West Sussex stands as a good example of how data from, for example the Neighbourhood Flood Vulnerability Index, might better support FRM.

Case study 2 – The River Thames

Introduction

The types of flood risk that affect London are tidal flooding, fluvial (river) flooding, surface water (pluvial) flooding, sewer, and groundwater flooding. The London Risk Register determines surface water flooding to be a 'Very High Risk'. This means it is a critical risk requiring immediate attention (Greater London Authority, 2022: 17). The Thames River Basin District is home to about 15 million people, with 1.7 million of these at risk of flooding from rivers and the sea, and 2.3 million at risk from surface water flooding (Environment Agency, 2022c). For the purposes of SOLARIS, the study area was refined to the Lower Thames Operational Catchment to the west of central London. The catchment area covers 422 km2, and "includes areas of south-west London, rural areas of Berkshire, Buckinghamshire and Surrey, and the suburban towns of Maidenhead, Windsor, Slough, Bracknell, Staines, Walton-on-Thames, Sunbury and Teddington" (Ref). This area is highly urbanised, causing high levels of urban surface runoff. The catchment has suffered from a range of flood events, most notably in 1947, 1968, 2003 and 2013/14, which impacted highly populated areas.

This case provides the opportunity to study a broad geographical and temporal perspective of flood risk inequality and how different flood risk management decisions impact on justice over space and time. As in many locations, flood risk management has occurred in a piecemeal nature in this area with different management initiatives and solutions being presented at different periods and in different locations. The large geographical area and complex governance arrangements for FRM make it necessary to provide specific examples of FRM that occur in different justice and equality contexts. The cases of Surrey and Slough provided excellent opportunities to consider the SOLARIS research questions in two contrasting socioeconomic areas. Both are implicated by a series of FRM schemes spanning a few decades., namely the Jubilee River project, the River Thames Scheme, and the Slough Resilience Innovation Fund (Sponge City) project (which builds on the earlier Slough Pathfinder project 2012 – 2015). These schemes are outlined in the next section.

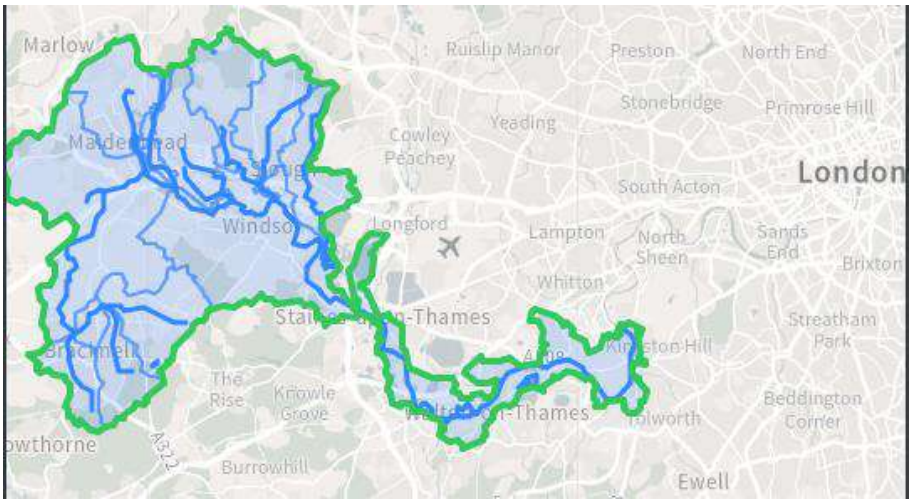

Figure 16: Outline map of the Lower Thames Operational Catchment[9].

Flood risk management initiatives in the Lower Thames

The scope of the case study considers several initiatives which have been developed and implemented in the Lower Thames since the 1980s to the present and incorporating a current initiative which is currently being implemented. Some of these, including the Jubilee River and River Thames Scheme have been developed and implemented according to overarching English Flood and Coastal Erosion Risk Management policy (i.e., as part of normal cost-benefit analysis processes of assessing flood risk management options), whilst others have been funded and implemented as part of special pilot initiatives (e.g., Slough Pathfinder and Sponge City).

The Jubilee River

This flood alleviation scheme on the Thames was conceived in the 1980s and completed in 2002. The scheme is designed to divert some of the River Thames flow into another channel in order to reduce the risk of fluvial flooding. It starts to the Northeast of Maidenhead and re-joins the Thames north of Datchet. The main populated areas to benefit in this area are Maidenhead, Eton, Windsor, and Datchet (totalling 3000 properties), although flow rates also have distributional flood alleviation benefits upstream and downstream. There is little evidence that the Jubilee River provides significant FRM benefits for Slough (see map in Figure 17).

[9] https://environment.data.gov.uk/catchment-planning/OperationalCatchment/3285#:~:text=The%20Lower%20Thames%20catchment%20covers,area%20extends%20over%20422%20km2.

At the time of conception and construction, the Jubilee River was seen as a flagship example for its scale of extensive stakeholder consultation (Warner, 2011). These engagement processes have since become more institutionalised (Alexander et al., 2016), and the introduction of partnership funding in 2011 has shaped the politics of flood alleviation in the Lower Thames area (as well as nationally).

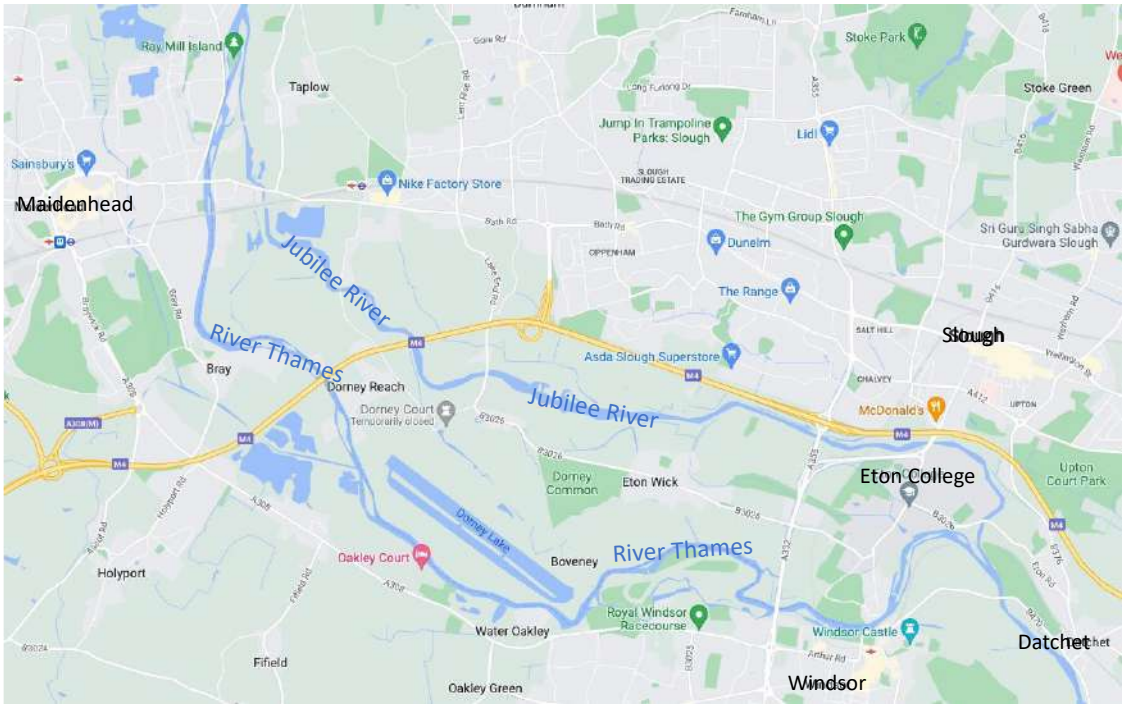

Figure 17: Key case study sites identified on a map adapted from Google Maps.

The adjacent residential areas in the Royal Borough of Windsor and Maidenhead that benefit from the Jubilee River can be described as relatively affluent. The proportion of people who are 'Economically Active' in Windsor and Maidenhead stands at 83%, which is markedly above the national average of 78.5% and the level of economic inactivity is 17%, compared with the national average of 21.5%. Educational levels are also high, with 58.7% of residents having an 'NVQ4 and above' qualification, which is the equivalent to undergraduate level, and compares favourably to the average for the South East of England (45.2%) and the UK (43.6%). Full time workers receive a significantly higher weekly gross pay than the national average (£759.1 compared to £642.2), although there is a significantly bigger gender pay gap than the national average. The proportion of people aged between 16 and 64 is very comparable to the national average (62.2% and 62.9%, respectively).

The River Thames Scheme (RTS)

The RTS was conceived in the 1980s but approval for the project was only granted in 2011 and construction has yet to commence. Construction is scheduled to begin in the winter of 2026, with an opening foreseen in the winter of 2030. The challenges in getting the scheme up and running have been partly geographical (it

covers part of the largest developed, undefended floodplain in England), and partly related to governance and financing issues (The Royal Borough of Windsor and Maidenhead failed to raise its portion of the funds and withdrew its support for the scheme – Royal Borough Observer story). Figure 18 below shows the main feature of the RTS.

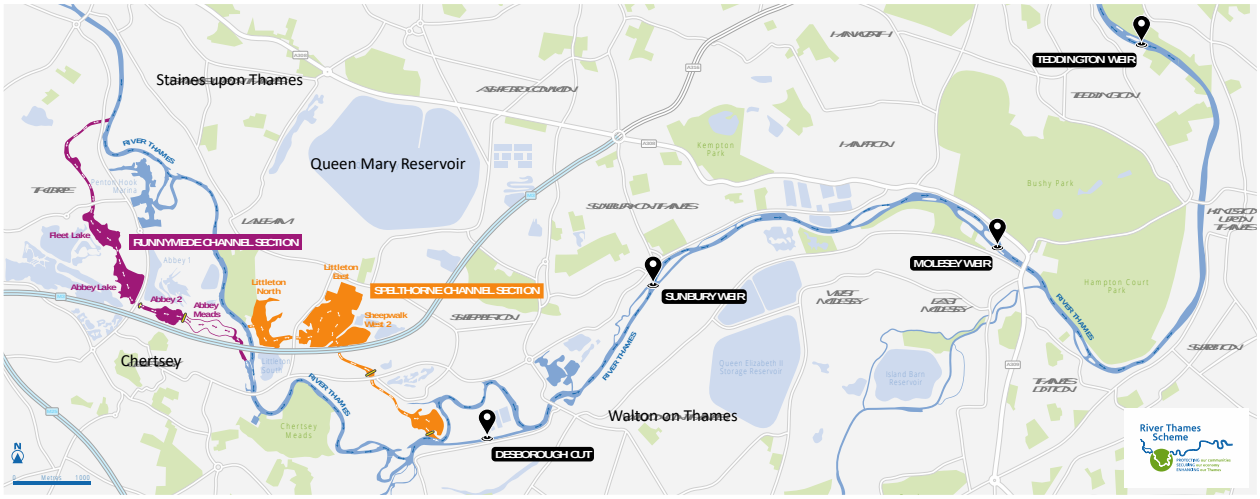

Figure 18: Main features of the RTS. Adapted from https://www.riverthamesscheme.org.uk.

The RTS is intended to better protect 11 000 homes and 1 600 businesses from flooding. It consists of six engineered FRM components that are designed to control flow of water through the area and reduce the risk of fluvial flooding. Two of these components are river channels. The 'Runnymede' channel is 4.8km long and will run from Egham Hythe to Chertsey, crossing newly created wetlands at Abbey Meads. The 'Spelthorne' channel is 3.2km long, running from Laleham to Weybridge. These new river channels will "essentially…add 150 cumecs of capacity to the River Thames" (interview, 10/10/2022). To add even more control to the overall flow of water, new gates will be built into the three weirs at Sunbury, Molesey, and Teddington. These gates will be used at times of very high flow. Finally, the RTS proposes to deepen the Desborough Cut, which is an existing river flow management channel.

In recent times the RTS has evolved into a semi-NBS solution in two ways. Firstly, the water capacities of Fleet Lake, Abbey Lake, Abbey 2, and Abbey Meads are being utilised in the overall water management. Great care has also been taken in these areas to ensure that the (new) local habitats can function in varying levels of water flow. Secondly, the new channels will provide additional riparian habitats in the area, often replacing 'low grade agricultural land' (Ibid.). On this point, it is interesting to note that the more recent project consultation phases have focused on what kind of recreational opportunities (including walks in the new habitat) that local residents would like to see in the area. In this sense, consultation events for the often centre on opportunities for creating habitats and recreational space. We return to this point later in the discussion of participation in FRM.

The Slough Sponge City Project

In early 2021 Slough Borough Council (SBC) (in collaboration with Buckinghamshire Council, the Wildfowl and Wetlands Trust and the National Flood Forum) submitted an expression of interest to DEFRA for the Flood and Coastal Resilience Innovation Fund. This fund totalled £150m nationally and there were 25 successful project applications, including the 'Smarter flood resilience - sponge catchments for people and nature' ('Sponge City') project in Slough. The project will build on several previous initiatives including a Pathfinder Project (2013-2015 – more on this below), the Slough Flood Alleviation Scheme (2015), and Transforming Slough – Saving the Salt Hill Stream (2018 – 2019).

Designed to cover two stream catchments that span the two jurisdictional areas, the project focuses on surface/groundwater and fluvial flooding. With more traditional FRM approaches having underperformed in the past, the project will seek to implement:

- integrated water management and nature based solutions
- more sustainable and enriched public spaces
- focused partnership with the community to empower them to learn about the benefits of these solutions and support them to co-create and deliver these measures on the ground
- provision of quantitative benefits of solutions and a monitoring baseline

These initiatives directly inform four project aims along the same themes. The Sponge City project is somewhat unique in its attempts to put communities at its heart and to focus on place making.

Slough differs significantly from areas such as the Royal Borough of Windsor and Maidenhead. At 63%, the working population (16-64) is slightly above the national average of 62.4%, but there is a high number of young people in Slough and the under-19 population is the highest in the country, at 29%. Of this working population 76.5% are 'economically active', which sits below the national average of 78.5%, and the unemployment level is markedly higher at 6% (4.1% national average). The education level at minimum bachelor's degree ('NVQ4') is 7% lower than the national average at 36.6%, and the proportion of people with no qualifications is significantly higher than the national average (9.2% and 6.6%, respectively). Whilst the average weekly wages of £646.7 is higher than the national average of £613.1, it is markedly lower than the average of the Southeast of England (£660.1), and the percentage of people claiming social benefits is distinctly higher than the national average (5.2% and 3.7%, respectively).

Most notably, perhaps, is that "Slough has a culturally diverse community, with the lowest proportion of White British outside London at 34.5% and the highest Asian/Asian British population at 40% compared to 7.5% for England and Wales. Slough has the largest Sikh representation of all local authorities in England and

Wales; the figure is 10.6% Slough also had the largest proportion of foreign-born residents at 39% compared to 13% for England and Wales." (Slough Borough Council, 2013: 7). As is reflected in the results below, this has affected the historical development of FRM measures in the area.

It is worth noting that at the time of writing this report the Flood Hazard Research Centre at Middlesex University is embarking on 'flood poverty' or 'flood disadvantage' research in the Slough area. This is in collaboration with SBC and the National Flood Forum.

Results

RQ 1 – Justice and equality in FRM

Flood risk management in the Thames catchment area is governed by many policies and actors. In this project we were able to consider five specific examples and their focus on justice and equality issues.

Thames river basin district flood risk management plan 2021 – 2027

This document is a collaborative effort by fifty risk management authorities and considers the written strategies of all of these. As emphasised by the Environment Agency in the plan, "working in partnership is the most effective way to address the issues of flooding and climate change and to deliver multiple benefits. The Environment Agency intends to continue to develop and strengthen this partnership working to collaboratively identify, develop and deliver solutions to increase resilience to flooding and climate change in the River Basin District" (Environment Agency, 2022c: 16). The anticipated economic impact of a major flood event in the area covered by this plan is £1 billion, with climate change possibly doubling this figure by 2055 (Ibid: 22).

The document details FRM measures (planned, completed, abandoned) in forty-six flood risk areas. The approaches taken in this area indicate that decisions are generally based on considering the number (and value) of assets in relation to offering them some form of protection. This is in keeping with the cost-based approach to deciding on FRM schemes across England. Many of the risk area assessments end on the disclaimer: "[t]aking further action to reduce risk will require an additional appraisal to assess whether there are socially and environmentally sustainable, technically viable and economically justified options." This is the only explicit mention of social considerations, with the burden of proof being placed on the mechanisms used to make a case for partnership funding, and the socioeconomic factors they consider. The Lead Local Flood Authorities within the Thames river basin, such as SBC can also include further social considerations in their own strategies.

The Local Flood Risk Management Strategy for Slough

This strategy demonstrates how some of the social considerations are picked up at the more local level in FRM in England. It clearly states that "[t]he general principle which SBC wish to apply to flooding in partnership with the EA and Thames Water is to reduce the risk of flooding to all those impacted as much as possible." (Slough Borough Council, 2013: 14). This can be identified as an overarching utilitarian approach to FRM in the area, but the strategy does go on to refine this in several places. For example, one of the criteria against which measures will be assessed (under 'social') is 'will the community benefit or suffer from the implementation of the measure?' (Ibid.). This is a more nuanced question that acknowledges the potential for distributional disbenefits of FRM measures. It is no longer a question of protecting the greatest number of people, but of understanding whom and where it is best to protect. Elsewhere the strategy emphasises the importance of comparing the environmental impact of measures against the against the technical, economic, and social benefits of these.

Surrey Local Flood Risk Management Strategy 2017-2032

This strategy is unique in that it focuses on policy integration to better address the wide range of social processes and public services that are affected by both flooding and FRM schemes. One example is that there is explicit mention in the document of how the Highways and Transport Strategy will be supported by the LFRMS. In doing so, the mobility of citizens is considered during a flood event, in addition to the protection of dwellings. The Highways and Transport Strategy recognises that:

> *"Our network is relied on by thousands of people and businesses every day. Our service supports the people of Surrey by making streets safe and reliable, offering more travel choices, and providing residents with access to schools, health services and care".* (Surrey County Council, 2017: 25).

In turn, the LFRMS promises:

> "An effective capital works and maintenance programme will better protect Surrey's highways assets, granting residents more secure and reliable access." (Ibid.).

Whilst this form of policy integration is vital in FRM, it is refreshing to see it so explicitly stated. This example shows a clear link between national policies that call for place making and building resilience, the regional policies and plans set at local authority level, and FRM-specific strategies. Funding objectives also support this alignment. Below we also provide an example of how participatory practices in Surrey reinforce this policy integration.

The Slough Pathfinder Programme and Sponge City

In the case of Slough, the Community Flood Resilience Pathfinder Programme ('Pathfinder') was the first significant programme to focus on 'people aspects' of flood risk management. It focussed on piloting public engagement methodologies with communities between 2013 and 2015. Interestingly, there were some justice and equality issues that emerged as a by-product of this project, even though identifying them was not an explicit objective. In the case of SBC there was a recognition that some of the areas at highest flood risk were also areas where deprivation and vulnerability were, and still are, highest. There was some implicit understanding that social justice and equality issues were relevant. The Pathfinder project recognised that working with communities to tackle flood risk was crucial. It also recognised that some communities were easier to work with than others, often on cultural and linguistic grounds. Other aspects, such as distributive and procedural justice, were not recognised, explicitly. At that time the link between disadvantage and vulnerability with the increased impact of flooding was not generally realised. This is beginning to change, but there is still a long way to go in understanding the nature of the interrelationships, such as the differential impact of interventions on homeowners and tenants.

The focus of the interventions was on setting up community led Flood Action Groups in two areas that could then engage with flood risk management organisations to collaboratively address flood risk issues. Those that were more successful in achieving results were in more affluent areas with greater social capital and one set up adjacent to the project has survived to this day. This is a pattern that is reflected elsewhere. One particularly important aspect of Flood Action Groups is how a group communicates, and works with, the rest of the community to achieve its aims. Doing so successfully gives them credibility and authority with professional partners and the community.

Slough's Sponge City Expression of Interest for the Resilience and Innovation programme explicitly recognises social justice issues, but only at a conceptual level and it does not disaggregate the different aspects. There are several workstreams that range from technical innovation, to using volunteers, to working with communities, articulated in the Outline Business Case. Most grant programmes highlight equality as a core requirement, but in flood risk management projects in England this rarely leads to practical action to address different types of equality. At one level, technical solutions to flood risk problems affect everyone indiscriminately, but as flooding has a differential impact the consequences are not even. This was not picked up in either of the two projects (Pathfinder and Sponge City). It is worth noting that the Sponge City project does now include a research project designed to analyse its impact on 'flood poverty' in the Chalvey Ditches catchment (one of two catchments covered by the project, the other being Salt Stream hill). This project is in its infancy, but the concept of flood poverty was explicitly used in the Rochdale Pathfinder project and is gaining some traction.

FRM is dependent on available financial resources, and in England the economic standing of Lead Local Flood Authorities (which are often local authorities) directly impacts the likelihood of measures or schemes being implemented. The Thames case highlights the potential disparities in FRM capacities between more and less financially stable local authorities (if they act as Lead Local Flood Authorities). In 2021 Slough Borough Council filed for bankruptcy, having amassed £760m in borrowing debts and a £357m deficit. This has led to a council tax increase for residents and plans for the council to sell £600m of assets (Reading and Berkshire News). This causes several problems. Firstly, bankrupt councils often reduce their services to the bare minimum, such as of rubbish collection, housing, care provision, road maintenance, etc. This reduces the financial and human resources available for additional FRM. Secondly, the necessary sale of assets might make future FRM more difficult to coordinate move into the private market, meaning that more actors would be involved in coordinating FRM projects. Thirdly, the increase in council tax leaves less disposable income for households who might have to implement property level protection measures, or deal with flood recovery costs. Although the Sponge City money is 'ringfenced' and thus secured for FRM purposes, the Environment Agency still called into question the SBC's ability to deliver on the project:

> "The EA became concerned about our ability to deliver the project. So we were, we were sort of subjected to regular inquisitions by the environment agency to how we could, whether we could continue to run the project, whether the project should be pulled. Whether somebody else, Buckinghamshire, should take over as lead authority."
>
> Interview 02/03/2023

This situation can be contrasted with the more financially secure Surrey County Council, whose impressive policy integration detailed above, and participatory practices outlined below, are made possible in part by their financial stability. According to a representative, "money plays quite a big part of that […] the fact that we've got money means we can […] do proper place making, you know, town centre regenerations…" (Interview 10/02/2023).

RQ2 – Participatory practices

As mentioned previously for the case of Surrey, efforts to integrate policy areas can improve participatory processes. Based on the understanding that public policy areas need to overlap, participants in engagement processes for FRM can address a range of adjacent topics that can support place making. The following is an account from an engagement event for the River Thames Scheme

> [a family with a young girl enter and…] "they're saying that firstly they want to know 'does it stop us from flooding?' and we go [checks map], yes it will".

> And then when you start asking look, but what else would you want from it? And then 'Ohh didn't realise, I don't know. There's no playgrounds near us or there's no access for my kid to go and enjoy countryside. And you go, right, well, let's have a look at you know, we can build that into the scheme if that's what the community are after."
>
> Interview 10/02/2023

It appears that in Surrey consultation events offer opportunities to consider wider place making and community welfare issues, which is in keeping with national policy. Following the years of contractual negotiations for the RTS, Surrey County Council is now co-delivering the project with the Environment Agency. This places a lot of responsibility (and power) into the hands of one local authority. It also means that Surrey's competency in public consultation supports the RTS, and the project can meet "the consultation requirements [which are] are very, very clear and very, very…there's quite a high bar, quite rightly for something like this in terms of our consultation and the requirement to address points of feedback from any stakeholder, as with the public, or a statutory body, or anybody else for that matter" (Interview 10/10/2022). It seems that the financial standing of a local authority, their level of policy integration, and their public engagement capacity can all benefit FRM. This results in somewhat of a 'postcode lottery' for citizens, so that where they live determines the level of interest in FRM and how much action can be taken.

One SOLARIS study participant used the example of Slough to outline some problems that can occur with FRM participation. They explained that in practical terms most engagement in England is based around two scenarios:

- Proposed Flood Risk Management construction activities. Submissions to the Flood and Coast awards for community engagement in 2021 and 2022 focussed almost entirely on forms of informing and consultation, for example, with only a couple of entries taking a co-production or community led approach.
- Following significant flooding, public meetings may be held to consult or placate communities. These are typically fractious. Lead Local Flood Authorities and the Environment Agency may work with communities to understand the causes of flooding through a programme of engagement, asking for information. The interventions range from public meetings to "Drop-ins". Investing in setting up a Flood Action Group is a further way of working with a community to fully understand what has happened and plan for the future. However, there is a difference between asking a group to form, or using an existing group, and investing in building the social capital that will enable the group to engage effectively with professionals and their community.

A third category is rarer, investing in a community in "peacetime" to set up a Flood Action Group. Both Slough projects attempt to do this. Investing in setting up a Flood Action Group that includes addressing some of the social capital issues as a deliberate way of working with communities to tackle flood risk is relatively rare, but is central to the concept of both the Slough Pathfinder and the Sponge City. Typically, knowledge, skills, confidence, leadership, and trust can all be tackled, but time, resources and other existing priorities are more difficult. Due to the delays in developing the Slough Sponge City Outline Business Case, and in confirming contractual arrangements, mapping and recruitment have only just started, so there is little practical progress to report. A few Flood Action Groups develop the ability to bring the agencies together and to drive change. This was never achieved in the Pathfinder, but it was elsewhere, such as in West Sussex.

Further, the timing of engagement is crucial. When the Sponge City project funding was awarded, the responsible organisations did not engage with the public right away, to manage expectations. There is a sense that…

> "…you end up doing more damage than good. So we deliberately […] did not want to engage too soon before we're ready, which actually has turned out to be a major blessing because we really haven't been ready to talk to people. So we […] would have done a lot more damage by attempting to engage with people and make any promises, or just set people's hopes up of what they might get out of it. And then let people down and."

Interview 02/03/2023

RQ 3 – The role of knowledge

Slough's Sponge City project has built in a requirement for communities to be actively engaged in governance arrangements for the project, building to the point where they become equal partners in the workstreams and in the project overall. It is not yet clear how this will be achieved, and who will be involved. There is currently little thought on the differential impacts of flood risk management programmes. For example, a capital scheme may result in property owners achieving higher prices should they sell their properties. However, tenants may find that because of the investment landlords increase their rents and this may force them to move to a cheaper area. These are complicated processes and knowledge of how an FRM scheme might impact people is difficult to build. The complexity of FRM governance itself proves to be a persistent problem, including in Surrey:

> "Because as you'll know in flooding, there's many people involved in managing flood risk and it's not easy to navigate, which is, which is funny enough, a thing that people in the community don't understand: that's the sort of a barrier to accessing flood risk management, really."

Interview 10/02/2023

This view was reflected in the work done by one flood victim to act on FRM in their area after feeling that their neighbourhood was being ignored by the system. This was partly down to the governance complexity of FRM in England.

> "You've got this just fractured responsibility. You know the environment agency isn't responsible so the, the homeowner and the riparian owner are responsible for the water if it falls on their ground. Then it falls onto the highways and becomes the highways. […] So literally, everyone's blaming each other and I get why, because whoever said 'Ohh yes, it's our fault', they'd be left with the bill."

Interview, 09/12/22

As a result of these fractured responsibilities (and partly because the surface runoff in the area was yet to be taken as seriously as it needs to be) this person worked tirelessly to raise general knowledge of the problems and push for FRM measures:

> "But it's taken me six years of really hard work and it it it breaks my heart that other communities have got to do this. You know, I'm not, it's not really my job to do this and to bring all these organizations together. But there isn't anyone else to do it."

Ibid.

The fact that it is so difficult to know the system means that communities often have to invest significant amounts of time to firstly understand their risks and then whom to communicate these to. The National Flood Forum provides support with this and one of their main roles is to help connect communities with relevant organisations. Even with this support the process places significant demand on people's time, money, and social capital, which are not evenly distributed in England.

Conclusions

The Lower Thames Operational Catchment covers a large, highly populated area. There are a multitude of actors involved in FRM in this area, or whose actions impact flood vulnerability in other ways. There have also been a number of large-scale FRM schemes in the area that span decades, with the RTS and Sponge City ongoing. As with case study 1, explicit focus on justice and equality policy is not particularly forthcoming. This does improve somewhat at the Lead Local Flood Authority (often council) level. And Surrey County Council is in some ways pioneering in its attempts to integrate public policy domains, which is reflected in its public engagement. The strong financial standing of the council is a strong advantage, making its progress in this perhaps more circumstantial than systematic (and thus easily emanated elsewhere).

The Pathfinder and Sponge City projects are, on paper, the most ambitious in terms of putting communities at the heart of FRM, with the eventual ambition to let them lead actions. However, Slough has its socioeconomic and cultural challenges that have stood as barriers in the past, for example in setting up (and maintaining) Flood Action Groups. The current poor financial standing of the council is a further barrier, which makes its comparison to Surrey County Council more interesting. The new focus on flood poverty in the area, with the support of Slough Borough Council, the National Flood Forum, and the Wildfowl and Wetlands Trust, is encouraging. There is an opportunity to further explore any injustices and/or inequalities caused by FRM, or inhibiting FRM.

The governance complexity of FRM was a strong theme in this case study, owing partly to the geographical scale and number of actors. This has its impact on both the dissemination of knowledge and on public participation. Flood Action Groups are often formed after a flood event, when interest spikes, and setting them up in ‘peacetime’ can be difficult. The knowledge, skills, confidence, leadership, and trust can be built up for this, but a lack of time and resources can be a more difficult barrier to overcome. The role of the National Flood Forum is essential to assist residents. These residents often still have to invest considerable amounts of time and effort investigating flood risk and management options.

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Annex 1: Interview dates and sectors

In total, we conducted 28 interviews with participants with a wide range of interest in flooding in England.

Date	Sector.
22 July 2021	National flood agency rep.
30 March 2022	National flood agency rep.
21 April 2022	Coastal partnership.
4 May 2022	Local council.
19 May 2022	Think tank member.
23 May 2022	National flood agency rep.
23 May 2022	National flood agency rep.
22 June 2022	Coastal Partnership.
28 June 2022	Coastal partnership
11 July 2022	Flood victim.
12 July 2022	Coastal engineer.
12 July 2022	Coastal engineer.
19 July 2022	Flood Action Group.
22 July 2021	National flood agency rep.
10 August 2022	Coastal engineer.
10 October 2022	Flood scheme rep.
15 November 2022	Academic.
06 December 2022	Flood victim/Flood Action Group.
06 December 2022	Local campaigner.
19 December 2022	Academic.

10 February 2023	Local council.
02 March 2023	Local council.
02 March 2023	Local council.
21 April 2023	Coastal Partnership.
24 April 2023	Environmental NGO
24 April 2023	Environmental NGO
13 June 2023	Academic.
13 June 2023	National flood agency rep.