

**An Investigation into Community Responses to
Localised Urban Flooding: The Potential Role of
Ecological Citizenship (EC)**

By

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Abstract

This study acknowledges the significant impact of climate change, specifically on resulting flooding and explores why it proves difficult to engender action at the community level. It aims to develop an understanding of the ‘value action gaps’¹ and “misperceptions”² that currently restrict climate change adaptation within communities.

It investigates whether ecological citizenship (EC) could provide a suitable framework for understanding the wider issues around localised flooding, in particular low impact sustainable urban drainage (LISUD).

It asks whether active participatory social learning can overturn individual or group behaviours and practices to improve EC. By investigating behavioural change theories, it is hoped to evolve strategies to tackle the gap between intentions and actions.

It enquires as to how and if consensus planning facilitates greater personal responsibility; whether top-down or bottom-up approaches are more successful; and seeks to understand whether engagement delivered as active participatory social learning can overcome a reluctance to act.

Based on an extensive review of relevant literature, online surveys and questionnaires were distributed to existing UK communities chosen based on location, the likelihood of flooding and the degree to which they were personally inclined to undertake pro-environment actions.

Analysis of the responses demonstrated a good awareness of the issues and an understanding of sustainable measures that could be implemented individually or collectively to restrict flooding. However, implementation proved to be constrained by ‘value action gaps’, and ‘misperceptions’. Focus group workshops and semi-structured interviews were also undertaken to provide an in-depth understanding of the barriers to motivation to determine drivers that would facilitate action.

¹ A psychological phenomenon where people act in a manner that is inconsistent with their personal values (<https://effectiviology.com/value-action-gap>).

² The ‘gap between actual attitudes’ or behaviours, and ‘what people think is true about others’ attitudes or’ behaviour, so that a ‘misperception occurs’ where ‘there is an overestimation or underestimation of the prevalence of attitudes’ and/or behaviour in a group (Berkowitz, 2004, p.7).

A study of the construction, implementation and operation of prototype planned adaptations was undertaken to interrogate the adopted strategies and their success in overcoming the value action gaps. The study illustrates how these strategies can provide best practice guidance to LISUD, including future replication abroad.

The results indicate that communities of practice (CoPs) undertaking social learning as part of wider consensus planning, may reduce those “misperceptions”. It is therefore recommended that CoPs are encouraged to participate in consensus planning around EC communication.

Further research is needed to identify other factors that could strengthen the effectiveness of the EC process as a theory of motivation.

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List of Abbreviations

CoPs – Communities of Practice

EC – Ecological Citizenship

FWMA – The Flood and Water Management Act 2013

IPCC – Intergovernmental Panel on Climate Change

LID – Low Impact Development

LISUDs – Low Impact Sustainable Urban Drainage

NPPF – The National Planning Policy Framework 2019

SuDS – Sustainable Urban Drainage

WSUD – Water Sensitive Urban Design

Glossary

	Definition
Adaptation	‘Refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential’ damage or ‘to benefit from opportunities associated with climate change’ (Smit, et al., 1999).
Autonomous Adaptation	Occurs as a ‘responsive reaction to a hazard after initial impacts are manifest to climatic stimuli, without direct intervention of a public agency’ (Smit, et al., 1999, p.883)
Big Society	‘The Big Society is about a huge culture change (...) where people, in their everyday lives, in their homes, in their neighbourhoods, in their workplace (...) don’t always turn to officials, local authorities or central government for answers to the problems they face (...) but instead feel both free and powerful enough to help themselves and their own communities’ (Prime Minister’s Office, https://www.gov.uk/government/speeches/big-society-speech)
Climate Change	‘Climate change is a change in the pattern of weather, and related changes in oceans, land surfaces and ice sheets, occurring over time scales of decades or longer’. Weather is the state of the atmosphere—its temperature, humidity, wind, rainfall and so on—over hours to weeks (https://www.science.org.au/learning/general-audience/science-climate-change/1-what-is-climate-change).
Coastal Flooding	Flooding that occurs with high tide levels, storm surges and wave action
Communities of Practice (CoPs)	‘Groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis’ (Lave and Wenger, 2002, p.4).
Community Infrastructure Levy (CIL)	‘The Community Infrastructure Levy (CIL) is a planning charge, introduced by the Planning Act 2008, as a tool for local authorities in England and Wales to help deliver infrastructure to support the development of their area. It came into force on 6 April 2010 through the Community Infrastructure Levy Regulations 2010’ (https://www.planningportal.co.uk/info/200136/policy_and_legislation/70/community_infrastructure_levy).
Consensus Planning	A form of planning that utilises ‘consensus decision making’ as a ‘creative and dynamic way of reaching agreement between all members of a group’ (https://cryptolisting.org/coin/csen).
Constructivism	Where truth or meaning, are constructed, not discovered, as people construct meaning in different ways, even in relation to the same phenomena.
Ecological Citizenship (EC)	A civic approach to citizenship that encourages ‘people to associate the implications of their daily activities with the state of the wider environment’ (https://epdf.pub/the-new-economics-of-sustainable-consumption-seeds-of-change.html).
FloodRe	‘A joint initiative between the Government and insurers. Its aim is to make the flood cover part of household insurance policies more affordable’ (https://www.floodre.co.uk/).
Incredible Edible	A vision to create ‘kind, confident, and connected communities through the power of food’ (https://www.incredibleedible.org.uk/).
Inland Flooding	Flooding which includes prolonged and intense rainfall causing flooding in the form of river (fluvial) flooding, overland flow or surface water (pluvial) flooding either naturally or man-made, ground water flooding and estuarine flooding (OPW, 2009; Pitt, 2008).
Hermeneutics	Meaning is participative, and as such is not produced by the researcher.
Heuristics	‘A mental shortcut that allows people to solve problems and make judgments quickly and efficiently. These rule-of-thumb strategies shorten decision-making time and allow people to function without constantly stopping to think about their next course of action’ (https://www.verywellmind.com/what-is-a-heuristic-2795235).

Misperceptions	‘The gap between actual attitudes’ or behaviours, ‘and what people think is true about others’ attitudes or behaviour, so that a misperception occurs where there is an overestimation or underestimation of the prevalence of attitudes’ and /or behaviour ‘in a group’ (Berkowitz, 2004, p7).
Mitigation	The ‘act of reducing how harmful, unpleasant, or bad something is’ (https://dictionary.cambridge.org/dictionary/english/mitigation).
Learning Curriculum	Learning for this research is seen as occurring through ‘centripetal participation in the learning curriculum’ of the ambient community (Lave and Wenger, 2002, p.93). It occurs from participation – of both absorbing and being absorbed in- ‘the culture of practice’.
Low Impact Sustainable Urban Drainage (LISUD)	A typology developed specifically for this research, drawing upon low impact development and sustainable urban drainage
Planned Adaptation	Adaptation undertaken before impacts are apparent.
Pluralistic Ignorance	‘Pluralistic ignorance occurs when people erroneously infer that they feel differently from their peers, even though they are behaving similarly’ (http://psychology.iresearchnet.com/social-psychology/decision-making/pluralistic-ignorance/), which has been seen to cause misperceptions in groups
Reliability	‘Describes consistency within the analytical procedures employed’ (Long and Johnson, 2000).
Section 106 Agreements	‘Planning obligations under Section 106 of the Town and Country Planning Act 1990 (as amended), commonly known as s106 agreements, are a mechanism which makes a development proposal acceptable in planning terms, that would not otherwise be acceptable. They are focused on site-specific mitigation of the impact of development’ (https://www.local.gov.uk/pas/pas-topics/infrastructure/s106-obligations-overview).
Social Learning	‘The shared learning’ of independent stakeholders as a ‘key mechanism for a desirable future, advocating interactive (or participatory) style problem solving, whereby outside intervention takes the form of facilitation’ (Leeuwis and Pyburn, 2002).
Super Wicked Problems	Extend wicked problems to also include time ‘running out, those who cause the problem seeking to provide a solution, the central authority needed to address them is weak or non-existent, and irrational discounting occurs that provides responses into the future (Levin, Cashore, Bernstein and Auld, 2012).
Symbolic Interactionism	Interactions that take place in such a way that individuals continually interpret the symbolic meaning of their environment
Transition Towns	Encourage communities to come together and rebuild our world (https://transitionnetwork.org/transition-near-me/).
Water Management	Activity of planning, developing, distributing, and managing water resources.
Wicked Problems	‘Those that are difficult or impossible to solve’ due to being ‘incomplete, contradictory’, or where there are no single solutions (Rittle and Webber, 1973).
Validity	The ‘integrity and application of the methods undertaken and the precision with which the findings accurately reflect the data’ (https://purehost.bath.ac.uk/ws/portalfiles/portal/205743296/HOUGH_Lee_THESIS_FINAL_27.5.20.pdf).
Value Action Gaps	‘A psychological phenomenon where people act in a manner that is inconsistent with their personal values’ (https://effectiviology.com/value-action-gap).
Vulnerability	The ‘quality or state of being exposed to the possibility of being attacked or harmed, either physically or emotionally’ (https://www.intechopen.com/books/the-new-forms-of-social-exclusion/vulnerability-and-social-exclusion-risk-in-adolescence-and-old-age).

Chapter 1. Introduction

1.1 Main Research Question

Despite an ever-increasing recognition of the issues surrounding super wicked complex problems such as climate change,³ and the everyday solutions that each one of us could adopt to mitigate and adapt to those issues, limited action has been undertaken to date at a community level. This research seeks to understand why this is so and enquires as to how local communities can become engaged with both mitigating and adapting to the local impacts of climate change.

The drivers for change are well documented by many authoritative texts. For clarity they are reviewed here to provide justification for the latter sections of this research. It looks in detail at one type of local impact, that of flooding,⁴ for which there is a range of known possible actions. This English research proposes low-impact sustainable urban drainage solutions (LISUDs)⁵ that aim to minimise the impacts on already stressed water resources. It seeks to determine whether ecological citizenship (EC)⁶ offers a process for understanding the impacts of those messy super wicked problems, providing methods for adapting to climate change, motivating individuals and communities to change their behaviours, norms, and practices, and undertake action, implementing LISUD.

1.2 Drivers for Change

1.2.1 Climate Change

‘The fourth assessment report of the IPCC concluded in 2009 that warming of the climate is unequivocal’ (OPW, 2009, p.17). There is growing scientific consensus that these changes are expected to increase flood risk and influence environmental and socio-economic factors, with the effects likely to be felt first by the most vulnerable in society. Climate change, as defined by Article 1 of the Framework Convention on

³ In this context super wicked problems are defined by Levin et al., (2012) as including include ‘time running out, those who cause the problem seeking to provide a solution, the central authority needed to address them is weak or non-existent, and irrational discounting occurs that provides responses into the future’.

⁴ Urban inland river (fluvial) flooding, overland flow, or surface water (pluvial) flooding, and ground water flooding.

⁵ A typology developed specifically for this research, drawing upon low impact development and sustainable urban drainage.

⁶ Ecological Citizenship is understood to be a civic approach to citizenship that encourages ‘people to associate the implications of their daily activities with the state of the wider environment’.

Climate Change (UNFCCC), is ‘a change of climate which is attributed directly or indirectly to human activity, that alters the composition of the global atmosphere, and which is in addition to natural climate variability observed over comparable time periods’. Impacts associated with climate change as summarised in the IPCC’s Fifth Assessment Report (WG11 AR5) are defined as ‘effects on natural and human systems’, and primarily ‘effects on natural and human systems of extreme weather and climate events’ (IPCC, 2014, p.3). It has been noted that in many regions, changes in precipitation have altered the hydrological system (IPCC, 2014, p.6), and the degree to which vulnerability and exposure within those areas occur (where vulnerability is defined as a ‘propensity or predisposition to be adversely affected’), varies considerably, depending on social, economic, cultural, political, and institutional factors.

Since the WG11 AR5, a special report on global warming of 1.5° Celsius was commissioned and approved by the IPCC. That special report,⁷ known as SR15 highlighted that the number of climate change impacts currently witnessed, could be avoided by limiting global warming to 1.5 ° Celsius compared to 2 ° Celsius, giving people and ecosystems more room to adapt and remain below the relevant risk threshold. As noted by the Danish Energy Minister Lars Christian Lilleholt, ‘we need everyone to take a common responsibility to reduce the now very visible consequences of climate change around the globe’.

‘Human influence on the climate system is clear... warming of the climate system is unequivocal, and since 1950, many of the observed changes are unprecedented’ (IPCC, 2014, p.2).⁸ There is mounting evidence that ‘anthropogenic greenhouse gas emissions have increased since the pre-industrial era, driven largely by economic and population growth, and are now higher than ever’ (IPCC, 2014, p.4). The built environment is already affected by extreme weather events, with impacts through increased

⁷ The report is known as ‘Global Warming of 1.5 ° Celsius. An IPCC special report on the impacts of global warming of 1.5 ° above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty’ (Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)). World Meteorological Organization, Geneva, Switzerland, 32 pp)

⁸ As this research was undertaken individually and over the duration of part time study, the timeframe of the research was significant. This has meant that much of the literature is old.

temperatures and changing rainfall patterns. These are the findings of extensive research undertaken across the world and summarised by the IPCC. Since starting this research back in 2013, the predictions of the IPCC have been revised upwards (IPCC, 2018) leading to significant acknowledgement by experts and lay people of a climate emergency.

1.2.2 Flooding

‘Serious flooding can happen at any time and is one of the most difficult problems facing us as a nation’ (APPG for EBE, 2015, p.5). Changes in climate and the associated risks and impacts are significant drivers for change. The increasing trends in extreme precipitation and discharge in some catchments implies a greater risk of flooding, which reveals ‘significant vulnerability and exposure of some ecosystems and many human systems to current climate variability’ (IPCC, 2014, p.8). But it is not just extreme events that threaten our cities. There is increasing evidence that flooding due to climate change is increasing (CIRIA, 2013; Environment Agency, 2011; IPCC, 2014; OPW, 2009).

Flooding is a major issue for the world, with urban centres being particularly vulnerable due to changes in migration and densification, increasing the extent of impermeable surfaces (Douglas, et al., 2007; Evans, et al., 2004; OPW, 2009; Pitt, 2008). At the start of this research, some five million properties in the UK were claimed to be at risk of flooding, due to either a major river, coast, or surface water run-off (EA, 2011). Today over 5.2m homes and properties in England are at risk for flooding and coastal erosion (EA,2020), and by 2050 that is projected to be in the range of 3.6 million people in the UK.

Floods are associated with extreme natural events that occur in a geographical area, such as a river basin, a catchment area, or a watershed. These areas can be rural or urban. There are⁹ fundamentally two main causes of flooding: coastal flooding¹⁰ and inland flooding,¹¹ which can all occur either individually or as more usually happens,

⁹ Alongside sea level rises (SLR) which exacerbates the issue, at least for coastal regions (<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>).

¹⁰ Which is taken to occur with high tide levels, storm surges and wave action.

¹¹ Which includes prolonged and intense rainfall causing flooding in the form of river (fluvial) flooding, overland flow, or surface water (pluvial) flooding either naturally or man-made, ground water flooding and estuarine flooding (OPW, 2009; Pitt, 2008).

in series leading to prolonged flooding. It is the predicted ever-increasing likelihood of these inland prolonged floods and the realisation that we are ill-prepared for them that has driven this research. The risk of any of the above types of flooding can be increased by new developments if the capacity and conveyance function of the watercourse and floodplain system is restricted upstream, or the volume available for flood storage on the floodplain is decreased.

Flooding can cause physical injury, illness, and loss of life (Runhaar, et al., 2012; OPW, 2009). Deep, fast-flowing or rapidly rising floodwaters can be particularly dangerous, with the risks increasing considerably if floodwaters carry debris. Some of these impacts are immediate and catastrophic to life, including drowning and/or physical injury due to being swept away. Other impacts are somewhat slower, with floodwater frequently contaminated with sewage and pollution that is likely to cause illnesses, either directly or through contact with polluted floodwater or incidentally because of sediments left behind (Runhaar, et al., 2012; OPW, 2009). But there are also other impacts. Extensive research has investigated the psychological impacts associated with the stress and trauma of being flooded or even of being under the threat of flooding. Some of these impacts may be long-term and involve a lengthy recovery process (OPW, 2009), with the ability of people to respond and recover from floods varying considerably, providing further drivers for change.

In the 19th century to combat the ‘Great Stink’ that overwhelmed London and effects felt in other cities, our urban areas were designed so that water was channelled from roofs through drainpipes and from impermeable surfaces to a series of underground storm water pipes (Collinson, 2019). But as towns and cities have densified these ‘traditional’ methods have proved less and less successful. The failure of the current drainage systems to discharge the more intense rainfall and more rapid snow melts adequately causes both ‘flash’ floods and prolonged inundations. Flooding is a broad subject, covering major catastrophic events such as tsunamis and tropical storms, such as Storm Barry witnessed in New Orleans, Louisiana, and the Mississippi (11-19th July 2019), to smaller localised floods within urban areas due to changes in the climate, increases in populations and densification; all of which put sudden enormous pressure on the drainage systems. It is on these ever more common smaller, more localised types of flooding that this research is focused, and to which this research proposes adopting LISUD.

1.2.3 Increased Urbanisation and Evolving Populations

‘Increasing pressures on the water environment, due to climate change and population growth, are being seen globally’ (CIRIA, 2013, p.2). The effect of urban development on our water systems has been apparent for decades but, as highlighted by CIRIA (2013), ‘is becoming more pronounced’. Populations are increasing, with many people globally migrating from the rural areas into our cities and major conurbations, ‘putting pressure on our existing water infrastructure and ecosystems’, and compounding the impacts described earlier. The relationship between the places people live and the water they depend on, as described by CIRIA (2013, p.2), ‘is often not prioritised in the design and evolution of the places’, with water shortages, flooding, and water course pollution commonplace. The Optimum Population Trust (2008) argues that ‘based on the best bio-capacity and ecological footprint research available’ the UK is ‘already overpopulated’ by 70 per cent, causing major concern.

In 2012 UNICEF, with help from design studio Periscope, produced *An Urban World*, a graphic depicting countries and territories from 1950 to 2010 with accurate figures of urban growth, and then from 2012 to 2050 showing predicted urban growth. The graphics illustrate the percentage of the population in those countries living in urban areas, and the predicted increases for each country per year up to 2050. The world’s population reached 6.8 billion in 2009 and is expected to climb to 9.2 billion in 2050, an increase of more than a third in only 40 years (The Optimum Population Trust, 2008; United Nations, 2005). According to the United Nations *World Population Prospects: The 2008 Revision*, 84% of this growth will be in developing countries.

Population increases are likely to compound a range of water issues already felt in urban areas. These include increased urbanisation, with new housing being built alongside existing houses, which are not water efficient; increased paving and impermeable areas, which contribute to flooding and pollution, as surface water enters ageing combined sewer systems; and increased water usage in areas where surface water flooding is prevalent. Coupled with these issues are the longer-term potential effects of climate change on water systems that also need to be addressed, as highlighted earlier. The largest of these is the predicted change in precipitation, with a likely 33 per cent increase in the winter and a 40 per cent decrease in the summer (Jenkins, et al, 2009). This will most likely result in increased stress in existing water infrastructure, and a greater risk

of flooding, exacerbated further when the predicted population increases to 70 million in the UK.

1.3 Opportunities

1.3.1 Mitigation and Adaptation

‘Throughout history, people and societies have adjusted to and coped with climate, climate variability and extremes, with varying degrees of success’ (IPCC, 2014, p8). Mitigation¹² of climate change is accepted by many (except climate change sceptics) as a way of changing our current practices so that future generations will not suffer in the ways predicted by scientists. Adaptation¹³ on the other hand is considered a ‘*Cinderella*’ in that its effects and successes are only recently being recognised, despite it becoming embedded in some planning processes. Adaptation is being developed across all levels of government in Europe, including coastal and water management (<https://www.eea.europa.eu>).

Adaptation and mitigation are complementary strategies for reducing and managing climate change risks. ‘Substantial emissions reduction over the next few decades can reduce climate risks in the 21st century and beyond, increase prospects for effective adaptation, reduce the costs and challenges of mitigation in the longer term and contributing to climate-resilient pathways for sustainable development’ (IPCC, 2014, p.17). Adaptation has been seen to ‘contribute to the well-being of populations, the security of assets and the maintenance of ecosystem goods, functions and services now and in the future. It is place-and context-specific...reducing vulnerability’ (IPCC, 2014, p.19), and understood to be enhanced if it is undertaken across multiple levels, including individuals and governments.

¹² In this context is taken to mean the ‘act of reducing how harmful, unpleasant, or bad something’ is (<https://dictionary.cambridge.org/dictionary/english/mitigation>). Refer to Chapter 1 drivers for change and Chapter 6 motivating changed behaviour, norms and practices through social learning and communities of practice for an expanded discussion.

¹³ ‘Refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damage or to benefit from opportunities associated with climate change’ (Smit, et al., 1999). Refer to Chapter 4 typology of adaption and ecological citizenship for an expanded discussion.

1.3.2 Super Wicked

Climate change has been referred to as a wicked problem¹⁴ (Rittel and Webber, 1973). Forty years after the original definition of wicked problems by Rittel and Webber, Levin and co-authors argue that climate change should be considered a ‘super wicked problem – a new class of global environmental problem’ (Levin, et al., 2012, p.6).¹⁵ If we are to learn to adapt to these super wicked problems of climate change (Levin, et al., 2012), a proposition supported by this research, then different approaches to planning and implementation of solutions that acknowledge uncertainty and recognise disagreements between groups affected, need to be developed. Local governments and the private sector are increasingly seen as critical for promoting adaptation within communities, households, and civil society and in managing risk information and financing. However, financial support has been slow, favouring private sector developers’ contributions, and the evidence shows only limited intervention to support insurance and protection of some domestic stock. This underpins the case for my research. This research acknowledges the need for mitigation of climate change as ‘effective implementation depends on policies and cooperation at all scales... enhanced through integrated responses that link adaptation and mitigation with other societal objectives’ (IPCC, 2014, p.26). However, it is focused predominantly on adaptation. It recognises that governments could implement flood/drainage action as a public infrastructure project: this is the current policy position, and has been the case throughout this research, with local flooding not currently prioritised. It is for this reason that this research investigates the role of bottom-up individual/community-led adaptation.

1.3.3 Changing Behaviours, Norms and Practices

Shove (2010, p.1273) argues that ‘the challenges associated with climate change are such that many familiar ways of life and many patterns of consumption associated with them are fundamentally unsustainable’. If that situation is to improve, then new forms of living, working, and playing should be adopted. Traditional methods of changing

¹⁴ In this context, ‘wicked problems are those that are difficult or impossible to solve due to being incomplete, contradictory’, or where there are no single solutions. Refer to Chapter 4 typology of adaption and ecological citizenship for an in-depth discussion.

¹⁵ ‘Super wicked’ problems extend wicked problems to also include ‘time running out, those who cause the problem seeking to provide a solution, the central authority needed to address them is weak or non-existent, and irrational discounting occurs that provides responses into the future’ (Levin, Cashore, Bernstein and Auld, 2012).

behaviour¹⁶ operate on the presumption that the behaviour and choices of individuals can be modelled as if individuals were rational maximisers of self-interest, making considered decisions, based on financial resources and information available to them (Prendergast, et al., 2008; Jackson, 2005). This approach uses information to overcome any deficit, and in so doing promotes rational behaviour. But a large body of research from behaviour economists,¹⁷ drawing upon the disciplines of psychology and sociology, suggests that individual actions are influenced by many more factors than accommodated by the ‘rational economic man model’. Behaviour economists argue that the narrow model of ‘rational economic man’ in effect neglects how original preferences are generated; it disregards the fact that individual actions are conditioned by social norms and emotional responses, and that human judgements are often inconsistent and may be systematically distorted (Prendergast, et al., 2008). Effectively it fails to consider the main motivations behind individual choices and, as such, does not provide a model adequately reflective of human judgements and decisions, a shortcoming which this research seeks to address.

1.3.4 Public Participation

Planning processes born of enlightenment from the eighteenth century and modernity are typified by the ‘systems or synoptic approach to planning’ (McLoughlin, 1969; Faludi, 1973), which strove to adopt ‘rational forms of social organisation and modes of thought to liberate society from the irrationalities of myth, religion, superstitions, as well as the arbitrary use of power and the dark side of our human natures’ (Allmendinger, 2009, p.173). Allmendinger (2009, p.197), notes issues such as ‘a wholesale distrust of the political process, a fragmentation into single-issue politics and a plurality of positions’. Yet given ‘increasingly political and popular interest in local environmental questions’ alongside calls for ‘more active citizen involvement in planning strategies and their implementation’ (Healey, 2006, p.22), planning as a communicative or collaborative process was promoted (Healey 1996; 1997), exemplified by Sherry Arnstein’s Ladder of Citizen Participation (1969). The ladder of participation proposes eight levels of citizen participation from non-participation that included manipulation and therapy, to tokenism incorporating informing, consultation,

¹⁶ For a wider discussion on changing behaviours refer to Chapter 4 motivating changed behaviour, norms and practices through social learning and communities of practice.

¹⁷ Including Daniel Kahneman and Amos Tversky in 1979.

and placation, and finally citizen power embracing partnership, delegated power, and citizen control.

The systems of governance of a society or community outlined by Healey (2006, p.206) refer to ‘processes through which collective affairs are managed. It legitimises initiatives taken on behalf of a political community and speaks for the collective concerns of the political community in the collective interests and values embodied’. In modern societies, ‘governance has traditionally been equated with what governments do, with the machinery of the state’. Healey (2006, p.206). However, over the last 30 years or so, increasingly, citizens have wanted to play a more proactive role in decision making.

In the Netherlands and Denmark Healey (2006, p.212) observes ‘a broader-based partnership between government agencies and interest groups produces modes of government which have been referred to as consociational’.¹⁸ In the 1980s and 1990s, the Polder Model of consensus decision making was formulated, based upon the Dutch version of consensus-based economic and social policy making. The opportunity for citizens to become more involved with planning and decision-making processes as stakeholders (Warner, 2013) was translated into a formal requirement via the European Union’s Water Framework Directive adopted in 2000 (Hartmann and Drieswen, 2013) and through infrastructural and spatial solutions such as the Dutch Room for the River programme (2000-2015)¹⁹ (Roth, et al., 2017).

In 1997, in the UK, the new social democratic government in Britain, sought to make government decisions more democratic as well as more effective, efficient, socially inclusive, and environmentally sustainable (Healey, 2006, p.319). Collaborative approaches to policy making and policy delivery were attractive to the new government. The Planning and Compulsory Purchase Act 2004 encouraged more active ways of involving citizens and stakeholders, by ‘framing strategic planning policy, orientated

¹⁸ According to Lijphart (1989), ‘consociational democracy has four basic elements, including: executive power-sharing among the representatives of all significant groups; a high degree of internal autonomy for groups that wish to have it; proportional representation and proportional allocation of civil service positions and public funds; and a minority veto on the most vital issues’.

¹⁹ “Room for the River” (2000-2015) was a Dutch flood risk management programme aiming at the integration of spatial and infrastructural flood protection measures for the major rivers of the Netherlands. Through the (partial) removal of “hard” boundaries, it ended the rigid spatial-infrastructural separation of water and land on which Dutch flood risk management had been based’. (Roth et al., 1997, p.4).

by a new purpose for the system- sustainable development' (Healey, 2006, p.319). Governance arrangements favoured 'enabling' rather than 'controlling', and were 'sensitive to the values, needs and demands of citizens'. Alongside this, democracy, focused on ways of moving beyond a politics centred on political parties and formal government, to promote 'decentralised policy making to lower levels of government' (Healey, 2006, p.319).

Out of this groundswell, came the wider concept of public participation, 'founded on the principle that contemporary democratic politics can be improved by including citizens more directly in the decisions that affect them' (EIPP, 2009, p.5). Localism and neighbourhood planning were introduced by the Localism Act of 2011, which embodied the fundamental principles of the Big Society, namely the dispersal of power away from central government to local public servants, communities, and individuals, given statutory expression in the Localism Act 2011. These aspirations were promoted by Conservative governments as a way of strengthening society (DCLG, 2011, p.1). The Localism Act gave local areas greater freedom and renewed responsibilities by promoting local action through enhanced provision for communities via Neighbourhood Development Plans (Referred to colloquially as Neighbourhood Plans or NPs) and Neighbourhood Development Orders. Communities were given a duty to cooperate, which encouraged cross-boundary cooperation, enabling environmental issues and impacts to be assessed at a landscape scale, beyond the administrative boundaries of individual localities and communities. Neighbourhood plans are created by Parish Councils and or Neighbourhood Forums (NFs) and approved via a referendum passed by a simple majority of voting residents (Holman and Rydin, 2012). However, these measures must be seen within the context of retained central control (particularly with significant developments where a separate system is implemented (set up under the Planning Act 2008) for major or nationally significant infrastructure projects. In these cases, the planning system is streamlined through involvement of a dedicated unit of commissioners. Also, an appeal regime whereby developments that are refused may be considered and decided upon by planning inspectors – a central government agency, and central government policy as set out in National planning policy (including the NPPF) remains significant. Thus, reinforcing a form of localism that exists in the shadow of centralism (Brownhill & Carpenter, 2009).

1.4 Potential Solutions to the Problem

1.4.1 Wickedness

Awareness of the ‘wickedness’ of climate change is growing but having an awareness of generic climate impacts does not necessarily translate into an understanding of climate risks, nor the acceptable variability before the system buckles and fails to adapt (UKCIP, 2011). To prevent systems failure, this research argues that wider social learning is necessary so that behaviours, norms and practices change and are sustained.

1.4.2 Adaptation

The impacts of climate change demand that adaptation occurs.²⁰ Adaptation is aligned to climatic variability and ‘involves adjustments to reduce the vulnerability of communities, regions, or activities to climate change and variability’ (Smit, et al., 1999, p.883) and foster community resilience. Adaptations can occur as a ‘responsive reaction to a hazard after initial impacts are manifest to climatic stimuli, without the direct intervention of a public agency’ (Smit, et al., 1999, p.883) known as autonomous or spontaneous adaptation, or they may be anticipatory, undertaken before impacts are apparent, known as planned adaptations. Adaptations can be short or long-term, localised, or widespread, and can serve various functions and take numerous forms (Smit, et al., 1999). This research proposes that for successful localised flood prevention to lessen flood risk to individuals and communities, adjustments to behaviour, norms and practices will be required, so that small-scale measures, such as LISUD, could be implemented by motivated individuals.

1.4.3 Responsibility

Technological innovations have enhanced our urban storm water management systems, leading to water management²¹ increasingly by centralised organisations with the technical knowledge and understanding necessary. This has led over the years to an over-reliance on those organisations and systems,²² to the detriment of personal responsibility for localised water management. In the face of the complex super wicked problem of climate change, leading to increased flooding, this research in line with Beaumont (2019, p24) suggests that ‘we need to overcome our own sense of paralysis

²⁰ Adaptation refers to both the process of adapting and to the condition of being adapted.

²¹ Water management in this context refers to the activity of planning, developing, distributing, and managing water resources.

²² Findings drawn from this research surveys, questionnaires, and focus group discussions.

in the face of an epochal moment’ and take personal responsibility for our actions. We need to recognise that we are more powerful than we think and acknowledge that many small acts can lead to immeasurably larger outcomes, as borne out recently by Greta Thunberg, the Swedish environmental activist who gained international recognition arguing that humanity is facing an existential crisis from climate change. Dewey, the US philosophical educator in the *Ethics of Democracy* rejected the idea that democracy should be confined to narrow ideas of government, political institutions, and electoral mandates. Rather, he suggested, ‘it should be a way of life, recognising that it is individuals, and their intrinsic interactions with society that make majorities for change’ (Dewey, cited in Beaumont, 2019, p.24).

Environmentalism as an aspect of Ecological Citizenship (EC) embraces the notion ‘that the individual is a member of a community of interdependent parts. A thing is right when it tends to preserve the integrity and stability and beauty of the biotic community, it is wrong when it tends otherwise’ (Leopold, 1968, p.203). ‘Environmentalism raises fundamental issues about who we are and what we care about’ (Landy, Roberts and Thomas, 1994, p.5). There appears to be a need for powerful community action, when considering the persistence and pervasiveness of environmental degradation. There is both an urgent need and a unique opportunity to retool and realign citizens and environmentalists alike, so that they are both equipped to improve the environmental and social conditions of their communities (Shutkin, 2000, p.126). This has started to occur in the UK with Transition Towns²³ and Incredible Edible,²⁴ which have had some successes, although not with localised flooding, the focus of this research.

Environmentalism and EC demonstrate that the ‘personal is political’ with the discourse of rights and responsibilities recognising obligations to future generations (since the Brundtland Report, 1987). In the words of Smith and Pangsapa (2008, p.36) ‘the relationship between entitlements and obligations (or more formally between rights and duties) should no longer be seen as flowing from living people in a specific time and

²³ Transition Town initiatives began in 2006 in Totnes, as a response to peak oil and climate change issues. Transition towns explore ways of changing the way we live, now and finding ways of living that respect biological limits (<https://www.transitiontowntotnes.org/about/what-is-transition>).

²⁴ Incredible Edible is a vision to create ‘kind, confident and connected communities through the power of food’ (<https://www.incredibleedible.org.uk/>).

place to a variety of actors'. We should not regard EC as a universal answer, but as just one way (perhaps even a variety of ways) of engaging in 'the political', and 'a way of inventing subject positions that will be environmentally beneficial, thus enabling us to 'identify the potential and limits of subject positions that feature in environmental discourses' (Smith and Pangsapa, 2008, p.36).

Under EC as defined by Dobson (2003), the 'principal duty is to act with care and compassion towards each other, as today's acts will have implications for tomorrow's people'. The obligations of the ecological citizen are to defend the preservation of nature and should be both political and ethical, resulting in ecological stewardship for future generations (Barry, 2002). One of the key features of EC is its ability to connect the local and the global, often referenced by the well-known mantra 'think globally, act locally'. Therefore, this thesis argues that EC offers the means for encouraging participatory planning planned adaptation to climate change, motivating people to think globally and act locally, with scope to encourage them to undertake LISUD, the key aim of this research. It promotes a process aligned to their personal values, involving participating in change through many small acts making a difference. It offers an explicit link between environmental problem solving and community building – by meaningful, informed participation in decision making.

But what are the means for undertaking EC? For this thesis, it is suggested that, in line with policy,²⁵ and the notion of the Big Society,²⁶ we need to learn to live with floods and make space for water. It is proposed that this can occur by developing 'culturally sensitive and sustainable ways of living and managing floods' (Ashley, et al., 2007). This means empowering the participation of all stakeholders through appropriate institutional frameworks and governmental mechanisms, whilst dispersing power away from central government to local public servants, communities, and individuals. Awareness-raising²⁷ helps develop a clear understanding and acceptance of the respective roles of the state, central and local government, other organisations and agencies and individuals, with the long-term aim of greater understanding and

²⁵ EU Water Framework Directive (WFD) 2000, the Flood and Water Management Act (FWMA) 2013, the National Planning Policy Framework (NPPF) 2012 (now 2019) and the Localism Act 2011.

²⁶ Discussed in more detail in Chapter 3.

²⁷ Where awareness raising is defined by Kelly and Garvin, 2007.

awareness of flood risks. The aim is to give local areas greater freedom and renewed responsibilities by promoting local action through enhanced provision for communities.

If changes are implemented through a top-down approach, then people believe that others will take responsibility for decisions. If, however, those decisions are instigated and undertaken with a bottom-up approach, via individuals or groups undertaking EC, then this research suggests it would encourage personal and collective responsibility for actions. Yet, if that were the case then we would see many more examples of LISUD implemented, but this has not occurred. This research argues that inclination is not enough and, in line with extensive behaviour theory research, other factors also play a part in influencing or deterring our actions.

1.4.4 Changes in Behaviours, Norms and Practices

For this research, it is proposed that to overcome those barriers that deter action involves understanding the nature and persistence of the problem. Using empirical tools and learning from other communities, prerequisites for change can be determined, recommending ways to engender and enable change, including changes in behaviour, norms and practices that motivate actions. The basic rational model is based on the premise that ‘we behave in such a way as to maximise the expected benefits to ourselves (as individuals) from our actions’. It assumes that ‘human behaviour is a continual process of making deliberate choices between distinct courses of action’ (Jackson, 2005, p.30). The disadvantage of this approach, as widely observed by behavioural economists and supported by this research, is that classical economic theory can never sufficiently reflect exhibited human behaviour (Prendergast, et al., 2008; Jackson, 2005; Kahneman and Tversky, 1979).

Many theories of human behaviour can be used to supplement and/or refine the rational man model. The most compelling ‘treat behavioural systems as complex ecologies with multiple influences working in competing directions to influence behaviour’ (Halpern, et al., 2004, p.16). As a complex ecology, the individual has certain and real perceived capabilities and attitudes, and these are seen to affect success. Interaction with other individuals is also seen as important, so context and social situations play a large role in behaviour. Institutions or people promoting specific, sometimes negative behaviours, influence behaviour alongside physical, cultural, and social environments and the norms therein. Selection pressures that reward success and punish failure influence

behaviour. Time pressures, short cuts, mental models, rules of thumb or ‘heuristics’ all guide behaviour (Halpern, et al., 2004, p.16). Rationality plays a role in our choices, but the findings of behavioural economics reveal that citizens are motivated by many more complex arrays of changing personal preferences, including ingrained habits and social norms. Behavioural change can occur in multiple contexts, individually, socially, or materially. Within flood prevention and sustainable water management through EC, it is argued that change could occur either individually or socially.²⁸

In policy discourses, it appears that progress towards a more sustainable society depends on helping people to make better choices, by explaining how changes come about from outcomes of individual choices. Understanding the environmental impact of what people do draws attention to contemporary expectations of ‘normal life’ and demonstrates how intensive lifestyles have become in terms of embedded and ordinary resources. It is not enough to change people’s behaviours, but rather the institutions and infrastructures that provide the framework in which we live, and work also need to be changed, if we are not to fall back into our old habits. By shifting behaviour change away from individuals to that of practices, we can reframe the question: not ‘How do we change individuals’ behaviours to be more sustainable?’ but ‘How do we shift everyday practices to be more sustainable?’, ‘replacing less sustainable practices with more sustainable alternatives’ (Spurling, et al., 2013, p.2) within flood prevention and sustainable water management frameworks. Many individual and collective decisions are made in organisational settings, where individual rationality is compromised by the need to account for the wishes and desires of others. While we often view an ‘individual’s choice of behaviour as resulting from personal individual preferences, it has been seen to also be heavily mediated by observation, social learning,²⁹ group dynamics and social expectation’ (Prendergast, et al., 2008, p.44). Our decision-making occurs within a collective or social setting. For these reasons, the mechanism of social learning offers a method for engaging communities in flood prevention and sustainable water management.

²⁸ Refer to Chapter 4 for an in-depth review of theories around changes in behaviours, norms and practices.

²⁹ Social learning in this context refers to shared learning of independent stakeholders as a key mechanism for a desirable future, advocating interactive (or participatory) style problem solving, where outside intervention takes the form of facilitation (Leeuwis and Pyburn, 2002).

1.4.5 Communities of Practice

Communities of Practice (CoPs)³⁰ offer the structure for social learning, where ‘learning is not a discrete activity, associated with formalised spaces of teaching or isolated contemplation, but more a matter of practical activity, as people learn from each other by mutually engaging in tasks’ (Lave, 1993), undertaking social practice. CoPs do not necessarily work together, but they meet because they find value in their interactions. The benefits of this research are that CoPs are not fixed organisations. We belong to several of them – at work, at school and at home. We are core members of some, taking a lead role, while only occasional participants in others. CoPs serve five critical functions.³¹ They provide a learning strategy to connect people who might not otherwise interact. They provide a

‘shared context for people to communicate and share information, stories and personal experiences in a way that builds understanding and insights. They enable dialogue between people who come together to explore new possibilities, solve challenges, and create new, mutually beneficial opportunities. They stimulate learning by serving as a vehicle for authentic communication and self-reflection, to capture and share existing knowledge, to help people improve their practices, and introduce collaborative processes to groups and organisations to encourage a free flow of ideas in exchange for information’ (Lave and Wenger, 2002).³²

1.5 Overall Aims and Objectives of the Research

1.5.1 Aims

The overall aim of the research is to develop a deep understanding of how or if EC³³ principles in CoPs³⁴ undertaking social learning³⁵ can play a pro-active role in

³⁰ ‘groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis’ (Lave and Wenger, 2002, p.4).

³¹ They offer education by collecting and sharing information, ‘support by organising interactions and collaboration among members’, cultivation by ‘assisting groups to start and sustain their learning’, encouragement by ‘promoting the work of their members through discussion and sharing, and integration by encouraging members to use their knowledge for real change’ (Wenger, 1998).

³² Refer to Chapter 4 for a review of communities of practice and their critical functions.

³³ In this context, ecological citizenship is defined by Dobson as the principal duty of acting with care and compassion towards each other (2003).

³⁴ ‘Communities of practice are defined as groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis’ (Wenger, et al., 2002).

³⁵ Refer to Chapter 4 for a discussion on social learning.

supporting measures such as LISUD to reduce local flooding impacts.³⁶ Its purpose is to optimise the potential for EC as a resource: for learning about sustainability; conditioning pro-environmental behavioural change; and overthrowing maladaptive behaviours that promote value action gaps³⁷ and misperceptions³⁸ that are seen to prohibit LISUD adaptations to the super wicked problem³⁹ of climate change.

This research is intended to enhance understanding, particularly amongst citizens in CoPs, so that through active participatory social learning, common ground can be developed on localised flood prevention and sustainable water management.

It considers whether CoPs offer the means for environmental learning and behaviour change, through highlighting the unsustainable actions currently undertaken, and empowering individuals in the decisions that affect their health and environment.

To assess whether top-down or bottom-up initiatives are more effective, the wider empirical research investigates a series of different programmes centred on sustainable water management to combat problems like climate change that cause localised flooding in our cities. It seeks to examine whether such programmes facilitate active participatory ecological social learning as a ‘learning curriculum’⁴⁰ to alter behaviours, norms, and practices, or whether wider structural measures are needed.

The research aims to understand how changes in behaviours, norms and practices highlight the risks associated with climate change in our cities. It addresses the loss of personal and collective responsibility of water management, and considers how that might be regained, arguing that collective responsibility is needed if behavioural changes are to occur, and ultimately LISUD be implemented.

³⁶ Throughout the research, where referred to as LISUD, this should be considered a typology developed specifically for this research, drawing upon low impact development and sustainable urban drainage.

³⁷ In this context, ‘a psychological phenomenon where people act in a manner that is inconsistent with their personal values’ (<https://effectiviology.com/value-action-gap>).

³⁸ The gap between actual attitudes or behaviours, and what people think is true about others’ attitudes or behaviour. A misperception occurs where there is an ‘overestimation or underestimation of the prevalence of attitudes and/or behaviour in a group’ (Berkowitz, 2004, p.7).

³⁹ Refer to Chapter 4 for a wider explanation of super wicked problems and the relevance to this research.

⁴⁰ Learning for this research is seen as occurring through ‘centripetal participation in the learning curriculum’ of the ambient community (Lave and Wenger, 2002, p.93). It occurs from participation – of both absorbing and being absorbed in- the ‘culture of practice’.

Research Questions

The aim of the research was to address a series of problems, centred on why people are reluctant to implement sustainable urban drainage flood prevention measures at a local level, and to consider measures which might overturn this reluctance. These problems were detailed as core research questions.

Table 1-1. Research questions

Core research questions
To what extent can people be motivated into adopting pro-environmental/social behaviour to facilitate personal and collective responses to sustainable water management and localised flood adaptation?
To what extent are bottom-up organisations able to achieve this, or are top-down measures required?
To what extent can EC / CoPs play a proactive role in supporting localised flood adaptation?
To what extents can we learn lessons from case studies in the UK and elsewhere?

The methods used to analyse those questions are detailed in Chapter 5.

1.5.2 Objectives

The main objectives of the research are to:

- Undertake an extensive literature review of the planning policy and controls framework related to localised flood prevention and sustainable water management centred on climate change adaptation, and the role of participatory planning. The aim is to identify an approach to facilitate greater implementation of LISUD;
- Explore the potential of EC, via active participatory social learning, to align values and actions within flood prevention situations and thereby eliminate the value action gaps⁴¹ that currently restrict localised flood prevention. The aim is to determine whether EC might change behaviours, norms and practices of both individuals and communities to motivate LISUD;
- Undertake empirical work using quantitative and qualitative methods of online surveys, questionnaires, semi-structured interviews and focus group workshops to support or refute the theoretical findings and highlight best practice in localised flood prevention methodologies.
- Analyse examples of climate change engagement methodologies in programmes that promote LISUD. Cloudburst Copenhagen, Amsterdam Rainproof and Climate Proof Rotterdam are case studies drawn from other jurisdictions to evaluate and translate lessons for the UK. These case studies may offer deeper understanding around the issues, and provide adaptive solutions to encourage flood prevention and sustainable water management in the form of LISUD; and

⁴¹ Refer to Chapters 4 for discussions on value action gaps and how they inhibit pro-environmental behaviour.

- Test via surveys, interviews and focus groups in areas subject to local flooding, the extent to which CoPs and EC principles have been/can be developed and sustained.

1.6 Chapter Content and Structure of Thesis

The thesis starts with an investigation of theoretical principles and the epistemological underpinning of the research.

An extended literature review is undertaken in **Chapters 2-4**, exploring how the research sits within wider academic fields. It identifies gaps in knowledge and clarifies what makes this research distinct. Theories surrounding super wicked problems, complexity, climate change adaptation, low impact development and sustainable urban drainage, participatory planning and sustainable placemaking, EC, CoPs, social learning, and behavioural change are considered, and serve to justify the approach to this research.

Chapter 2 reviews the framework of government policy and controls related to water management and flood prevention, reviewing the two main policy domains Flood and Coastal Erosion Risk Management and Planning and spatial planning.

Chapter 3 investigates global, European and UK perspectives as well as current theoretical and philosophical thinking related to sustainable urban environments and legislative issues. It defines types of global site stormwater management systems including Integrated Urban Water Management (IUWM), Water Sensitive Urban Design (WSUD), Green Infrastructure (GI), Sustainable Urban Drainage Systems (SuDS), Source Control, Typology of Low Impact Development, Low Impact Sustainable Urban Drainage Systems, developing a new typology known as low impact sustainable urban drainage (LISUD).

Chapter 4 concerns climate change mitigation and adaptation and the different approaches to planning and implementation of solutions. This chapter emphasises a bottom-up approaches to problem-solving, one that empowers people to work together and initiate action. It highlights the interconnected nature of human behaviour, sustainability, and the built environment, and defines ecological models of sustainable behaviour in the context of a variety of psychological and theoretical perspectives and demonstrates how human behaviours, sustainability and the built environment are inextricably linked. It also defines the different types of water management and flood

prevention commonly undertaken, and demonstrates how social learning within the wider theory of organisational learning, could improve group responsiveness to the issues, promoting climate change adaption in the form of LISUD via EC.

Chapter 5 explains the methodology and methods adopted.

On-line surveys, questionnaires and semi-structured interviews conducted within CoPs around water management and flood prevention are presented and analysed, alongside targeted focus group discussions, and analysed via reflective thematic analysis in **Chapter 6**.

Chapter 7 presents the three European case studies. The cases are analysed collectively to provide a holistic overview, highlighting the differences, similarities and lessons learned. The qualitative research findings from questionnaires and semi-structured interviews with the organisers of each case study programme are also presented. The analysis uses reflective thematic analysis. The findings from the organisers' responses are presented on a case-by-case basis focusing on awareness of issues, policy intentions, proposed solutions and motivators for behaviour, norms, and practice changes, leading to long-term actions.

Chapter 9 brings together the theoretical and practice-based findings of the research, discussed in Chapters 6-8. It draws conclusions from all strands of the work and outlines future research. Finally, it acknowledges and defines the limitations of the research, noting issues beyond the scope of this research and options for future research.

Chapter 2. Extended Literature Review: Framework of Government Policy and Controls

2.1 Introduction

This section establishes the history and extent to which flooding is recognised as a growing climate change-related issue within policy and legislation in the UK. It highlights the two main policy domains central to flood prevention and adaptation, Flood and Coastal Erosion Risk Management (FCERM) and spatial planning. It provides an overview of both and explains how roles and responsibilities are distributed in England so that a context for the research can be provided. It also introduces the concept of governance, recognising that different modes of governance are adopted, and defines and provides encouragement for participatory planning in the UK, emphasising parallels with the European countries analysed in the case studies presented later in Chapter 7

2.2 Policy

Strategies looking into origins, effects and responses to flooding are generally segregated into the main areas of flooding including rural (mainly fluvial); coastal (due to marine phenomena), and urban (pluvial) which may also be because of ‘coincident fluvial and coastal impacts’ (Ashley, et al., 2007, p.416). Strategies may also be categorised as phenomenological, technological, economic, environmental, or sociological. However, rarely are the coincident aspects considered in conjunction with one another. Policy as described by the Oxford Dictionary is ‘a course or principle of action adopted or proposed by an organisation or individual’. Policies are focused on what is to be achieved (the outcomes), and not how those outcomes are to be achieved.⁴² Policies are commonly legally adopted by governments or by organisations. Regulations are defined as a rule or directive made and maintained by an authority, or the action or process of regulating or being regulated. Regulations generally follow policy. At the European level, regulations implement European Directives within member states.

⁴² The five principles of good policy are described as ‘transparency, accountability, proportionality, consistency and targeting’ (Ashley, et al., 2007).

At the national level within Europe, there are variations in the regulations and responsibilities for flood protection and flood risk management (Kelly and Garvin, 2007), leading to a potential conflict of interest, with some countries focusing upon the precautionary principle and others on flood management. The European Commission (EC) building upon work by the International River Commission (Rhine), developed a best practice common strategy on flooding development throughout Europe published in 2003 (Ashley, et al., 2007; Kelly and Garvin, 2007). This document was strategically focused rather than technical, considering basic principles and approaches and investigated how to translate and implement them. It followed a river basin approach setting standards and offering best practice scenarios for prevention, protection, preparedness, emergency responses, recovery, lessons learned and research (EU, 2003). Prevention of floods deals with preventing damage by restricting construction in flood-prone areas and adapting future development to the risk of flooding. Protection looks at both ‘structural and non-structural measures’ that ‘reduce the likelihood and/or impact of floods’, whilst preparedness deals with informing the population about flood risks. Recovery and lessons learned encompass post-flood measures, looking at returning to normal conditions and mitigating both social and economic impacts on the affected populations. Research is also promoted, acknowledging that in certain areas of flood risk and management, a better understanding of climatic conditions, hydrology, ecological and landscape context of floods is required so that appropriate mitigation and adaptation measures can be developed.

In England, responsibilities for flood risk management are set out in primary legislation such as Acts of Parliament and secondary legislation like regulations. Guidance, circulars, and codes of practice extend the primary and secondary legislation to enhance understanding and support the implementation of the law (Alexander, et al., 2016, p11). The Flood and Water Management Act 2010⁴³ (FWMR) is the primary legislation in England relating to flood risk management, alongside the Flood Risk Regulations 2009⁴⁴ (FRR), with the FRR 2009 transposing the EU Flood Directive⁴⁵ into domestic

⁴³ HM Government, 2010. Flood and Water Management Act 2010. Chapter 29. London: HMSO.

⁴⁴ H M Government, 2009. Flood Risk Regulations 2009. No.3042. London: HMSO.

⁴⁵ The Floods Directive 2006 was as a response to wider water management policies adopted within ‘The Directive 2000/60/ES of the European Parliament and of the Council establishing a framework for the community action in the field of water policy’ or, in short, the EU Water Framework Directive (WFD), published 22nd December 2000 and entered force the same day. By adopting the WFD, the EU thoroughly restructured its water protection policy. The aims of the WFD are to ‘promote the

law (Alexander, et al., 2016). Responsibilities for flood risk management are established through common law, characteristic of the English legal system. Riparian owners have the right to protect their property from flooding and erosion, and a legal duty to use their property or land in a way that does not increase the risk of flooding to a neighbouring property (EA, 2013).

2.3 Devolved Administrations

There is no single body responsible for managing flood risk in the UK, following the introduction of devolved administrations in Scotland, Northern Ireland and Wales. Responsibility for managing flood risk is decentralised and spread among several bodies (LGA, 2021) but within a centralised system. The Department for Environment, Food and Rural Affairs (DEFRA) is the policy lead for flood and coastal erosion risk management in England. New or revised policies are prepared with other parts of the government such as HM Treasury, the Cabinet Office (for emergency response planning) and the former Department for Communities and Local Government (DCLG) (for land-use and planning policy), now named the Department for Levelling Up, Housing and Communities (DLUHC).⁴⁶ These national policies are then delivered by Risk Assessment Management Authorities (RMAs) which include the Environment Agency (EA), Lead Local Flood Authorities (LLFA), District and Borough Councils, Coast protection authorities, water and sewerage companies, Internal Drainage Boards (IDBs), and Highways authorities.

Flooding and coastal erosion cannot be entirely prevented, and the relevant legislation is largely permissive. This means that there is no general right to be protected from

sustainable use of water, while progressively reducing or eliminating pollutants for the long-term protection and enhancement of the aquatic environment' (Ashley, et al., 2007, p.415). Promoting sustainable use of water and sustainable flood prevention and protection is also considered under UN/ECE guidelines (Kelly and Garvin, 2007). All appropriate action is encouraged to create and maintain legal, administrative, and economic frameworks for public, private, and voluntary sectors to contribute to flood prevention, dam safety and reduction of the effects of floods on human health, safety, and property. The way envisaged of achieving this was to focus on the promotion of integrated water management measures for the whole river catchment area rather than managing floods in specific locations. Flood risks should be reduced through precautionary measures, backed by legislation (within the Floods Directive) as well as informal implementation measures guided by the EU Water Directors.

⁴⁶ The Department for Communities and Local Government (DCLG) existed until January 2018, when it became the Ministry of Housing, Communities and Local Government (MHCLG). The department was renamed to reflect the government's renewed focus to deliver more homes and build strong communities across England. In September 2021, this department was renamed again as the Department for Levelling Up, Housing and Communities (DLUHC), dropping local government from its title.

flooding and coastal erosion and no right to be protected to any standard where risk management action is taken. Rather, Government promotes nationally consistent approaches to assessing and managing flood and coastal erosion risk (LGA, 2021).

2.4 Flood & Coastal Erosion Risk Management (FCERM)

Tunstall et al. (2004) provide an overview of Flood & Coastal Erosion Risk Management (FCERM) highlighting the shift from predominantly rural land drainage of the 1940 -1970s focused on the protection of food crops, to urban flood defence during the 1980s to mid-1990s which entailed flood hazard management – holding back the water. The traditional methods of flood defence or protection sought to control the hazard (Galloway, 2008). However, current flood risk management emphasises the importance of controlling the hazard and of lessening societal vulnerability to its effects, so dealing with the outcomes (Ran & Nedovic-Budic, 2014).

Following the Foresight review of future flooding (Evans, et al., 2004; DEFRA, 2004) and wider influences from European Directives and best practice guidance issued at that time, the traditional approaches to flood risk management adopted in the UK were reviewed and a new perspective for managing flood risk in urban areas proposed (Ashley et al., 2007), known as integrated urban drainage management (IUDM), part of a programme entitled *Making Space for Water* which looked at learning to live with floods (Butler & Pidgeon, 2011; Galloway, 2008; Nye, 2012; Sayers, Hall & Meadowcroft, 2002; Ran & Nedovic-Budic, 2014). The major drivers for this shift in thinking and approach were the complex and dispersed institutional responsibilities for managing flood risk in England and Wales (Ashley et al., 2007). These were problematic, as responses to floods or threats were not necessarily being delivered in the most cost-effective or sustainable way. The vision for the strategy was to ‘allow space for water’ in our cities so that the adverse consequences for people and the economy could be managed while achieving environmental and social benefits in line with wider government objectives (Kelly and Garvin, 2007, p.347). Once a problem had been identified, the approach comprised 11 sequential steps (Digman, et al., 2006). Themes covered by the strategy included risk management calling for a sustainable approach to flood management and coastal erosion solutions that work with natural processes to provide more space for water; planning and building to ensure land use

reduces, and certainly does not add to, the overall level of flood risk; and awareness-raising' (Kelly and Garvin, 2007, p.347).

Drawing on *Making Space for Water*, the UK government developed a new strategy for flood and coastal erosion risk management in England in 2005. It highlighted recent flooding incidents including those in 1998 and 2000, which demonstrated the increasing need for a comprehensive, integrated and forward-thinking strategy. The strategy proposed was a holistic, risk-driven approach. It was to adapt to climate change, incorporate allowances for flooding and erosion risks and ensure measures were reversible and adaptable.

Risk-based flood management is a whole-system approach that assesses and compares the structural and non-structural ways of pursuing the optimal effects (Sayer et al. 2002) where structural measures of mitigating flood hazards include construction and maintenance of levees, dams, mobile elements such as sandbags and mobile flood walls which remove obstacles from the flood plains restricting construction and controlling design of the physical spaces in flood-prone areas (Kryanowski, Brilly, Rusjan & Schnablw 2014; Neuval & Van Den Brink, 2009). 'Non-structural measures apply knowledge, practices, agreements, and/or policies to mitigate flood hazards' (Ran & Nedovic-Budic, 2014, p.69).

The FCERM strategy serves as a means of providing a national framework for flood and coastal erosion risk management, with all sources of flooding and coastal erosion being identified and managed using a risk-based approach. FCERM is the process of understanding when and where flooding and coastal erosion is likely to happen. It encompasses taking reasonable steps to reduce the likelihood of the risks occurring, forecasting, and providing warning of floods so that people, businesses, infrastructure providers and public services take effective action to minimise the risk. It also encompasses adaptation to coastal change to reduce the risk to life, damage and disruption, transferring risks to areas where the consequences of risk are considered low and tolerating a residual level of risk.

The strategy was updated in 2011, the first of its kind for England.⁴⁷ It provided an overarching national framework for action by all RMAs to tackle all sources of flooding and coastal change, manage the risks and reduce the effects. The strategy sat within an evolving policy at the same time as the emergence of the national planning policy framework (NPPF)⁴⁸ which greatly simplified planning policy and promoted sustainable development, and the Natural Environment White Paper.⁴⁹ The strategy drew on earlier studies including the Foresight report⁵⁰ which agreed an integrated approach to decisions on flood management and regulations (IFI/P, 2004), the Institution of Civil Engineers (ICE) Ministerial Commission's *Learning to Live with Rivers*,⁵¹ and the government's *Making Space for Water*.⁵² It also drew on lessons learnt from the 2007 floods identified in The Pitt Review⁵³ which aimed at improving resilience through institutional change that guided people and organisations to take appropriate measures in the event of a flood. Of relevance to this research, the Pitt Review drew on the wider sustainability agenda and recommended a shift in focus to promote 'soft' solutions alongside more traditional approaches, including property resilience measures and the use of sustainable urban drainage (SuDS) as a flexible approach to adaptation. For the first time, SuDS measures were recognised as having a key role to play in preventing future flooding by mimicking the natural movement of water and slowing the process of the water to the watercourse. Three systems were promoted in the Review:

source control prevention techniques, designed to reduce the volume of water discharged from a developed site; permeable conveyance systems that channel the run-off slowly towards the watercourse through a process of filtering and storage and through the mediation of water via evaporation and infiltration; and passive treatment systems

⁴⁷ Entitled understanding the risks, empowering communities, building resilience: the national flood and coastal erosion risk management strategy for England.

⁴⁸ National Planning Policy Framework (NPPF), 2012. Revised July 2018, February 2019 and March 2021. Available at: <<https://www.gov.uk/government/publications/national-planning-policy-framework--2>>.

⁴⁹ Natural Environment White Paper, 2012. Revised October 2014. Available at: <<https://www.gov.uk/government/publications/natural-environment-white-paper-implementation-updates>>.

⁵⁰ Foresight Future Flooding – executive summary, 2004. London, Department for Business Innovation and Skills.

⁵¹ Fleming, G., Frost, L., Huntingdon, S., Knight, D., Law, F., and Rickard, C., 2001. Learning to live with rivers. Institution of Civil Engineers.

⁵² Defra, 2005. Making Space for Water. London, Department for the Environment, Food and Rural Affairs.

⁵³ Sir Michael Pitt, 2008. Learning lessons from the 2007 floods. London, The Cabinet Office.

that use natural processes to break down pollutants from surface water run-off as well as reducing flood risk. (Pitt, 2008, p.94)

SuDS were promoted at different levels. At the property level, this involved water butts, green roofs and permeable driveways; at the community level it included swales, detention basins, porous paving and rain gardens; and at the strategic level, large balancing ponds and wetlands.

Under FCERM, managing flood and coastal erosion risks included:

- ‘understanding the risks of flooding and coastal erosion by working together to put in place long-term plans to manage the risks and making sure other plans take account of them;
- avoiding inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks;
- building, maintaining and improving flood and coastal erosion management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society;
- increasing public awareness of the risk that remains and engaging with people at risk to encourage them to take action to manage the risks that they face and to make their property more resilient, and
- improving the detection, forecasting and issue of warnings of flooding, planning for and co-ordinating a rapid response to flood emergencies and promoting faster recovery from flooding’. (The Stationary Office, 2011).

There are 5 main flood risk management strategies employed in flood risk management – prevention, defence, mitigation, preparation, and response and recovery – and a series of corresponding flood risk management measures (Alexander et al., 2016, p.15). Prevention, defence, and mitigation are all flood risk management strategies relevant to this research. Table 2.1 shows the current measures employed in FRM in England.

The cornerstone of the flood risk management policy is the prevention of floods, and safety standards are embedded in the primary flood defence system to facilitate this. New insights in climate change and socio-economic developments have given urge to a broader focus on prevention, mitigation, preparedness, and vulnerability reduction of floods. Prevention aims to minimise people’s exposure to flooding. This is achieved through adopting measures that keep people and property away from water, including spatial planning to influence location and layout of future development described in more detail later, and multi-functional land use, where space is designated for multiple

Table 2-1. Current measures employed in FRM strategies in England

Item	Flood Risk Management Strategies		Flood Risk Management Measures	
1 Prevention:				
	Strategy that aims to minimise people's exposure to flooding, achieved via measures that keep people and property away from water		Spatial Planning: Influencing location and layout of future development.	The sequential test is a mechanism to reduce development on the floodplain
			Multi-functional land use: Space is designated for several purposes	For instance a park accommodating flood storage during periods of heavy rain
2 Defence				
	Strategy that 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	
			Demountable defences	
3 Mitigation				
	Strategy that aims to minimise the likelihood and/or magnitude of flooding, via measures that accommodate water		Flood storage areas / retention basins	
			Natural flood management measures	
			Management realignment	
			Property resistance and resilience measures	
			Green roofs	
			Living walls	
			SuDS	
			Permeable pavements	
			Designated floor heights above flood level	
4 Preparation & Response				
	Strategy that aims to minimise the consequences of flooding via measures that strengthen societal capital to prepare and respond to flood events		Flood forecasting	
			Range of communication methods for disseminating flood warning	
			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
5 Recovery				
	Strategy that 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

uses including flood storage areas. Conditions are often also imposed on planning consents related to managing flood risk, so that there is also a crossover with strategies such as defence or mitigation. Defence strategies aim to minimise the likelihood and magnitude of flooding via measures that keep water away from people, such as tidal surges, embankments, flood walls, conveyance engineers and demountable defences. Mitigation aims to minimise the likelihood and magnitude of flooding via measures that accommodate water such as flood storage areas, retention basins, natural flood management measures, managed realignments, property resistance and resilience, green roofs, living walls and permeable pavements (Alexander, et al., 2016).

There are many rules and laws relating to fluvial and coastal flood defence and mitigation⁵⁴ involving many actors. ⁵⁵ DEFRA is the lead government department

⁵⁴ Including the Flood and Water Management Act 2010, the Flood Risk Regulations 2009, National Flood and Coastal Erosion Risk Management Strategy, FCERM Partnership funding 2012, Land Drainage Act 1991, Water Resources act 1991, the Environment Act 1995, Environmental Assessment of Plans and Programmes Regulations 2004, Coast Protection Act 1949, Environmental legislation such as the Water Frameworks Directive and funding levies and charges (Alexander, et al., 2016)

⁵⁵ Including the Lead Local Flood Authorities (LLFA), the EA, DEFRA, RCC, Riparian owners, the HA, Water companies and regulator OWFAT, a range of private actors, coastal group, Natural England the Forestry Commission, and the RSPB (Alexander, et al., 2016).

tasked with coordinating national support to the response phase of flood incidents and for identifying and steering policy for FCERM. At a local level, RFCCs created by the EA under the FWMA 2010 manage fluvial and coastal flood and erosion risk within their region through investment for centralised sources targeted according to need which is used to promote FCERM across catchments and along the coast. It considers the likely future impacts of climate change.

Operational responsibilities for managing risk from rivers and reservoirs,⁵⁶ estuaries and the sea lies with the EA which also maintains a strategic overview of flood risk management in England for all types of flooding and was established under the FWMA 2010. It plays a key role in the distribution of national funding for defence and mitigation (Alexander et al., 2016). Local strategies for flood risk management for ordinary watercourses other than main rivers, surface water and groundwater are developed by LLFA. In areas where IDBs exist, LLFAs liaise with IDBs as they have operational responsibility for managing ordinary watercourses and maintaining drainage infrastructure within their internal drainage districts. The Highways Authority (HA) and water companies also have operational-level responsibilities and operate as RMAs. Riparian land and property owners are also required under common law to use their property or land in a way that does not increase the risk of flooding to a neighbouring property (LGA, 2021). Local Authorities (LAs) have increased power under the localism agenda for FRM, operating in a decentralised system. However, power predominantly continues to be centralised, with Local Government finance arrangements facilitating adherence to national flood risk management policy (Penning-Rowsell and Johnson, 2015).

Surface water flood risk was neglected by formal arrangements of flood risk governance until 1989 when the privatisation of the water industry occurred (Alexander et al., 2016). In 2010, surface water flood management was strengthened under the FWMA 2010, clearly defining a framework of responsibilities. The key rules and legislation related to surface water flood management are like those of fluvial and coastal flood defence and mitigation.⁵⁷ Multiple organisations are also involved with

⁵⁶ The FWMA 2010 amended the reservoir Act 1974 and introduces new arrangements for reservoir safety, based on risk rather than the size of the reservoir.

⁵⁷ Including the Flood and Water Management Act 2010, the National Planning Policy Framework (NPPF) 2012, now 2019, the Flood Risk Regulations 2009, National Flood and Coastal Erosion Risk

surface water flood management.⁵⁸ Governance of surface water and pluvial flooding is decentralised with overall responsibility for surface water flood risk management assigned to LLFAs which are county councils and unitary authorities within a centralised system (LGA, 2021) with LLFAs conforming to national policy and receiving funding from centralised sources.

Under the FWMA 2010, LLFAs develop, maintain, apply and monitor local flood risk management strategies⁵⁹ which include surface water, groundwater and fluvial flood risk by ordinary watercourses. Where significant flood risks have been identified, the LLFA sets out risk management plans as required by the Flood Risk Regulations 2009, and these form a central part of the local strategy. These strategies build on CFMPs and SMPs and inform future developments to ensure that flood and coastal erosion risk management activities are coordinated, facilitating sustainable risk management and making it easier to deliver benefits.

The LLFAs reduce the risk of flooding from surface water, groundwater and ordinary watercourses as set out under the FWMA 2010 and Part 3 of the Land Drainage Act 1991 by regulating ordinary watercourses (outside of internal drainage districts) to maintain proper flows and undertaking a statutory consultee role by providing technical advice on surface water drainage to local planning authorities on major developments (10 dwellings or more). Under that Act, LLFAs also maintain a register of assets – physical features that have a significant effect on flooding in their area (LGA, 2021).

Highways drainage and roadside ditches are managed under the Highways Act 1980 by the HA. This is undertaken in partnership with the EA, LLFA and district councils to ensure that it is well coordinated. The owners of land adjoining a highway also have a common law duty to maintain ditches to prevent them from causing a nuisance to road users.

Management Strategy, FCERM Partnership finding 2012, Land Drainage Act 1991, Water Industry Act, 1991, Water Resources Act 1991, Environment Act 1995, Highways Act 1980, HM treasury's Green book, Local Government finance settlements and local government grants, Environmental legislation such as the Water Frameworks Directive, Water Act 2014, Future Water (Defra, 2008), Regulatory rules by OFWAT, Non-statutory technical standards for SuDS (Defra 2015) (Alexander, et al., 2016).

⁵⁸ Including the LLFA, Local Planning Authorities, EA, Defra, HA, water companies and regulators, OFWAT, IDB, Private actors, Natural England (NE) and RSPB (Alexander, et al., 2016).

⁵⁹ Part1, Section 9(1), Flood and Water Management Act 2010.

Utility and infrastructure providers such as water and sewerage companies, energy companies and the HA maintain plans for future development and maintenance of services. In so doing, they input into FCERM plans by providing information and advice and consider FCERM in their own planning processes. Water and sewage companies are also responsible for managing the risks of flooding from water and foul or combined sewer systems. This is often undertaken in partnership with developers and landowners to reduce the input of rainfall to sewers through storage, source control and SuDS. Water and sewerage companies make sure their systems have appropriate levels of resilience to flooding. Under Section 94 of the Water Industry Act 1991, water and sewerage companies must ensure that the area they serve is effectually drained. Where there is frequent and severe sewer flooding, sewerage undertakers are required to address this through their capital investment plans.

Natural England (NE) and English Heritage (EH) are the government's advisors on the natural environment and cultural heritage. The Met Office, British Waterways, and transport and utilities providers all have important expertise and infrastructure that may affect FCERM. Several organisations own and maintain FCERM structures that may have other primary functions, but also help to reduce flood risk or coastal erosion. These include ports authorities, the Highways Agency, Network Rail and other third-party asset owners.

Many non-government organisations contribute to managing flood and coastal erosion risks, including the Association of British Insurers, Royal Society for the Protection of Birds, Association of Drainage Authorities, engineering consultants and contractors, The National Flood Forum, National Voice for Coastal Communities, Royal National Lifeboat Institution, Red Cross, Salvation Army, the armed forces, professional institutions, universities, Country Land and Business Association and National Farmers Union, River Restoration Centre, as well as land owners and land managers (The Stationary Office, 2011).

2.5 Flood Risk Governance

Flood risk governance involves many actors operating at national, subnational and local scales including the DLUHC, the EA, LLFAs, LAs the HA, utility and infrastructure providers, NE, EH and communities.

At the national level, the DLUHC is responsible for setting policy and for policy enforcement. Those policies seek to prevent inappropriate development in areas at risk of flooding. The Department works closely with those national organisations overseeing flood risk (DEFRA and the EA), ensuring planning policy is implemented in line with flood risk policy, and overseeing the recovery phase after an incident.

At a strategic level, the EA manages all sources of flooding and coastal erosion as defined by the Flood and Water Management Act 2010. It is a statutory planning consultee and advises planners and developers on avoiding inappropriate development in flood risk areas and facilitating climate-resilient development. It does this both at the strategic level, advising local planning authorities on their spatial plans for future development, and at the site-specific level advising on individual development proposals at the pre-application and application stages (Foley, 2021). However, its power is curtailed with developers pushing hard to meet housing targets within areas and delivering wider policy aspirations.

Strategic local planning is undertaken via the preparation and adoption of local plans under the NPPF by the LPAs, which also have responsibility for assessing and approving individual planning applications and developments. Local planning provides the means for community engagement on flood risk management by involving the communities in the development of planning policies for their areas. This means that LPAs must ensure that flooding is considered when preparing Strategic Flood Risk Assessments (SFRA) (DEFRA, 2014), which directly allocates land for development, and when assessing planning applications (Alexander, et al., 2016). There is also a statutory requirement⁶⁰ for LPAs to consult the EA for proposed developments in areas at risk of flooding.

Flood and coastal erosion risks can only be effectively managed if they are properly understood. The EA is responsible for developing and maintaining national information on current and future risks arising from all sources of flooding and coastal erosion, supplemented by information provided on local risks by LLFAs. These risks are combined and represented through strategic plans such as catchment flood management plans and shoreline management plans, and at a local level in England via LLFAs' local

⁶⁰ under the Town and Country Planning (Development Management Procedure) (England) Order 2010 para q.

flood risk management strategies and multi-agency flood plans by local resilience forums.

Historically, flood risk was predominantly considered locally but since 2001, this has been strengthened nationally with the introduction of specific flood-related policies including Planning Policy Guidance 25 (DTLR, 2001), Planning Policy Statement 25 (DCLG, 2006) and instruments such as SFRAs and FRAs. Planning Policy Statement (PPS) 25: Development and Flood Risk sought to ensure that climate change was also considered by those implementing flood and coastal erosion risk management measures through the promotion of robust and resilient solutions. Resilience and resistance in new buildings as set out in *Making Space for Water* were encouraged and promoted by PPS25. Owners of existing buildings were encouraged to incorporate resilience and resistance in their properties, ensuring that they would recover quickly following a flood event and helping them to reduce the time, stress, health problems and repair costs associated with flooding. In terms of new buildings, updates to the Building Regulations ensured that new buildings on floodplains were appropriately flood-resilient, accompanied by the Code for Sustainable Homes.⁶¹ Building regulations in the UK do not specifically deal with the risk from flooding to domestic or non-domestic buildings. Flood risk was to be dealt with indirectly via Approved Document C *Site Preparation and Resistance to Contaminates and Moisture* (2004) and Approved Document H (2002) *Drainage and Waste Disposal* (Kelly and Garvin, 2007). For existing buildings, the government recognised that the majority were already on a floodplain, and emphasis was placed on encouraging property owners to make those buildings more resilient.

Planning Policy Guidance 25: Development and Flood Risk (ODPM, 2001) ‘advised local planning authorities on how to manage flood risk as part of the planning process’ (Kelly and Garvin, 2007, p.343). Opportunities to reduce flood risk in existing communities ‘were to be carried out using techniques such as recreating and safeguarding functional flood plains and wash lands, designing green spaces, and introducing sustainable drainage systems’ (ibid), all promoted through local plans.

⁶¹ Code for Sustainable Homes Technical Guidance, 2010. Subsequently withdrawn in March 2015 and replaced by streamlined national technical standards.

The EA works with local authorities and developers to prevent inappropriate building or redevelopment in areas of high flood or coastal erosion risk, with local plans including appropriate policies that restrict inappropriate development in areas at risk and development permission being withdrawn for inappropriate development. The key to this is ensuring risks are identified in local strategies and that there is good cooperation between LLFA and the planning authorities. This ensures that local development and other plans include appropriate policies and avoid inappropriate development in areas at risk.

Increasing public awareness of the risk that remains and engaging with people at risk to encourage them to take action to manage the risks that they face and to make their property more resilient are key requirements of FCERM. People who live and work in flood and coastal erosion risk areas are seen as being vitally important in managing the risks they and their communities face. This is supported by RMAs. Communities are involved with flood risk management through flood action groups formed in collaboration with the National Flood Forum, a charity set up to support and represent people at risk from flooding.

2.6 Community Participation Flood Risk Management

As mentioned above, an important element of FCERM is the shift in management away from professionals towards encouraging greater responsibility by communities and individuals whether as local partnerships, forums, flood action groups or community groups, undertaken as semi-autonomous flood risk governance (Alexander, et al, 2016). Communities and individuals are asked to take responsibility for understanding the risks associated with flooding, and not to rely upon strategic organisations taking responsibility on their behalf. They are encouraged to understand where flooding and coastal erosion occurs, and to take appropriate steps to protect themselves and others, a key aim of this research. This is undertaken by signing up to the EA's flood warning systems, ensuring individuals and organisations have adequate insurance, participating in preparation of a flood plans or community flood action plans, joining a local flood or coastal action group, taking steps to protect their own property, and monitoring and reporting the condition of FCERM assets. However, the degrees to which those groups can take responsibility for the risks is questionable. In some areas the risks are large and require extensive professional partnering to ensure that technological solutions are

developed. In other areas, the risks are less, or considered multiple and therefore more community involvement in developing and implementing the solutions is possible.

To assist with that process, EA, LLFA's and coastal erosion risk management authorities work in partnership with communities so that awareness of flood and coastal erosion risks is increased. Community and partnership working is seen as an important aspect of FCERM. RMAs are encouraged to work with communities so that they better understand the risks and actively prepare for them, being directly involved in decision-making and risk management. The intention is that decision making and ownership for risk management measures should be as local as possible, but within a catchment, coastal cell and or national framework, so that fair allocation of funds is agreed. The risk management solutions are encouraged to also be forward looking, taking account of potential risks that may raise in the future and being adaptable to climate change. They are urged to work with natural processes where possible and enhance the environment through measures such as management re-alignment schemes and upland grip blocking (The Stationary Office, 2011).

Partnership working ensures information on risks is up to date and liaison is undertaken between the partnership group and those groups who may be better placed to provide links with the communities, such as flood action groups. By working in partnership with communities, LLFA's can raise awareness of flood and coastal erosion risks. Partnership working also enables community adaptation, via community adaptation planning and engagement and implementation of innovative adaptive solutions. DEFRA, DLUHC, the EA and LLFA's support this work by raising awareness and understanding and assisting the wider take up of flood resistance and resilience measures to reduce damage to buildings, by seeking to prevent water from entering the property and or seeing to reduce the damage that may happen if water does get in. However, partnership working is only as good as the organisational structures in which it works allows. Many of the environmental organisations are under considerable pressures, and these pressures sometimes inhibit the successes of partnership working, leaving community groups exasperated with the process.

FCERM is seen as a means for promoting multiple benefits, not only the reduction of risk to people and property, but also enhancing and protecting the built, rural, and natural environments, by preventing loss and damage to habitats and heritage assets and

reducing pollution. One means for achieving this was through the promotion of the use of SuDS, a key focus of this research.

2.7 Spatial Planning

In England spatial planning is primarily embedded at local levels of government, although local institutions are required to adhere to national planning policy. The key rules and legislation related to spatial planning include the National Planning Policy Framework (NPPF) 2012, now 2021 (MHCLG,2021), which drives development including improved environmental outcomes aligning wider government policies, through requirements to produce local design guides or guides with the intention of creating well-design, beautiful and safe places, with significant weight be placed on development which reflects local and government design guidance and policy. The Town and Country Planning Act 1990⁶², The Localism Act 2011⁶³, sequential and exception tests, and Planning Policy Guidance 25 (DCLR, 2001). Multiple organisations are involved with spatial planning, including the Department for Communities and Local Government (DCLG), now named the Department for Levelling Up, Housing and Communities (DLUHC), Local Planning Authorities (LPA's), Environment Agency (EA), planning applicants or developers and Lead Local Flood Authorities (LLFA). Some of these have responsibilities for both strategic spatial planning such as plan making and spatial planning decision making (Alexander, et al.,2016).

Spatial Planning is a type of planning concerned with arranging physical space and guiding future activities within it according to suitability and other accepted principles (Kidd, 2007; Larsson, 2006). It involves attempts to plan processes of social, economic, and environmental change to bring about certain ends, together with drawing up plans, maps, or diagrams that indicate where socio-spatial activities should take place (Yamagata & Yang, 2020). In flood-prone areas, spatial planning is expected to contribute to flood mitigation (Howe & White,2004; White & Richards, 2007), as it can influence the incidence of flooding and its consequential damage, by regulating the locations of activities, types of land use, scales of development, and designs of physical structures (Neuel & Van Der Knapp, 2010; White & Richards, 2007). However, this

⁶² Town and Country Planning Act 1990.

⁶³ Localism Act 2011.

does not always occur, with current tensions being shown between developers and LPA's over achieved housing targets, which override in some instances flood mitigation measures.

Spatial planning is an important tool to drive proactive, preventive adaptation of human settlements to the hazards caused or exacerbated by changes in climate patterns and extreme events (ADB, 2016; UN-HABITAT, 2014). The composition of flood risk and climate change enhanced new challenges and new factors for spatial planning in both urban and rural level (FRMRC, 2007). It is stated that "We use the term spatial planning in its broader sense to refer to actions and interventions that are based on critical thinking about space and place" (RTPI, 2003). Responding to adaptation of climate change impacts and mitigation of flood risks are ideally major and important priorities for the regional and local level authorities when developing and delivering policies in many jurisdictions, where spatial planning plays a significant role to identify climate change impacts and vulnerability (PPS 25, SPG). However, this does not always occur when Local Authority officers are under pressure to deliver, and those pressures outweigh identification of impacts and vulnerability.

Getting the right kind of growth in the right places is one of the main ways of achieving climate resilient places. Effective spatial planning is an essential tool for making land use choices that help to achieve greater flood and coastal resilience, as well as wider environmental benefits good place making is a central theme in the National Flood and Coastal Erosion Risk Management (FCERM) Strategy for England.

2.8 SuDS

More recently spatial planning process have begun to recognise surface water flood risks more formally through the consideration of SuDS⁶⁴. The government was committed to ensuring a greater take-up of SuDS a key premise of this research, and integrated urban drainage management techniques were facilitated where appropriate (DEFRA, 2005b, p29).

The FWMA 2010 included provision for increased uptake of sustainable urban drainage measures in new developments and redevelopments, wherever possible, by introducing

⁶⁴ Sustainable Urban Drainage Systems (SuDS). For a detailed explanation refer to Chapter 3.

standards for their design, construction, maintenance, and operation⁶⁵ as specified in the 2011 White Paper, and by removing the automatic right for such developments to connect to the public sewer network. Connection would depend on the drainage system being approved, meeting new National Standards for SuDS, and thus encouraging alternative more sustainable measures. Many of the requirements refer to the National Standards for Sustainable Drainage Systems, which were published in draft in 2011 to accompany the 2010 Act and consulted on during 2012. These standards promoted SuDS alongside other regulations and statutes including the National Planning Policy Framework (The Frameworks, 2012, paragraph 103, now 2021) which supports the use of SuDS; Schedule 3 of the FWMA (2010), which creates a compulsory approvals regime for all construction works with drainage implications, and considers where SuDS should be incorporated within the development; and S106A of the Water Industry Act (WIA, 1991) (inserted by paragraph 16 in schedule 3 of the FWMA 2010) which prohibits SuDS from being connected to the public surface water sewer or combined sewer unless the SuDS (including the manner of connection) has been approved.⁶⁶

The draft National Standards for Sustainable Drainage Systems set out the design, construction, operation, and maintenance of SuDS. The design principles endeavoured to manage surface water runoff at its source, where reasonably practicable, in line with the Pitt Review's recommendations. Likewise, surface run-off was to be managed on the surface where reasonably practicable and, where utilising public space, this was to be undertaken in an integrated manner so that it served more than one function. Surface water run-off was to be discharged into the ground unless the rate of surface run-off would be greater than the rate at which water could infiltrate the ground, in which case the surface run-off should be discharged into a surface water body, or a public sewer or local highway drain or combined sewer. The design of the drainage system was to

⁶⁵ Flood and Water Management Act 2010, Section 31, Schedule 3, which makes provision for the publication of national standards for the design, construction, maintenance and operation of new SuDS; establishes unitary or county councils as SuDS Approval Bodies (SABs); requires all construction work which has 'drainage implications' to gain approval for its drainage system from a SAB before it commenced; requires the SAB to consult with several bodies, including the Environment Agency, any relevant Internal Drainage Board and any relevant sewerage company when considering the application; and provides the SAB with the power to attach conditions to any approval it grants, including the provision of a non-performance bond.

⁶⁶ At the time of the empirical work SuDS was new and novel.

consider the impact of rainfall on any part of the site and any estimated surface run-off flowing onto the site from adjacent land. The drainage system was to be designed so that unless an area was designed for flood management under the Local Flood Risk Management Strategy, flooding would not occur in any part of the site, in either a 1 in 30-year or 1 in a 100-year rainfall event, in any part of a building including basements or utility susceptible to water (paragraph D5).

The measures in Schedule 3 were never formally adopted in England. Following criticism by developers, who felt that SuDS approving bodies (SABs) would complicate the planning process and potentially cause delays in development and conflict with the need for housing and economic recovery (House of Commons, 2015), Schedule 3 was withdrawn, withdrawing SuDS as a legal requirement and the notion of SABs). Instead, in England, SuDS are treated as an additional material planning consideration within the existing planning system (DEFRA / DCLG, 2014), with the strengthening of planning policy in 2015 to “ensure that sustainable drainage systems are provided in new major developments where appropriate, and that clear systems are in place for ongoing maintenance over the lifetime of the development” (Secretary of State for Environment, Flood and Rural Affairs, 2017). The Planning Practice Guidance was amended, and DEFRA also published non-statutory technical standards for the design, maintenance, and operation of SuDS to drain surface water (Defra,2015). The Schedule did come into effect in Wales, following commencement by the Welsh Ministers, in January 2019” (MHCLG,2018, P38). Likewise, Northern Ireland. “Scotland has a strong policy in presumption of SuDS” (Secretary of State for Environment, Flood and Rural Affairs, 2017); all illustrating the benefits of devolved administrations and policy adoption.

Greater powers and responsibilities for tackling local sources of flood risk were also promoted within FCERM, with a new role for lead local flood authorities (LLFAs), set out under the Flood and Water Management Act (2010)⁶⁷, which brought partners

⁶⁷ The Flood and Water Management Act (FWMA) aimed to provide a better, more comprehensive management of flood risk in England and Wales. It sought to help safeguard against unaffordable rises in surface water drainage charges and protect water supplies (Landscape Institute, 2014), achieving this largely by adopting the 92 recommendations in the response to the Pitt Review, and objectives set out in the DEFRA’s Making Space for Water, and embodied in the FWMA (Engineering Nature’s Way, 2013). The FWMA in a ‘slimmed down’ form was granted Royal Assent on 8th April 2010, entering the statute books just before the end of the last Labour government, initially intending it to be the

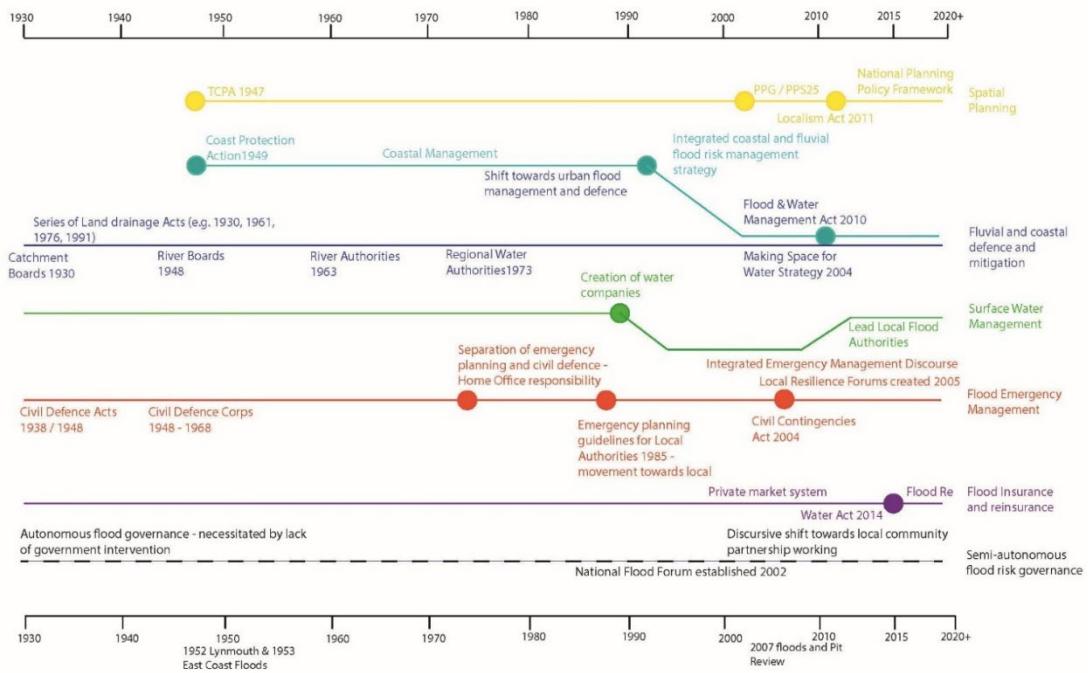


Figure 2-1. Timeline highlighting key changes to Flood Risk Governance Arrangements in England, modified from Figure 2.6 Alexander, et al., 2016. Analysing and Evaluating Flood Risk Governance in England – Enhancing Societal Resilience Through Comprehensive and AI

together to ensure things got done. Refer to Figure 2.1 for the Timeline highlighting key changes to Flood Risk Governance Arrangements in England.

2.9 Chapter Summary

Flood policy and planning controls in the UK were extensively reviewed, which highlights how they have evolved concurrently with awareness of flooding as an issue linked to climate change. Policy and regulation influence, guide and encourage our actions. Changes to climate and populations that have led to changes in the ways we live have been shown potentially to be putting our lives at risk. Recent policy shifts have aimed at reducing those risks by encouraging greater acknowledgment of the risks and management for the flood risks through FCERM, and promoting more sustainable ways of living, centred on making space for water within spatial planning, alongside the wider concepts of deliberative democracy. The evidence demonstrates the benefits of these shifts. Changes endorse greater use of SuDS and encourage dispersal of policy away from central government (promoting citizen participation and participatory

vehicle for transposing the European Floods Directive (Directive 2007/60/EC of the European Parliament) into law for England and Wales.

planning through the Localism Act and Neighbourhood Planning, which envisages a participatory role, as advocated by Arnstein), but the review does not reveal the role and success of local actions to implement SuDS.

Chapter 3. Extended Literature Review: Learning to Live with Water

3.1 Introduction

This chapter sets the scene for why different types of site stormwater management systems are important. It reviews and details the various types of system, including Integrated Urban Water Management (IUWM), Water Sensitive Urban Design (WSUD), Sustainable Urban Drainage Systems (SuDS), and Low Impact Development (LID), and develops a specific type for this research, known as Low Impact Sustainable Urban Drainage (LISUD). It analyses the benefits of SuDS and reviews the different types of LID, including conservation designs, infiltration practices, run-off storage practices, run-off conveyance practices, filtration practices and low impact landscaping. Finally, it touches upon the challenges witnessed in the UK, The Netherlands and Denmark – countries witnessing similar issues to those faced in the UK, but countries which have been adopting alternative measures for far longer than the UK, and hints at the lessons that could be learned from The Netherlands in particular, being a deltaic country, where learning to live with water is a key priority, and which has a strong track record in participatory planning and citizen involvement.

3.2 Background

Throughout Europe, there has been an increase in the frequency and depth of flooding. The causes are the spread of urbanisation and the affiliated impervious surfaces exacerbated by climate change, which affects the intensity and frequency of precipitation (Joachim, Tourbier and White, 2007). These changes alter substantially the volume and peak flows of storm water run-off, with the volume of run-off from impervious surfaces being up to 20 times that of undeveloped sites (Lampe, 2005). In an undeveloped environment only 10% of rainfall forms run-off, with 40% evaporating and 50% infiltrating into the ground. In urban areas, however, with 75 – 100% paved surfaces, over 55% of rainfall forms run-off, with only 30% evaporating and 15% infiltrating (Joachim, Tourbier and White, 2007).

Increased populations with greater areas of impervious surfaces cause additional run-off water, requiring increased capacity within the system to maintain the same effectiveness as if the areas had not been made impervious. To accommodate this increased capacity is costly. It causes considerable upheaval to existing systems and

has been proved ineffective (Monbiot, 2014), even before likely changes to our climate are factored in. To combat these issues and reduce costs, alternative approaches that minimise impervious cover and maximise infiltration of rainfall have been developed.

Sustainability has emerged in recent years as an ‘extension to previous environment protection endeavours’ (Wong, et al., 2012, p.1). The pursuit of sustainable urban environments involves development that ‘neither depletes natural resources nor degrades the health and amenity of land and water environments. It is an emerging challenge as growing urban communities seek to minimise their impact on already stressed water resources’ (Wong, et al., 2012, p.1). Harnessing the potential of stormwater to overcome water shortages, reducing urban temperatures, improving waterway health, and lessening the impacts associated with climate change that leads to flooding, are all aims advocated in this research.

On-site storm water management, or sustainable drainage systems (SuDS), were conceived to satisfy the ecological, social, and economic aspects of sustainability (Joachim, Tourbier and White, 2007). In certain European countries, SuDS are supported by supplemental institutional arrangements, covering run-off attenuation, water quality improvements, infiltration, and detention. In the USA and the UK, ordinances have been passed for water quality control, infiltration, and on-site detention up to 1 in 100-year storm frequency (Tourbier and Westmacott, 1974).

Urban stormwater is defined as storm run-off from urban environments that consists predominantly of run-off from impervious areas such as roads, roofs, footpaths, and car parks, during rainfall events (Wong, et al, 2012). Storm run-off can also be attributed to pervious areas such as gardens and lawns, where intensity or duration of rainfall is such that stormwater runs off from those areas, contributing to stormwater flows. Traditionally stormwater infrastructure in urban areas has been built to convey urban stormwater rapidly away from an area to receiving waters such as waterways, estuaries, groundwater reservoirs, and the sea. That process of conveyance also transports pollutants derived from urban activities leading to the deterioration of water quality in many of our towns and cities.

Conventional storm water systems are designed to prevent site flooding and promote good drainage by conveying run-off to best management practice facilities (BMP – terminology used specifically in the USA) that control storm water, or to streams

(USEPA, 2000). A conventional system decreases deep percolation of groundwater, increases run-off volume, and affects the timing, frequency, and rate of discharge, all of which can cause flooding, water pollution and stream erosion (USEPA, 2000; Paul and Meyer, 2001).

For most of the last century, a process of rapid conveyance discharged into streams and rivers, managing storm water run-off from impervious surfaces. Around the world, large cities combine both storm water and sanitary sewers, conveying wastewater to treatment plants which successfully treat small-scale storm events, reducing pollution to the river network (Roy, et al., 2008). However, as our climates have changed with increased storms and hurricanes (IPCC, 2018), and our cities have grown, these systems have not been able to cope. Regulations like the Clean Water Act (CWA, 1972) in the USA, Water Sensitive Urban Design Regulations (1994) in Australia and the National Standards for Sustainable Urban Drainage SuDS (2011) in the UK described earlier in chapter 2, were developed out of a perceived need for change at government level (Roy, et al., 2007; Runhaar, et al., 2012). They indicate a shift via national standards that encourage more sustainable approaches to storm water management, with the intention of both reducing pollution contaminants in the water and hydrological alteration to the site. For clarity regarding terminology, the different types of stormwater management are reviewed below, focusing upon on-site source control measures, leading to the proposed formation of a new type, low impact sustainable urban drainage (LISUD). This new classification combines the specific structural and non-structural techniques of urban storm management of SuDS, with the broader principles of urban water cycle management drawn from LID, focusing upon specifically low impact measures of on-site source control measures.

As a ‘deltaic country with 26% of the country being located below sea level and a further 29% being flood sensitive’ (Netherlands Environmental Assessment Agency, 2004, cited in Roth, et al., 2017), ‘Living with Water’ in the Netherlands is a high priority. It was acknowledged in 2000 that the current water management system based on technological solutions for prevention in the Netherlands was inadequate, and that more space needs to be made for water. It was also recognised that the citizens of the Netherlands did not recognise the impacts of the risks. Consequently in 2003, “The Netherlands Live with Water” public awareness campaign was launched (Kazmierczak & Carter, 2010). That campaign focused on public engagement as an integral aspect of

the Netherlands climate change adaptation strategy and emphasised the need to store water along both the main national and regional water management systems. The key aims of the campaign as highlighted by Kazmierczak & Carter were

- ‘To increase the awareness of water problems, stimulating a sense of urgency without frightening the people;
- To communicate that a new approach and policy for water management was needed and the reason why;
- To increase knowledge of what the new policy (‘giving more room to water’) means and what the consequences will be, and
- To get acceptance of the idea that far reaching measures are needed to keep Holland safe in the future, even if these measures have unpleasant personal consequences’ (2010, p 21).

‘Flood risk management is an ongoing concern, especially so with the new urgency caused by climate change and its imputed consequences’ (Roth et al., 2017, p.2). The Netherlands, as described in Chapter 7 and as highlighted by Roth et al. (2017, p.2) has an ‘established system of parliamentary democracy and water management traditions based upon what the Dutch refer to as “poldering” – seeking inclusive negated solutions to societal problems’. It is worth reviewing why the Netherlands has been so successful in developing and implementing localised flood prevention measures, termed here LISUD. (Refer to Chapter 7 where the case study analysis reviews two examples in Holland (Rotterdam and Amsterdam), and one case in Denmark (Copenhagen), to determine lessons that can be carried over to the UK to stimulate greater implementation and development there.)

3.3 Types of Global Site Stormwater Management Systems

Urban drainage dates to at least 3000BC (Burian & Edwards, 2002). The focus is on conveyance of water away from urban areas. Recently ‘urban drainage and related literature’ has witnessed the development and adoption of a range of new terms, that spotlight a more holistic approach (Fletcher et al., 2014), including integrated urban water management (IUWM) (Biswas,1981), low impact development (LID) (Department of Environmental Resources, 1999), sustainable urban drainage systems (SUDS) (CIRIA, 2000) water sensitive urban design (WSUD) (Whelans et al., 1994; Wong, 2007), best management practices (BMPs) Schueler, 1987). These terms operate at a variety of different scales and for a variety of different functions. They are reviewed

here from the broadest to the narrowest, providing the context to the research, before focusing upon those that are most relevant to this research.

3.3.1 Integrated Urban Water Management (IUWM)

At the broadest level, IUWM relates to the integrated management of all parts of the water cycle within a catchment (Biswas, 1981). It achieves this by prioritising liveability within cities, ensuring not only that green open space is provided for the increased population, but also water services, rethinking how water, wastewater and stormwater services are delivered. IUWM principles recognise the water cycle as an integrated system. It considers all requirements for water, both anthropogenic and ecological. It thinks about the local context, and accounts for environmental, social, cultural, and economic perspectives, whilst striving for sustainability, by aiming to balance environmental, social and economic needs in the short and medium terms (Mitchell, 2006). However, IUWM cannot be delivered solely by the water sector alone. It requires ongoing collaboration between land-use planning, local government, and the water sector in both policy and planning at different scales to be effective. In current use, the term is closely linked to WSUD, water sensitive cities and LID, as it extends well beyond just dealing with the management of urban drainage (Fletcher et al., 2014). IUWM is significant as it brings together water supply, sanitation, storm- and wastewater management and integrates these with land use planning and economic development to create a holistic approach.

3.3.2 Water Sensitive Urban Design (WSUD)

Water Sensitive Urban Design (WSUD) offers another broad conceptual solution to the process, 'striving to create greater harmony between water and communities by creating attractive, functional and valued places to live that are sensitive to the needs of the natural water cycle' (CIRIA, 2013, p.4), in effect encouraging people to re-learn how to live with water. WSUD was developed from two different disciplines, 'integrated urban water cycle planning and management' and 'urban design' (Wong and Brown, 2009). The term 'Water Sensitive Urban Design' originated in Australia, with the first known reference to it being by Mouritz (1992). It gained popularity globally in the last ten to twenty years as 'an encompassing term that frames all aspects of the water cycle within the urban design process', with the 'water sensitive' prefix becoming a short form used to 'delineate designs or outcomes where the WSUD process has been applied' (CIRIA, 2013, p.4). WSUD and its derivatives have gained popularity in

Australia and the USA, but recently through extensive promotion by organisations such as ARUP, AECOM, The Landscape Institute (LI) and CIRIA, are now also being more commonly adopted in the UK.

The objectives of WSUD as listed by Whelans et al., include managing water balance, maintaining and where possible enhancing water quality, encouraging water conservation and maintaining water-related environmental and recreational opportunities (1994). As a holistic process for managing an urban area's water cycle, WSUD seeks to provide resilience against climate change (CIRIA, 2013). It limits vulnerabilities through better management, using water sensitive processes that make 'urban areas more tolerant to increased precipitation and better equipped to supply water during times of drought' (CIRIA, 2013, p.5), which minimises impact on already stressed water resources (Wong, et al., 2012).

WSUD is often described as a 'philosophical approach to urban planning and design that aims to minimize the hydrological impacts of urban development on the surrounding environment" (Lloyd et al., 2002, p2). Stormwater management under WSUD provides "flood control, flow management, water quality improvements and opportunities to harvest stormwater to supplement mains water for non-potable uses' (Lloyd et al., 2002, p2.). WSUD explicitly focuses on 'building in' a sustainable water approach to the planning and urban design process. It addresses the wider sustainable development objectives of several international conventions, policy guidance and regulations; and builds in the opportunity for social capital via localism. Communities with shared values around water usage, quality and storage are encouraged to participate in local planning processes via Neighbourhood Plans (NP) and Neighbourhood Development Orders (NDO's). Through participation with Parish Council NP's water quality, conservation and storage capacities are discussed and potential opportunities determined. As a holistic approach, WSUD looks at water efficiency and available water resources in an area and 'seek(s) to match a supply of suitable quality and availability to appropriate uses' (CIRIA, 2013).

Despite WSUD being considered originally quite broad in its definition, its principal application in the early years appears to have been stormwater management (Fletcher et al., 2014). More recently, stormwater management under WSUD has been considered within an integrated framework, enabling a consideration of the entire urban water cycle

(Mouritz et al., 2006; Wong, 2007). In Australia, the term WSUD is now often used in parallel with the term water sensitive cities. However, Brown and Clarke highlight the important distinction between the two, water sensitive city describes the destination (objective), while WSUD described the process (2007).

3.3.3 Green Infrastructure (GI)

Green infrastructure (GI) emerged in the USA in the 1990s (Walmsley,1995). GI is both a broad concept and a process (Benedict and McMahon, 2006). It goes far beyond stormwater. Its origins lie both in landscape architecture where it promotes a network of green spaces (Benedict & McMahon, 2006) and landscape ecology (Forman ,1999). As a concept it influences urban planning and layouts to maximise inclusion of green space hubs and corridors, but as a process also attempts to maximise the benefits of such green spaces, identifying the potential ecosystem services (Centre for Neighbourhood Technology, 2010). One such potential usage is to assist stormwater management (US EPA, 2012), with the term often being interchangeable with BMPs and LID (Struck et al., 2010) mentioned later, hence its inclusion within this literature review.

As a stormwater management process, GI is seen as a network of decentralised stormwater management practices, that can capture and infiltrate rain where it falls, thus reducing stormwater run-off and improving the health of surrounding waterways (Foster et al., 2011). It includes practices such as green roofs, rain gardens and permeable pavements.

The central tenet of GI is the use of vegetated systems to deliver desired ecosystem services (Fletcher et al., 2014). Unlike, single-purpose grey stormwater infrastructure which uses pipes to dispose of rainwater, green infrastructure uses vegetation and soil to manage rainwater where it falls, in so doing not only providing stormwater management but also flood mitigation and air quality management (Fletcher et al., 2014). This process is significant to this research in that it offers one type of opportunity for capturing and storing water, which is the type of opportunity that communities are likely to consider beneficial in their areas, and potentially a type of opportunity that they may be willing to implement themselves at a small scale, or alongside others through Neighbourhood Plans via localism.

3.3.4 Sustainable Urban Drainage Systems (SuDS)

From the late 1980s, stormwater management in the UK started to adapt, and by 1992 the “Scope for Control of Urban Runoff” (CIRIA, 2001) was published, which provided technical guidance on control options. During the 1990s, acceptance of stormwater management advanced rapidly in Scotland, with the Scottish Environmental Protection Agency pushing for the implementation of stormwater best management practices (BMPs) in new developments (Fletcher et al., 2014), where BMPs refer to a type of practice or structured approach to prevent pollution. It is currently commonly referred to as pollution prevention activities, consistent with Pollution Prevention (United States of America, 1990), including both non-structural practices such as town planning, strategic planning and institutional controls, pollution prevention procedures and education and participation programs; and structural ones such as on-site and regional treatment like stormwater ponds and wetlands and after prevention and source control mechanisms.

SuDS as a term derived from the concept of the sustainable drainage triangle (quantity, quality, habitat/amenity) initially set out by D’Arcy (1998), with Jim Conlin of Scottish Water first coining the term SuDS back in October 1997. In the UK, “SuDS consist of a range of technologies and techniques used to drain stormwater / surface water in a manner that is (arguably) more sustainable than conventional solutions” (Fletcher et al., 2014, p529). The aim is to replicate as closely as possible the natural, pre-development drainage from the site. SuDS provide a range of flexible drainage techniques that alter the focus of drainage design, practice, construction, and maintenance to facilitate a higher consideration for society in general and the receiving environment (CIRIA, 2000; Joachim, Tourbier and White, 2007), in tackling local water issues. There are several different types of SuDS, which can be used either as an individual system or an integrated network of techniques. Whilst each SuDS measure might only bring limited benefit, the cumulative effects over an entire catchment can be significant. SuDS are typically a sequence of stormwater practices and technologies that work together to form a management train (Fletcher et al., 2014). SuDS are considered more sustainable than conventional drainage techniques and, as explained by Joachim, Tourbier and White 2007, offer flood-related, water quality, ground water and river-related benefits.

In Scotland, SuDS have been mandatory in most new development since 2003 (WEWS, 2003). They were introduced to improve water quality in receiving waters. They also

safely convey design storms for a range of recurrence intervals up to 200 years (Fletcher et al., 2014). The Scottish EPA oblige developers to use a multi-element management train approach (SEPA, 2010) to manage water quality (Duffy et al., 2013); one which promotes division of the area to be drained into sub-catchments with different drainage characteristics and land uses each with its own drainage strategy, from source control, to site control with infiltration and evapotranspiration, to regional control and finally a receiving water course. The fundamental aim is prevention (preventing runoff by reducing impermeable areas), however if that is not possible then source control and site control are favoured. Only if those fail, would regional control be utilised. However, in England and Wales, SuDS are aimed more at water quantity than quality (Defra, 2011).

SuDS aim to manage the discharge of surface water run-off from a site through various means either installed by developers at the site level, or by professionals or community groups as post-development retrofits. The distinctions between the various measures described so far are mainly surrounding language and understanding. The main distinctions are around size of measure, with some focusing on broad strategies at a regional level that are all encompassing such as WSUD, and others like SuDS predominantly focused as a site level and entail smaller measures that relate to specific problems related more to stormwater management.

Table 3-1. Benefits of adopting SuDS (Source: Joachim, Tourbier and White (2007, p.17)

Flood related benefits:
Attenuation of run-off prior to concentration
Reduction of run-off peaks
Reduction of run-off volumes
Reduction of flood-related erosion and deposition in channels and reservoirs
Water quality benefits:
Through a passive level of treatment, the quality of run-off is improved *
Groundwater benefits:
Pre-development groundwater recharge rates can be maintained through infiltration
River related benefits:
Reduction in floodwater flows that cause channel degradation through erosion of stream beds and banks
Minimisation of adverse flood impacts on the environment
Social and economic benefits:
Reduction of flood damage to property
Reduction of flood-related public health and safety problems
Creation of visual enhancement and amenity
Passive recreation
Employment opportunities in construction and maintenance
* (CIRIA, 2000; SEPA and EA, 1999)

3.3.5 Source Control

Moving towards narrower definitions, source control⁶⁸ as a term was initially used to clarify between on-site stormwater systems and practices that were used at the source where run-off was generated, as opposed to larger detention basins that are constructed at the downstream end of a drainage network (Fletcher et al., 2014). Early stormwater management planning in North America focused on detention to mitigate increased runoff, treating on-site (or source control) practices as a subset of detention techniques, with essentially only quantity control as the objective (American Public Works Association, 1981; Whipple et al., 1983).

With the advent of LID in the early 1990s, described in more detail in the next section, the term source control became associated with the use of small-scale practices disseminated throughout the water shed to reproduce or maintain pre-development hydrological conditions (Fletcher et al., 2014). Source control helped mitigate stormwater impacts on receiving waters, by promoting flow control, evapotranspiration and infiltration as close to source as possible, minimizing the hydrologic and water quality impacts of development, so promoting sustainable development principles (Rivard et al., 2005). This approach is extremely useful from a water management perspective and benefits the wider area, by minimising localised impacts in a local way. However, source control as a terminology is often related to measures implemented by professionals on behalf of others, and as such has had limited effect as a measure implemented by local communities.

3.4 Typology of Low Impact Development

‘Sustainable development challenges us all to accommodate development in ways that enhance or protect the environment’ (HMSO, 1995, p.129). As a way of meeting these aspirations, ‘low impact development’ together with a hierarchy of lesser categories of terminologies has been encouraged. Low impact development has two meanings. The first, from the UK, refers to developments with little or no environmental impact, whilst the second, adopted in the USA and Canada, refers to an approach to planning and engineering that manages storm water run-off at the source, using uniformly distributed decentralised micro-scale controls modelled from nature, leading to less run-off and

⁶⁸ Source Control: The range of approaches and techniques for local, on-site management and control of stormwater runoff at the point of rainfall (Ellis et al., 2004).

pollution, and so protecting developing watersheds. In this sense, it refers to the narrowest definition of all the terminologies described here.

The original intent of LID was to “achieve a natural hydrology by use of site layout and integrated control measures” (Fletcher et al., 2014). The most influential early use of the term was in Prince George’s County, Maryland, USA where the term was used to distinguish the site design and catchment wide approach from the common stormwater management approach, which typically involved conveyance to large end-of-pipe detention systems. LID was characterised by smaller-scale stormwater treatment devices such as bioretention systems, green roofs and swales, located at or near the source of runoff (Fletcher et al., 2014). Low Impact Development (LID) is similar in approach to WSUD, aiming to ‘maintain or replicate the pre-development hydrologic regime using design techniques to create a functionally equivalent hydrologic landscape’ (USEPA, 2000; USEPA, 2007; USEPA, 2009; Goodwin, et al., 2008; Roy, et al., 2008), but refers to a narrower scale, focusing upon specific measures rather than wider principles. LID is adopted both for new developments, to reduce the impacts of the development and replicate the pre-development hydrology of the site, and in the process of retrofitting to existing schemes, reducing run-off volumes, pollution, and the overall impact of the scheme. (USEPA, 2007). LID practices found in the USA, Australia, and the UK, as referred to in comparative case studies (USEPA 2000, USEPA 2007; Emanuel and Burris, 2012 and Goodwin, et al., 2008) include:

- **Conservation designs** which minimise run off from the site by preserving open space, including cluster development, reduced pavement widths, shared driveways, reduced setback and site finger printing;
- **Infiltration practices** that are engineered landscape features designed to capture and infiltrate runoff including infiltration basins and trenches, porous pavements, bio-retention areas (bio-swales, rain gardens, etc.) and other vegetated treatment systems;
- **Run-off storage practices** including parking lots, street and sidewalk storage, rain barrels, depression storage in landscape islands and tree shrub and turf depressions, green roofs;
- **Run-off conveyance practices** which slow water flows, lengthen the run-off time and delay peak flows from the area, which can then be discharged off-site including grass swales and grass-lined channels, long flow paths, smaller culverts and pipes and inlets;
- **Filtration practices** which are used to treat run-off by effectively filtering it through media designed to capture pollutants including bio-retention, rain gardens, vegetated swales and vegetated filter strips/buffers; and finally.

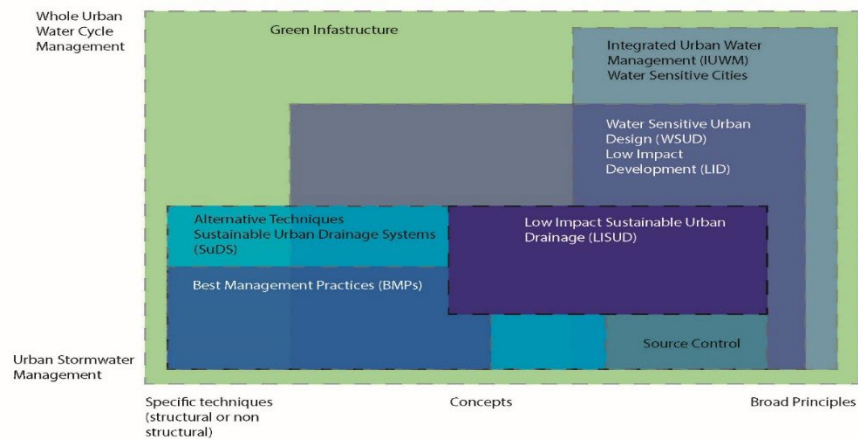


Figure 3-1. Classification of urban drainage terminology including LISUD, modified from one possible classification of urban drainage terminology, according to their specificity and their primary function by Fletcher et al., 2014

- **Low impact landscaping** where native plants are arranged to uptake pollution biologically including vegetated roofs, native drought-tolerant planting, wildflower meadows and soil amendments (USEPA 2000; USEPA 2007 and Goodwin, et al., 2008).

3.5 Low Impact Sustainable Urban Drainage Systems

For this research, a new terminology has been formulated. It sits at the heart of water management classifications, drawing upon source control and LID's focus on smaller-scale stormwater treatment located at or near the source of runoff, and SuDS definition of a range of technologies and techniques used to drain stormwater / surface water in a manner that is more sustainable than conventional solutions, replicating as closely as possible the natural, pre-development drainage from the site. Its distinctions incorporate a range of different water management solutions that involve the organisation of surface water run-off in the urban environment, at source, whilst also mimicking the organisation of natural drainage processes.

3.4 Chapter Summary

There is growing recognition of the potential for future problems through a combination of the impacts of climate change, conventional drainage, and the rising demand for housing. Sustainable urban drainage systems (SuDS) as a drainage approach, (alongside IUWM, WSUD, BMPs and LID) are inspired by natural processes and gaining in sophistication (CIRIA, 1992, 1996, 2000). They offer the potential to prevent

stormwater from having a negative influence on society (CIRIA, 2000; Howe and White, 2001; Joachim, Tourbier and White, 2007).

This chapter through review and analysis of the various classifications and practices including IUWM, WSUD, BMPs, SuDS and LID, from the broadest through to the narrowest, highlights the benefits of adopting these approaches, whilst distinguishing between them and emphasising their distinct characteristics, so that a new classification can be determined known as LISUD. It demonstrates their increasing recognition and implementation. These classifications show that the right approaches are being developed and progressively being implemented, however wider lessons could be drawn from Australia with regards to WSUD and America for LID and BMPs, as they have been implementing those measures for far longer than we have. Wider lessons can also be transferred from the Netherlands, a deltaic country that has over 26% of this land mass lying below sea level and a further 29% being flood sensitive (Netherlands Environmental Assessment Agency, 2004, cited in Roth, et al., 2017), where ‘living with water’ has become a way of life, an everyday reality, that experts and communities fully acknowledge and embrace. This recognition hints at an increased acceptance of these types of measures in those countries, devised and implemented due to necessity through participatory planning initiatives that include citizens in all decision making. This has, in turn, led to a greater acceptance of bottom-up approaches to solving localised flooding, which is the focus of this research, and which are reviewed within the case study analysis in Chapter 7, offering lessons that could be learned by the UK.

Chapter 4. Extended Literature Review: Typology of Adaptation and Citizenship - Motivating Changes in Behaviours, Norms and Practices through Social Learning and Ecological Citizenship

4.1 Introduction

Chapter 1 highlighted the drivers of change, including climate change, population growth, densification, and flooding. So, what shifts need to occur to address those drivers of change? It is proposed here that mitigation is critical though not the whole answer. Adaptations might also be necessary, including one which could potentially be highly influential, namely Ecological Citizenship (EC). Physical adaptation to respond to increased risk at any scale requires not only regulation and public investment, but also citizen action.

This chapter seeks to define adaptation and in particular climate change adaptation as means for lessening localised flood prevention. It provides a background on environmentalism and modern environmentalism and reviews how individuals participate and take control of decisions, looking at citizenship, both environmental and ecological to assess whether this offers a mechanism as a meaningful social context both for developing and expressing EC in daily life – in other words, overcoming the limitations of the mainstream unsustainable strategy and fostering sustainable actions. It looks at the traditional responses of policymakers seeking to alter behaviours through rational choice, and then turns to behavioural economics, reviewing both behaviour barriers and behaviour drivers. It also considers the role of collective behavioural change and moral and normative aspects, to gain a greater understanding of misperceptions and value action gaps, and how changes in behavioural and everyday practices are fostered.

We must also establish and nurture the forums that are best placed to encourage our changed behaviours and practices. It is suggested here that social theories of practice could offer ‘an important intellectual resource for understanding and perhaps establishing social, institutional and infrastructural conditions in which much less resource-intensive ways of life might take hold’ (Shove and Spurling, 2013, p.1), which would reward adaptations to climate change and offer increased benefits to both individual and collective behavioural change. Finally, it looks at motivating action

through CoPs utilising EC, and the processes for change by looking in detail at social learning as part of wider participatory planning initiatives to build awareness of LISUD and motivate action.

4.2 Mitigation and Adaptation

Mitigation encompasses making something less harmful, unpleasant, or bad (Cambridge Dictionary, 2020). In the context of this research, it refers to ‘tackling the causes and minimising the possible impacts of climate change’ (Iberdrola, 2020). Throughout time individuals, societies and economies have constantly been adapting in various ways and with various degrees of success to changes in environmental conditions (Smit et al., 1999, p.887). By their very nature, ‘approaches to adaptation need to be flexible so that they can evolve and respond to new conditions and challenges’ (UKCIP, 2011), with adaptation no longer being considered the ‘Cinderella’ of climate change (UKCIP, 2011). It is now accepted that ‘immediate investment in adaptation will be essential to buffer the worst climate impacts’ (Parry, et al., 2008). Climate change poses not simply a technical challenge but also demands long-term responses which in themselves should be ‘flexible and adaptive to changing values, expectations and priorities as well as changing environmental conditions’ (UKCIP, 2011, p.12). These are amongst the concerns of this research.

4.2.1 Adaptation

The term adaptation ‘describes a myriad of different actions throughout society, by individuals, groups, and governments (Adger et al., 2005), encompassing a huge range of different approaches, perspectives, and levels of analysis. Adaptation refers both to the process and to the condition of being adapted. ‘It entails at least three functional components: planning, process, and outcomes’ (Tompkins, et al., 2005; McEvoy, et al., 2010; UKCIP, 2011). There are specific interpretations in different disciplines. For example, in ecology, adaptation refers to changes whereby an organism or species becomes fitted to its environment (Lawrence, 1995; Abercrombie, et al., 1997). In social sciences, adaptation refers to adjustments by individuals and the collective behaviour of socioeconomic systems (Denevan, 1983; Hardesty, 1983). For this research, adaptation will be defined as adjustments in natural or human systems in response to experienced or future climatic conditions or their effects or impacts – which may be beneficial or adverse. This aligns with Carter, et al., (1994), the IPCC, (1996),

UNEP, (1998), and Smit et al., (2000, 2011) and combines both the ecological and the social science perspectives. Adaptation involves ‘adjustments to reduce the vulnerability of communities, regions, or activities to climate change and variability’ (Smit, et al., 1999, p.881). It is important in two ways: firstly, with regards to the assessment of likely impacts and vulnerabilities, and secondly in the development and evaluation of response options (Smit, et al., 1999).

4.2.2 Adaptive Capacity

‘Adaptive capacity refers to the potential, capability, or ability of a system to adapt to climate change stimuli or their effect or impacts’ (Smit, et al., 1999, p.881). Such capacity greatly influences the vulnerability of communities and regions to climate change effects and hazards (Bohle, et al., 1994; Downing, et al., 1999; Kelly and Adger, 1999; Mileti, 1999; Kates, 2000). Human activities and groups are considered sensitive to the climate, to the degree that they can be affected by it and vulnerable to the degree that they can be harmed (Rayner and Malone, 1998), where vulnerability is described as the ‘capacity to be wounded’ (Kates, et al., 1985).

With regards to climate change, the vulnerability of a given system or society is a ‘function of its physical exposure to climate change effects and its ability to adapt to those conditions’ (Smit, et al., 1999). ‘Adaptive capacity refers to both the ability to prepare for hazards and opportunities in advance as in planned adaptation, and to respond or cope with the effects, as reactive adaptation’ (IPCC, 1996).

4.2.3 Climate Change Adaptation

Climatic conditions are inherently variable from year to year. Variability is an ‘integral part of climate change’ (Mearns, et al., 1997; Karl and Knight, 1998; Berz, 1999; Hulme, et al., 1999). ‘The partially chaotic (non-linear, unpredictable) nature of the climate system leads to difficulties in estimating future emissions and characteristics of climate models, which results in deep uncertainties’ (UKCIP, 2011, p.16). Thus, adaptation to climate change, by its very existence, necessarily includes adaptation to variability (Hewitt and Burton, 1971; Parry, 1986; Downing, 1996; Yohe, et al., 1996; Smithers and Smit, 1997; Smit, et al., 1999). Regarding water resource management (Smit, et al., (1999, p.882) notes that variability highlights ‘climatic hazards’ that deal with ‘changes in the recurrence interval of extreme conditions, which are associated with changes in means’ (Beran and Arnell, 1995; Kundzewicz and Takeuchi, 1999).

Variability encompasses both changes in mean conditions that are considered normal or within a ‘coping range’, and those changes that occur at a frequency and magnitude of an extreme level, to which systems and communities struggle to cope and are particularly vulnerable (Baethgen, 1997; Schneider, 1997; Rayner and Malone, 1998; Kelly and Adger, 1999). Many social and economic systems have evolved to accommodate some deviations from ‘normal’ conditions, but rarely do these accommodate extreme levels.

Awareness of climate change and adaptation is growing, but an awareness of generic climate impacts does not necessarily translate into an understanding of climate risks relevant to a particular endeavour; nor does it indicate how much variability is acceptable before the system buckles and fails to adapt (UKCIP, 2011). The difference between information and adaptation has been referred to as an ‘adaptation bottleneck’ (Vogel, et al., 2007). Decision makers have high levels of awareness of climate change and frequently understand the case for adaptation but have difficulty in identifying and implementing specific adaptation policies and measures. The symptom of this bottleneck is, therefore, ‘frequently a lack of awareness, or insufficient detailed awareness, of vulnerability to current climate mean and variability extremes’ (UKCIP, 2011, p.26). In this research it is for the latter variability that adaptation measures are sought.

4.2.4 Adaptation Typology

Adaptations can occur as a ‘responsive reaction to a hazard after initial impacts are manifest to climatic stimuli, without [the] direct intervention of a public agency’ (Smit, et al., 1999, p.883) known as autonomous or spontaneous adaptation, and as anticipatory undertaken before impacts are apparent, known as planned adaptations. Adaptations can be ‘short or long-term, localised or widespread, and can serve various functions and take numerous forms’ (Smit, et al., 1999). Adaptations can affect individuals through ‘bear losses, share losses, modified threats, prevent effects, change use and change location’ (Burton, et al., 1993; Rayner and Malone, 1998), in addition to community structures, institutional arrangements, and public policies (Downing, et al., 1997; UNEP, 1998). Adaptations occur, and the ‘who’ or ‘what’ that adapts is known as the ‘system of interest’, ‘unit of analysis’, ‘exposure unit’, ‘activity of interest’, or ‘sensitive system’ (Carter, et al., 1994; Smithers and Smit, 1997; UNEP, 1998). In an unmanaged natural system, adaptation occurs automatically as an

autonomous and reactive response. It is how species and communities respond to changes in conditions (Smit, et al., 1999). Managed system adaptations are consciously undertaken by humans in economic sectors, settlements, communities, regions, and managed ecosystems, motivated either by private or public interest. Private decision makers include individuals, households, businesses, and corporations. Public interests include all levels of government, unions such as the European Union and world organisations.

Planned anticipatory adaptation, as recognised in the UNFCCC (Article 3.3), aims at reducing a system's vulnerability, by diminishing risk and improving adaptive capacity. Planned adaptation often occurs through policy devised and enforced by public agencies through various levels of government, based on the 'awareness that conditions are about to change or have already changed and urgent action is required to either minimise losses or capitalise on benefits' (Pittock and Jones, 2000). It is usually purposeful and intentional, tends to be reactive and operates on long time scales at a wide-scale strategic level (Smit, et al., 1999), often referred to as 'intervention strategies'. Autonomous adaptations on the other hand are usually 'initiatives by private actors... triggered by market or welfare changes induced by actual or anticipated climate change' (Leary, 1999). They occur 'naturally' (Smit, et al., 1996), are passive and anticipatory and devised as short-term instantaneous measures that operate at a localised spatial scale (Smit, et al., 1999). Autonomous adaptation tends to form a baseline against which planned anticipatory adaptations can be evaluated (Smit, et al., 1999). But there are also constraints to those 'optimal' autonomous adaptations, such as limited information and access to resources, adaptation costs, and residual damages. These emphasise the need for a planned adaptation process, one that is anticipatory and facilitated (Smith, et al., 1996; Tol, 1998; Fankhauser, et al., 1999; Bryant, et al., 2000).

To enhance future adaptations and policies, it has been proved useful to understand factors and circumstances that hinder or promote adaptation. Rayner and Malone (1998) argued that the consequences of a climate event are not only direct functions of its physical characteristics, but also of the 'ways in which society has organised its relations among its members'. Thus, to overcome vulnerability 'it is essential to consider ways in which societies might have coped better, and to focus on the political, cultural, and socioeconomic factors which inhibited them from doing so' (Ingram, et al., 1981). There is also strong evidence of the sharp increases in damage costs of

extreme climatic or weather events (Berz, 1999; Bruce, 1999). Many adaptations to climate change risks also reduce vulnerability to climate variability, extremes, and hazards (El Shaer, et al., 1996; Rayner and Malone, 1998). Societal responses to large environmental challenges tend to be incremental and ad-hoc rather than fundamental (Rayner and Malone, 1998), leading to a tendency Glantz (1998) terms to ‘muddle through’. Action was not taken without a catalyst or trigger that dramatically indicated the seriousness of the threat. The significance of a change in climate for regions depends on the ability and likelihood of those regions to adapt. Within flood risk associated with urban sprawl, there are already signs that population growth coupled with increased impervious surface cover will lead to intensification of surface water flooding. When coupled with predicted increases in climate change that lead to further intensification of localised precipitation and storms, the seriousness of surface water flooding is magnified. This research surmises that the catalyst for action is already apparent.

4.2.5 Framings

One of the key adaptation challenges highlighted by the Royal Commission on Environment Pollution (RCEP, 2010) is that of framing, mainly due to the ‘wickedness’ of climate change and the adaptation challenge as previously described. Culture shapes the way actors interact and take shared or opposing structures (UKCIP, 2011). As highlighted by Boer, et al., (2010) there appears to be a relationship between the framing of climate change and other wicked problems, and the understanding of decision problems it represents. This largely determines the tools selected for the task of planning, and the institutional structures required to deliver them (UKCIP, 2011). The framings and underlying assumptions are therefore highly influential in governing the goals of adaptation, the assessment of risks, and prioritisation of options, which in turn determines who is involved in adaptation efforts.

Recent research recommends ‘making explicit the dominant framing’ (UKCIP, 2011, p.22) at least alongside ‘contrasting framings’, to assist with enhancing the adaptation process. This would encourage a greater understanding of the issues and problems associated with difficult matters like climate change, including contrasting opinions and facilitating a wider participatory approach.

4.3 Environmentalism, Environmental Justice and Sustainability

4.3.1 Environmentalism

‘At this time in both human and environmental history, we have reached a “tipping point” in terms of anthropogenic impacts on environmental stability from broad-based effects of climate change’ (Smith and Pangsapa, 2008, p.xi). How might that tipping point be overcome, and the dominant framings of climate change be made more explicit, to encourage people to adopt more pro-environmental behaviour and practices framed around sustainability? Adaptation can be small scale. It does not need to include mega infrastructure projects at a national level, although those are also required to tackle the issues. Local individual level change is part of the solution, and EC as modern environmentalism, as posited here, offers the means to adapt to those issues locally.

Pervasive problems persist owing in part to the fact that systems are considered centralised, fragmented, and professional. This disempowers community responsibility, inhibiting people from coming together, and depriving them of the physical experiences that ground them in their communities. In both urban and suburban communities alike, the ‘fraying social fabric’ has created an environmental void, which is being filled by the pervasive forms of global capitalism (Shutkin, 2000, p.77). As a response to these super wicked environmental problems and effects, environmentalism has matured. Shutkin (2000, p.89) observes that it ‘celebrates the ideal of community and interconnectedness that is at the heart of democratic theory’.

In Britain and the USA, the environmental movement has been closely associated with localised action exemplified by the followers of Richard Jefferies and Aldo Leopold. This research questions why despite a long historical association with local action, is water management and localised flood prevention predominantly overseen by centralised organisations rather than at a local level? ‘Preservation gave to environmentalism its bent to the sublime, embodied in wilderness and natural parks, drawing upon the enlightenment cult, while turning environmentalism away from cities and other densely populated places’ (Shutkin, 2000, p.95), places where environmentalism is most required, and to which modern environmentalism now turns. Conservation introduced professionalism and expertise to environmentalism steeped in progressive ideology, embedding in environmentalism a commitment to the sacred and the profound, efficiency, and public administration. It shifted the emphasis away from

everyday people looking after their land, to organisations with professional expertise, conserving and preserving the land on their behalf, a shift that this research believes needs to be challenged. The romantic-progressive thrust of preservation and conservation determined the basic constituent parts of modern environmentalism and, in so doing, delineated its scope in terms of certain key social issues. To counter the preoccupation of modern environmentalism with expertise and professionalism, an alternative developed commonly referred to as grass-roots environmentalism. This is grounded in countless local struggles against industrial polluters and unwarranted development. 'Emerging parallel to the preservation and conservation movements, grass-roots efforts orientated towards cities and citizen activism comprised of a legitimate environmental agenda in the early twentieth century, enriched by an emphasis in social democracy' (Shutkin, 2000, p.97).

Environmentalism embraces the notion 'that the individual is a member of a community of interdependent parts. A thing is right when it tends to preserve the integrity and stability and beauty of the biotic community, it is wrong when it tends otherwise' (Leopold, 1968, p.203). Environmentalism raises fundamental issues about who we are and what we care about (Landy, Roberts and Thomas, 1994, p.5). Considering the persistence and pervasiveness of environmental degradation, and the inability of local communities and environmentalism to grapple with it, there is both an urgent need and a unique opportunity to retool and realign citizens and environmentalists alike so that they are both equipped to improve the environmental and social conditions of their communities (Shutkin, 2012, p.126). The social democracy agenda emphasised in modern grass-roots environmentalism draws upon the environmental justice movement as a typically grass-roots or 'bottom-up' political response to external threats. The sustainability agenda on the other hand emerged largely from international processes and committees, governmental structures, think-tanks, and international non-governmental organisations. Despite their historically different origins, there are areas of theoretical compatibility between them, which are increasingly evident in practice (Schlosberg, 1999; Cole and Foster, 2001; Agyeman and Angus, 2003). These two concepts even though highly contested (Foreman, 1998; Jacobs, 1999; Connelly, 2007), have tremendous potential to effect long-lasting change in policy as well as people's behaviour (Agyeman and Evans, 2006, p.186), with the former offering a process for achieving change and the latter, offering the scope 'for a broad social movement to

create liveable, sustainable communities for all people in the future' (Agyeman, Bullard, and Evans, 2003).

4.3.2 Modern Civic Environmentalism

Out of these varied movements came civic environmentalism, which stems from the USA and has a variety of interpretations (US EPA, 1997, 2002, 2003); Friedland and Sirianni, 1995; Roseland, 1998; Hempel, 1999; Landy, Susman, and Knopman, 1999; Mazmarian and Kraft, 1999; Sabel, Fung and Karkkainen, 1999; and Shutkin, 2000). It was first articulated and named by De Witt John of the US National Academy of Public Administration as an 'emergent policy framework that recognized the limits of top-down command-and-control environmental regulation' (Agyeman and Evans, 2006, p.188). It is argued that today's environmental problems demand local solutions, ones crafted and administered by the diverse stakeholders that constitute our communities. One way of attaining those local solutions is to adopt modern civic environmentalism, which embraces civic action and community planning (Shutkin, 2012). Under this modern approach, civic environmentalism aims at promoting both environmental protection and democratic renewal in the form of participatory process, community and regional planning, environmental education, industrial ecology, environmental justice, and the importance of place. 'What ultimately defines civic environmentalism and distinguishes it from other forms of social action is the explicit link between environmental problem solving and the goal of community building' (Shutkin, 2000, p.128). Modern civic environmentalism is fundamentally about ensuring the quality and sustainability of our communities, economically, socially, and environmentally. It is about meaningful, informed participation in the decision-making procedures that affect the quality of people's lives, combining civic environmentalism and civic democratic practice.

'In addition, participation in modern civic environmentalism also requires face-to-face interaction among diverse stakeholders, enabling people to develop a more complex, more human, and more realistic picture of their fellow citizens. It encourages people to live up to commitments they make during public decisions, in effect, making citizens accountable and thus more reliable' (Briand, 1995, p.12-13). Such interaction has been shown to foster a genuine sense of community, which in turn inspires more participation, creating a positive feedback loop. 'It embraces a bottom-up approach to problem solving, empowering people to work together, initiate action, experiment and

learn facts' (Shutkin, 2000, p.129). Under this approach, ordinary people with the help of experts, can act for themselves in attempting to solve social problems (Putnam, 1991).

Systems theory originated from the work of natural scientists who studied 'organised complexity' – the capability of complex systems to organise, regulate, and direct themselves. The essence of a systems approach is the understanding that the components comprising a system interact in many ways, and that those components are then influenced by the new order that emerges from those interactions. Systems' thinking has been widely embraced, not only in academic circles and the arenas of public policy, but also among community activists seeking comprehensive solutions to social problems. Modern civic environmentalism embodies a systems approach. It holds that to be effective, environmentalists must explore issues that, at first sight, might seem unrelated or marginal but which otherwise influence environmental outcomes. In other words, all things are connected. There are two major orientations of modern civic environmentalism: 'narrow focus and broad focus' (Agyeman and Angus, 2003), with the former being based on the environment to the exclusion of justice and the latter focused on justice to the exclusion of the environment.

Modern civic environmentalism demands an 'awareness of the distributive aspects of environmental protection and a commitment to democratic justice' (Shutkin, 2000, p.139). "The environment is not something "out there", but something deep within each of us, and part of each of us" (Shutkin, 1995, p.586). Drawing upon environmental justice, modern civic environmentalism emphasises the structural conditions surrounding the democratic process and asks, 'are ordinary people, especially the disenfranchised, participating in the decision-making procedures of institutions that fundamentally regulate our lives?' (Shutkin, 2000, p.135), and if not, how do we encourage them to be better represented? By striving to empower individuals to participate in and take control over decisions that affect their health and environment via active social learning and full participatory process, this research posits that environmental justice increases the civic capabilities of the community and ensures that environmental results last at the community level.

4.3.3 Citizenship

So how can individuals participate and take control of decisions? It is suggested here that citizenship offers that scope. There are many different types of citizenship commonly referred to using a three-fold typology: civic, political, and social, as described by Marshall (1949; 1966), and more recently a fourth dimension known as Ecological Citizenship (Van Steenberg, 1994). There is also an array of different kinds of 'sites of citizenship' as illustrated by Smith and Pangsapa including citizen science (Irwin, 1995); cultural citizenship (Kymlicka and Norman, 2000; Stevenson, 2001, 2003; Chouldry, 2006); technological citizenship (Chouldry, 2006); environmental and ecological citizenship (Dobson, 2003; Smith, 1998, 2005), all of which manifest at different levels (street, locality, city, nation-state, transnational arenas and the globe) and involve a wide range of acts, including voting and political party membership, volunteering, participating in community initiatives, exchanging knowledge, blogging, activist networking and organising (Isin and Nielson, 2008).

Traditionally, citizenship operates within two guises either as liberalism or civic republicanism, 'concerning the status and activity of individuals in the public domain' (Seyfang, 2006, p.387). Under a liberal political philosophy, the emphasis is placed on the rights of individuals and in the context of the environment incorporates 'human rights to a habitable environment' (as a prerequisite to all other rights) (Bell, 2006, p.387). Those rights should be expressed through the objective of environmental protection. A safe and healthy environment may be viewed either as a pre-condition to the exercise of existing rights or as inextricably entwined with the enjoyment of these rights, including the right to a liveable and sustainable environment, and the right of the environment itself (Shelton, 1991, p.105; Turner, 1986, p.9). The alternative approach known as civic republicanism emphasises 'duties and responsibilities that citizens ought to act in the interests of the common good' (Seyfang 2006, p.387). From an environmental perspective, civic republicanism operates under the concept of 'self-sacrifice for the greater good' and encourages people by being active citizens to associate the implications of their daily activities with the state of the wider environment. In this way it emphasises a dualist notion of individuals either acting according to their personal, private interests or the collective public good (Seyfang, 2006).

Civil citizenship has been described as a ‘concrete expression of the idea of bargain whereby some of the liberties of owners are sacrificed in exchange for legal protection for private property’ (Smith and Pangsapa, 2008, p.10). ‘Political citizenship involves the entitlements to vote, association and free speech combined with reciprocal obligations to comply with the legislation produced by representative democratic institutions’ (Smith and Pangsapa, 2008, p.10). Social citizenship provides for a wide range of entitlements, such as social welfare provision, healthcare, and educational opportunity. All of these demonstrate the characteristics of

‘a clear distinction between state and civil society (and their associated conceptions of public and private spheres); and the fact that citizens have reciprocal entitlements and obligations (with a special emphasis on rights and entitlements) that often leave duties and obligations as residual categories’ (Smith and Pangsapa, 2008, p.10).

Environmental and ecological citizenship challenge these assumptions, including a required change in both public and private spheres demonstrating that the ‘personal is political’ with the discourse of rights aimed towards recognising future generations obligations since the Bruntland Report (1987), habitats (conservation and preservation movements), the biotic community (Leopold, 1949), and even the mystic conception of the planet as a self-regulating organism (Lovecock, 2000).

‘Green thinking has impacted on our understandings of citizenship in at least three different ways. First, environmental concerns have entered our understanding of the rights we enjoy as citizens. Second, the enhanced level of global awareness associated with ecological thinking has helped to broaden our understanding of the potential scope of citizenship. Third, emergent ecological concerns have added fuel to a complex debate about the responsibilities that attach to citizenship’ (Dean, 2001, p.491).

Environmental rights have been canvassed as an addition to the standard triumvirate of civil, political, and social rights mentioned above, commonly arguing that, ‘environmental rights are a type of social right rather than something completely different’ (Dobson, 2003, p.84). The debate on climate change illustrates that ‘practically adequate understanding of contemporary environmental problems also must take account of the social dimension. The way we see environmental problems like all social representations should also be subject to the mechanisms of social constructions’ (Smith, 2008, p.13).

In the Aristotelian tradition, being a good and virtuous citizen has often been tied to active involvement in the community (Smith and Pangsapa, 2008, p.48). Of interest to this research, there is also environmental citizenship, which works within broadly liberal concepts of rights and obligations; citizenship that deals in the currency of environmental rights, conducted exclusively in the public sphere, whose principled virtues are reasonableness and willingness to accept the force of the better argument; and procedural legitimacy, whose remit is 'bounded political configurations modelled on the nation-state' (Dobson, 2003, p.89).

4.3.4 Language of Environmental and Ecological Citizenship

The language of environmental and ecological citizenship has been well known since the 1990s in policy documents, academia and institutional campaigns, starting with Fred Steward (1991), and Bart Van Steenbergen (1994), through more developed ideas by Peter Christoff (1996), Mark Smith (1998), John Barry (1999, 2002), Andrew Dobson (2000, 2003, 2005) treating environmental, ecological and green citizenship synonymously (Valencia Saiz, 2005; Dobson, 2003; McGregor, 2006; Dean, 2001); Sherilyn Macgregor (2011) researching ecofeminism; and Rebecca Schild with regards environmental educational practice (2015).

Environmental citizenship is like other forms of 'adjective citizenship', a relatively recent invention (Bell, 2004). In its common usage environmental citizenship 'makes demands on people to act differently for the sake of the environment. It is an attempt to make environmental conversation and sustainability an important duty of citizenship that citizens all over the world should be aware of' (UNEP, 2002). In environmental literature the different ways that citizenship and the environment interplay led to the acknowledgment of further aspects of citizenship: 'ecological citizenship' (Christoff, 1996; Dobson, 2003, 2005; Smith, 1998; Curtin, 2002, 1999; Van Steenbergen, 1994); 'green citizenship' (Dean, 2001; Bell, 2004; Smith, 2005); 'environmental citizenship' (Dobson and Bell, 2006; Luque, 2005); 'sustainability citizenship' (Barry, 2006); 'environmentally affordable citizenship' (Hailwood, 2005) and 'ecological stewardship' (Barry, 2002, 1999).

Environmental Citizenship developed out of the civic environmentalism described earlier, recognising the limitations of top-down command, and instead advocated a bottom-up approach in which justice and wider sustainability aspirations are furthered.

Under this definition environmental citizenship attempts to ‘extend the discourse and practice of rights’ placing them firmly within the environmental context.

‘Environmental citizenship is a personal commitment to learning more about the environment and to taking responsible action. Environmental citizenship encourages individuals, communities, and organisations to think about environmental rights and responsibility we all have as residents of Planet Earth. Environmental Citizenship means caring for the Earth.’ (McGregor and Szerszynski, 2003, p.8).

Under this definition environmental citizenship encourages a ‘personal commitment’ to ‘taking responsible environmental action’, where the personal commitment emphasises an individual voluntary choice – one we might or might not choose to take (Bell, 2004).

4.3.5 Ecological Citizenship (EC)

Extending environmental citizenship, Ecological Citizenship as a concept originated in Canada, first coined by Environment Canada, and defined as

‘an idea that each of us is an integral part of a larger eco-system and that our future depends on each one of us embracing the challenge and acting responsibly and positively towards our environment. It’s about making changes in our daily lives to be environmental citizens all day, every day’ (Environment Canada, 2001).

EC as suggested by Dobson (2003) is specifically an ecological form of what he calls ‘post-cosmopolitan citizenship’, extending beyond the remits of liberal and civic republican citizenship described earlier, and as such ‘provides a new description of citizenship that is required to cope with ideological and material changes taking place in the world today’ (Dobson,2003, p82). ‘It deals in the currency of non-contractual responsibility, inhabits the private as well as the public sphere, refers to the source rather than the nature of responsibility to determine citizenship virtues, and works with the language of virtue, being explicitly non-territorial’ (Dobson, 2003, p89). It is considered post-cosmopolitan by Dobson (2003) in that it cannot be fully expressed as either traditional liberal, civic republican, or more recently cosmopolitan. Wolf (2007, 2009) quoting Dobson, describes it as a normative green political theory, one ‘sharing the language of virtues with civic republican citizenship’ (2003, p.132), and that of liberalism, with its ‘principal virtue being justice’ (2003, p.132). As described by Barry

‘Citizenship as viewed by green democratic theory, emphasises the duty of citizens to take responsibility for their actions and choices – the obligation to ‘do one’s bit’ in the collective enterprise of achieving

sustainability. There is thus a notion of ‘civic virtue’ at the heart of this green conception of citizenship. A part of this notion of civic virtue refers to consideration of the interests of others and an openness to debate and deliberation’ (1999, p.231).

Liberal traditions are encapsulated via the reference to the virtue of ‘an openness to debate and deliberation’, as well as ‘public reasonableness’, a key liberal citizenship, where ‘[L]iberal citizens must give reasons for their political demands, not just state preferences or make threats’ (Kymlicka and Norman, 1994, p366). Civic virtues are expressed through the idea of the ‘collective enterprise’ of achieving sustainability; a specific version of the ‘common good’ notion.

Dobson considers care to play an important role in encouraging ecological citizens. For Dobson, care is understood as a requirement of being a good ecological citizen, and as such focuses upon the harm inflicted on the environment and on fellow human beings. ‘Care is understood as a virtue that helps to enact justice and compensate for the damage caused by one’s ecological impact’ (Bartkiene et al (2019, p. 5).

Its ‘obligations are owed non-reciprocally, its remit includes not only public but also private space, and it extends beyond the boundaries of the state’, therefore is considered ‘non-territorial’ (2003, p.82). By focusing upon non-territoriality, Dobson’s EC as highlighted by Wolf et al., ‘links this citizenship to climate change (and indeed other global environmental problems)’ (2009, p506), which importantly for this research offers a process of adaptation to rectifying environmental problems such as flooding. The global nature of climate change is considered one of the obstacles to effective action. The impacts are unequally distributed across geographic space and time, and do not respect national boundaries, affecting those that are most vulnerable (Adger et al., 2006). The ‘responsibilities of ecological citizenship arise from the asymmetric distribution of power and effects between (and among) developed and developing countries’ (Wolf et al., 2009, p506). ‘All citizens who participate in activities that contribute to climate change bear responsibilities to reduce their share in causing the problem’, and theoretically, ‘bear a share of responsibility for whatever damage and subsequent remediation arises from the impacts of climate change’ (Wolf et al., 2009, p506).

EC considers the private realm as the place of citizenship activity, where private actions have public implications, and the principal virtue of justice, with secondary virtues of care (and compassion) (considering the impacts of one's actions on others, on future generations and strangers (Wolf et al., 2009, p507) (alongside protection, stewardship and conservation) are typically associated with the private realm and private realm relationships (Dobson 2003). 'the point about ecological stewardship is that the private sphere, when considered from an ecological point of view, moves from being 'non-political' to a political site of activity' (Barry, 2002, pp147-8). Therefore, 'the public implications of private actions generate a responsibility of a civic nature' (Wolf et al., 2009, p507).

Wolf (2009) quoting Seyfang, describes EC as an 'a theory of change, the idea that ecological citizenship could be a motivating force for sustainable lifestyles and living standards' (2006). EC is part of this 'new generation of kinds of citizenship that takes the politics of obligation' seriously, where the 'importance of obligation' is an understanding that 'the enjoyment of rights comes with corresponding duties to act in a manner that contributes to one's community or at the very least to restrain behaviour that could inflict harm on others, including distant strangers'. (Smith and Pangsapa, 2008, p.9).

'Ecological Citizenship explicitly defines private consumer behaviour as political and a space for collective action for the common good. In this way, EC rises above traditional understandings of citizenship to embrace new possibilities, the development of consumption as a site of political activity.' (Seyfang, 2006, p.387).

Dobson's EC is focused on ecology, and the 'ecological footprint' metaphor (Wackernagel and Rees, 1996). Through this definition Dobson highlights the obligations of ecological citizens as a 'justice-based account of how we should live', based upon virtue (Barry, 1999), and sustainability. Dobson interprets those obligations as being both private and public action, a marked difference to that of traditional citizenship, and in this way reducing the environmental impacts of our everyday lives on others (Seyfang, 2006). Obligations under this type of citizenship refer to a 'new politics of obligation' as defined by Smith (1998, p.95): 'human beings have obligations to animals, trees, mountains, oceans, and other members of the biotic community' (Dobson, 1998, p.99). EC obligations do not prescribe either reciprocity or mutual advantage, but instead a non-reciprocal sense of justice, and/or compassion (Dobson,

1998, p.6). Ecological citizens know that today's acts will have implications for tomorrow's people (Dobson, 1998, p.17).

EC highlights the current inequalities associated with space inhabited by a given human population and the ecological space required to sustain it. Seyfang notes how the footprint of people within industrialised nations is much larger than, and indeed has negative impacts on the life chances of, the inhabitants of developing countries (2006, p.388), illustrating 'environmental and social inequality and injustice'. An ecological citizen's duties as defined by Dobson and others is therefore to 'minimise the size and unsustainable impacts of one's ecological footprint', and for this research the water footprint, and this is promoted through 'many individual acts, at the local level', to bring about 'significant change' (Goodall, 1994, p.7).

4.3.6 EC Morality & Practical EC

So how should EC operate? How does the ecological footprint highlighted by Dobson (2003) as the main obligation of EC, and for this research the water footprint encourage a 'green conscience'? (Christoff, 1996, p162), and how could that green conscience motivate sustainable water management and flood prevention? When facing these problems many philosophers have argued for 'environmental ethics', whereby philosophy should offer wisdom and provide 'practical norms' as guides to life. Environmental ethics entered philosophical literature when John Passmore called for the replacement of domination over nature, and instead advocated religious tradition to be replaced by stewardship, recognising that we are here to care for the world and not simply to exploit it (Passmore, 1974). This belief, argues Scruton, was based on the premise 'that until we see nature as a source of intrinsic rather than instrumental value, we will not refrain from pillaging it', and present emergencies such as floods considered consequences of this pillaging will continue to trump the claims of future people. 'Non-human things may have intrinsic value, even though it is only from the point view of human interest that intrinsic value exists' (Scruton, 2012, p.197). Under environmental ethics and, more importantly, under EC, morality is not concerned only with values but also with rights and duties, and with what rational beings 'owe to each other'. As Scruton observes, 'we all recognise that human beings are not governed only by cost-benefit analysis, and that-even with costs and benefits entering their reflections – they take account of the costs and benefits to others' (2012, p.203). What Kant's metaphysics illustrates is that 'people are not motivated by self-interest but are also

motivated by a conception of their place in the world, and by a habit of evaluation that situates them as objects of judgement, among others. In short, people are governed by a sense of responsibility' (Scruton, 2012, p.203).

Theoretical advances by Dobson have sparked debates about what enables ecological and green citizenship to be enacted (Bell, 2005; Carter and Huby, 2005; Hailwood, 2005; Luque, 2005; Saiz, 2005; Seyfang, 2005; Smith, 2005; Valdivielso, 2005). As highlighted earlier by Dobson, EC should be promoted as a 'shared personal commitment to sustainability' (2003). He argues that ecological citizens will feel a sense of environmental responsibility on a planetary scale and will act in their daily lives to reduce the unjust impact on others (Seyfrang, 2006, p.384) by considering the implications of their routines and changing attitudes to inform their behaviour accordingly. Seyfrang explains the notion in this way, in that the EC promotes sustainable actions, and may also:

'offer a new route to sustainable consumption⁶⁹ which avoids the punitive and restrictive financial measures commonly associated with efforts to reduce the impacts of consumption decisions, as ethically motivated citizens voluntarily make the required changes in lifestyle' (2006, p.384).

However, there are also criticisms of Dobson's work namely 'Dobson's insistence on the efficacy of individual political agency' (Saiz, 2005, p.176), which is a 'critical point of weakness because it implies that individuals can be relied upon to strive to be better citizens, ignoring that individuals act within a social, economic, cultural, and institutional context that shapes and constrains their ability to act in a particular way' (Wolf, 2007). Numerous authors question the effectiveness of individual actions and what enables ecological and green citizenship to be enacted (Bell, 2005; Carter and Huby, 2005; Drevensek, 2005; Hailwood, 2005; Luque, 2005; Saiz, 2005; Seyfang, 2005; Smith, 2005, Valdivielso, 2005). Critics have argued that the focus on individual responsibility also undermines its political potential to generate major socio-environmental changes (Maniates, 2002; Gabrielson, 2008; MacGregor, 2016). They have suggested that this approach is too abstract and universalistic due to its reliance

⁶⁹ Sustainable consumption is commonly referred to as 'the use of goods and related products which respond to basic needs and bring a better quality of life, while minimising both the use of natural resources and toxic materials, and the emissions of waste and pollutants over the life cycle, so as not to jeopardise the needs of future generations' (Norwegian Ministry of Environment, 1994, cited in CECD, 2002, p.9; Seyfrang, 1996, p.384).

on a narrow and exclusionary understanding of the natural worlds, human-nature relationships, and agency (Gabrielson and Parady, 2010). Hayward questions whether ‘citizenship can be conceptualised intelligibly, as Dobson believes it can, without any necessary reference to polity to which citizens belong’ (2006, p436) arguing that ecological citizenship does not have a polity that has political power, authority, and institutions, therefore people will be unable to recognise responsibilities as they will not be able to clearly identify institutional structures to which their actions can be directed. Wolf et al, quoting Hayward also suggests that the distinction between moral and citizenly responsibility does not hold up to scrutiny (2009, p507). Hayward (2006) argues that there is no clear indication of what the membership of ecological citizenship is and what makes one eligible for such a membership. Bartkiene et al (2019) highlights that Dobson’s approach to care as a (secondary) virtue, is also not without limitations, and that such an approach overlooks the role of social bonds, affect and embodied experiences as key dimensions of citizenship (Noddings, 2002; Sevenhuijsen, 2004; Tronto, 2005, 2013). Additionally, by ‘elevating individual obligations and self-consciousness, Dobson obscures the role that routines and habituation play in shaping people’s behaviours and their sense of themselves’, therefore, Dobson’s ecological citizenship ‘overlooks the embodied and affective particularities of human experiences’ (Bartkiene et al., 200, p5?).

Also the ecological footprint metaphor as used by Dobson implies that ‘individuals who recognise their footprints to be too large can satisfy their responsibility to those impacts by simply reducing their footprint’, but ‘unless doing one’s share focuses most of all on bringing about structural change, the deactivation potential of the ecological footprint metaphor would be of concern’ (Saiz, 2005, p.216), highlighting as stated by Wolf et al quoting (Hayward 2006) that it may be ‘unclear whether the responsibility generated by the asymmetric utilisation of ecological space should give rise to a right to sufficient ecological space (2009, p507). Also, ‘changes in individual impacts may not be sufficiently large’ (Wolf, 2007), a point recognised by Valdivielso, who suggests that:

‘many motivated ecological activists do not have the opportunity to maintain sustainable consumption... Living in the developed world often means adhering to a minimum living standard that embodies a lifestyle intricately intertwined with patterns of consumption, which in turn are culturally and socially embedded needs of mobility, food,

work, housing, training and leisure... as a result, in these cases the least possible impact is often still much higher than the desired' (2005, p.214).

The challenge then is to find mechanisms and initiatives as a meaningful social context both for developing and expressing EC in daily life – in other words, to overcome the limitations of the mainstream unsustainable strategy (Dobson, 2003; Seyfang, 2005) – and fostering sustainable actions, and for this research, focusing those actions on the water footprint within the context of sustainable water management and flood prevention.

4.4 Rational Choice

Our attention now turns to other means than EC for effecting change so that more sustainable ways of living are facilitated, and localised flood prevention and sustainable water management encouraged. But how would those mechanisms and initiatives develop? One response proposed for developing more sustainable choices has been shifting behaviours, norms and practices. The traditional response of policymakers seeking to alter individual behaviours in favour of more sustainable ways of life has been to 'rely upon market-based policy tools – offering financial incentives or disincentives (grants, taxes, tax relief) and tackling informational barriers that prevent change, and only then if those tools yield insufficient results, reach for regulations of legislation' (Prendergast, et al., 2008, p.10). This reliance on policies that manipulate 'external factors of cost, effort and information' possibly reflects the limits of intervention or public acceptability that people are willing to accept from a government before they start to question the degrees of interference. These traditional responses embed the understanding that 'man can be conceived of as a rational economic actor', referred to more widely as the 'rational man approach' (Jackson, 2005, p.vi).

The basic rational model assumes that we behave in such a way as to maximise the expected benefits to ourselves (as individuals) (Jackson, 2005, p.30). It assumes that 'human behaviour is a continual process of making deliberate choices between distinct courses of action' (Jackson, 2005, p.30). Under the rational choice approach, we weigh up the expected benefits and costs of the different actions and choose the one that offers the highest expected net benefit or put another way the lowest expected net cost to us (Elster, 1986; Homans, 1961; Jackson, 2005). The disadvantage of this approach, widely observed by behavioural economists, is that classical economic theory can never

‘sufficiently accurately reflect exhibited human behaviour’ (Prendergast, et al., 2008; Jackson, 2005; Kahneman and Tversky, 1979), and as such, it could never be a worthy model upon which to base policy promoting change. Evidence from behavioural economists such as Kahneman and Tversky and Jackson has demonstrated that there are many instances where the predictions of rational choice models are not played out either in real markets or academic experiments. The failure of neo-classical economic models to increase levels of sustainable behaviour has led to claims that behaviour might not change simply because of better quality information (Whitmarsh, 2009; Whitmarsh, et al., 2011).

4.5 Behavioural Economics

To overcome the limitations described above behavioural economics developed, combining insights from the disciplines of psychology and sociology with traditional economic models. It originated in the 1960s when psychologists benchmarked their cognitive models of decision-making against economic models of rational behaviour (Prendergast, et al., 2008, p.18).

Many theories of human behaviour can be used to supplement and or refine the rational man model. The most compelling ‘treat behavioural systems as complex ecologies with multiple influences working in competing directions to influence behaviour’ (Halpern, et al., 2004, p.16). As a complex ecology, the individual has certain and real perceived capabilities and attitudes, and these are seen to affect success. Interaction with other individuals is also seen as important, so context and social situations play a large role in behaviour. Institutions or people exhibiting specific, sometimes negative behaviours, influence behaviour alongside physical, cultural, and social environments and the norms in those environments. Selection pressures that reward success and punish failure influence behaviour and, due to time pressures, short-cuts, mental models, rules of thumb or ‘heuristics’ also guide behaviour (Halpern, et al., 2004, p16). Behavioural economics recognises that individuals have bounded rationality (Conlisk, 1996), often engaging in satisfying behaviour (Simon, 1959), and it highlights the importance of social norms and routines.

4.6 Behaviour Barriers and Drives

Barriers to behavioural change may be internal to an individual, for instance, a lack of knowledge regarding how to carry out a specific activity, or external in the form of

structural changes that are needed for behaviour to become more convenient (Stern and Oskamp, 1987, pp.1043-1088). External barriers that are considered to interfere are inconvenience, unpleasantness, cost, and time (McKenzie Mohr, 1999, p.116). These can be overcome by making the unsustainable activity you wish to discourage, less convenient and more expensive.

To nurture a shift to sustainable behaviours, we need to recognise the multiple internal and external barriers, which vary from person to person, and seek to resolve and reduce those barriers. Behavioural drivers overcome those barriers. There are a wide variety of behavioural drivers that influence our decisions. Behavioural change can be undertaken in multiple contexts, either individually, socially, or materially. The 'individual refers to initiatives that focus on influencing attitudes of individuals to change their behaviours and choices. The social refers to social norms, cultural conventions and shared understandings, and the material refers to the objects, technologies and infrastructures, that both enable and constrain ways of behaving' (Southerton, McMeekin and Evans, 2011, p.5).

4.6.1 Information and Educational Communication

One such driver to persuade individuals to change their attitudes is through education initiatives, whether via marketing, information, or communication campaigns. Marketing campaigns are often used to raise awareness of environmentally problematic activities, presenting information to people that raises awareness and encourages changes in attitudes (Southerton, McMeekin and Evans, 2011, p.8). Targeted marketing allows value-based campaigns. Often information, when perceived alongside other measures, can be very successful, either acting as a prompt at the point of action to remind people of the sustainable, desirable options or assisting to govern behaviour by providing evidence of what ought to occur, and what is accepted as a social norm. Information can be used to enhance knowledge or alter attitudes by educating people on more sustainable approaches. However, this increased knowledge does not necessarily translate into action and has been proved to have little or no effect upon sustainable behaviours, as illustrated by Scott Geller and his colleagues when studying residential energy conservation in response to the energy crisis of the 1970s. While environmental attitudes and knowledge have been found to be related to behaviour, frequently the relationship is weak or non-existent. This is due to a variety of other barriers that deter individual and groups from engaging in sustainable behaviour. One

way in which information persuades people to adapt their behaviours and motivates changes in their lifestyles is through communication strategies. Persuasion has been shown to begin with capturing attention and, once the attention is caught, the most effective way of ensuring it is psychologically compelling is to ‘present information that is vivid, concrete and personalised’ (McKenzie-Mohr, 1999, p.84; Gonzales, et al., 1988). This means the audience first needs to be understood, and then the messages that are to be portrayed, need to be crafted and tailored to the different segments of the community. The accessibility or availability of information (effort costs) are also considered important in effecting behavioural change.

There are many tangible negative impacts to society associated with climate change. Surveys have shown that communication focusing on negativity are not as good as those portraying positive messages. Threatening or fear-arousing messages need to be combined with clear suggestions regarding what people can do to reduce the threat, if maladaptation is to be avoided.⁷⁰ When threatened, people adopt one of two broad coping strategies, either problem-focused coping or emotion-focused coping (Lazarus and Folkman, 1984). Problem-focused coping involves taking direct action to alleviate the threat, whereas emotion-focused coping involves ignoring the issue, changing the topic, and denying that there is anything that can or needs to be done. Whether someone adopts one or the other appears to be determined by their perception of how much control they might have of the problem. If we perceive that we have a significant amount of control, we are likely to adopt problem-focused coping. Conversely, if we perceive we have little control, as with climate change, then we are likely to use emotion-focused coping (McKenzie-Mohr and Dyal, 1991).

Everyday thousands of images of climate change as a super wicked problem are shared around the world. Yet while research on verbal and written communication on climate change has proliferated (Corner, Webster, and Teriete, 2015, p.2), our understanding of how people interpret visual images is less researched. Few studies consider how climate change images might condition behaviours and motivate sustainable actions. Research carried out by Climate Outreach, as highlighted by Corner, Webster, and Teriete (2015), concluded that climate change was not an easy issue to visualise, being characterised by ‘uncertainty and made up of long-term, cumulative processes that often cannot be

⁷⁰ As demonstrated by Rachel Carson in *Silent Spring*.

directly observed' (2015, p.6). For many audiences, the issues are 'intangible and abstract, reinforced by the impression that climate change is a distant problem' (Manzo, 2010, p.196). To evaluate the effectiveness of climate change visuals Corner, Webster, and Teriete recommended that the images use identifiable people, or make 'eye contact', promoting authenticity and therefore being more convincing and compelling. Dramatic and potentially fear-inducing images of climate impacts and extreme weather were considered good at capturing people's attention (salience). They made 'climate change seems more important, and emotionally powerful' (Leviston, et al., 2015, pp.441-454). However, 'whilst making the issues more salient they also sometimes distance viewers (both psychologically and geographically) leaving them feeling overwhelmed' (Banse, 2012), and unable to understand change.

A key finding of the Climate Outreach study and pertinent to this research is that 'many people did not understand how aspects of their normal lives linked to climate change, and in some instances may become resistant to the feelings the ideas prompt' (Corner, Webster, and Teriete, 2015, p.25). Individual causes of climate change may not be recognised as such, and if they are recognised, may provoke defensive reactions. It has become apparent that communicating the links between 'problematic behaviours and climate change is best undertaken by showing those behaviours at scale' (DEFRA, 2015). Localised relevant information was found to be better than global information, so that people could gain a true picture of their own situation through relevant information. However, these risks localising the problem to concern only those directly affected, rather than normalising the issues. Communication was found to be improved if it was targeted to specific people, addressing them personally. This increased the chances that they would take notice of it, aligning previous comments on targeting the audience and understanding the role of values and beliefs in influencing behaviour and norms and motivating action.

4.6.2 Empowering People to Act

In earlier research, including the Climate Outreach study - Climate Visuals (2016), grass-roots bottom-up local mechanisms were considered as a potential way of increasing participation and engagement with the causes and issues, and developing solutions. Local workshops focusing on actions and mitigations that encouraged people to come together and talk, were considered important to extend the reach of the messages. The use of local ambassadors as trusted local sources was also seen as key

in empowering communities along with encouraging and motivating key workers to go out into the community and through word of mouth spread the information locally.

Previous experience of flooding or family and friends who have been flooded appears to be a big driver in the willingness to act (DEFRA, 2015) overthrowing the 'It won't happen to me' attitude. Likewise, a sense of community or community resilience also seemed to play a key part in overcoming barriers to action, overturning a lack of community coherence, higher levels of isolation and more diverse communities. More connected communities overcame the levels of isolation otherwise seen and should be more prepared to deal with flooding (DEFRA, 2015, p.35).

Participants with experiences of flooding seemed to have a clear sense and expectation of community action in the event of a flood due to 'community memory' of past events (DEFRA, 2015, p.35). What seemed less clear in recent dialogue research on flood risk communications was 'whether participants least affected by flooding would be willing to attend a local meeting on flooding'. Certainly, from small-scale research carried out with two communities in the South of England, community participation in planned adaptation flood forums and dialogue seemed to consist mainly of those who had already witnessed flooding first hand. (Refer to Chapter 6 for focus group analysis and findings.) Those who from mapping would appear to be at risk from flooding but who had not witnessed it were less likely to attend, confirming the rule of thumb 'It won't happen to me, so I do not need to attend'. This attitude appears to be one of the main barriers to action and one which this research needs to challenge if it is to be successful.

Previous research (DEFRA, 2015; Corner, Webster, and Teriete, 2015,) confirmed by the case studies in this research (Amsterdam Rainproof, Cloudburst Copenhagen and Zoho Rotterdam suggests this apathy may be overcome by combining information on impacts with information on action. If behaviours are to be moderated and sustainable actions encouraged, 'Don't just tell us it could be bad, empower us to do something about it' (DEFRA, 2015, p.36).

4.7 Feedback

Feedback was also considered on top of information and educational communication alongside empowering people to act through community initiatives as important to help people improve their decision-making. It tells people when they are doing well and when they are making mistakes, in this way encouraging some activities and

discouraging others. All decisions incur some degree of error. To enable more decisions to be made, and ultimately shift behaviours away from those that are unsustainable and encourage pro-environmental behaviours, well-designed systems should be devised. Current systems should be analysed and where alternative options could have been adopted but are not due to lack of encouragement or incentives, feedback should be given along the way to gradually encourage subtle shifts in behaviour, ultimately leading to a larger shift. In the context of localised flooding, the warning signs are apparent, our climate is changing, we are likely to incur more episodes of heavy rain, our cities are growing and becoming denser, and our drainage systems are nearing the end of their life having been built in the Victorian period. All these signs are warnings. If heeded, people should start to change their behaviour and adopt more pro-environmental habits that lessen the impact of these warnings. But as has been seen over the last fifty years, many people still choose to ignore the warnings, and it is only when rain is exceptionally heavy or unpredictable and extensive flooding occurs, that people then start to change their behaviour. Faced with this situation it is proposed that policy strategies might also be required to improve our urban areas. One such area discussed under chapter 3 and relevant to this research is removal of the default ‘automatic right to attach to the sewer’ in favour of sustainable urban drainage measures.

4.8 Collective Behavioural Change

Until this juncture, the discussion has focused on individuals, although groups are equally significant. For Mead (1934), the self is the result of ‘social conversations’ and in some senses, ‘social interaction is formally antecedent to identity’. Jackson (2005) and (Burr, 2002) observe that we learn to construct a sense of self or identity, through our intentions with others, such that ‘the relationship between self and other must be regarded as dualist’ (Jackson, 2005, p.38). In practice, a good number of decisions are made in a collective, organisational setting, in which individual rationality is compromised by the need to account for the wishes and desires of others. ‘While we often view an individual’s behaviour as resulting from personal individual preference, these choices are, in fact, according to critics of rational choice, heavily mediated by observation, social learning, group dynamics and social expectation’ (Prendergast, et al., 2008, p.44). We are in effect influenced by how people around us act and by how

we think the people around us think we should act – our decision-making occurs within a collective or social setting.

4.9 Social Norms

The power of social norms stems from the way they guide our learned behaviour. For issues as diverse as how to behave in a library or how fast to drive on motorways, the behaviours of others provide clues about prevalent social norms and evidence about how we should act in any given situation (Cialdini, 1993; Prendergast, et al., 2008, p.44), often referred to as ‘social proof’. Prendergast, et al.; 2008 cite an Ipsos MORI survey on public attitudes toward climate change which concluded that over half of respondents would try to do more if others did more as well. We are in effect swayed into behaving in a certain way by seeing others behave in that manner, and by believing that the group might accept us if we acted in a certain way. ‘The choices we take are shaped by a complex interaction between our personal values and expectations, and an awareness of the prevailing societal values and the attitudes of our peers’ (Prendergast, et al., 2008, p.44). ‘As a society we value ideas of reciprocity, responsibility, generosity, loyalty and kindness, and often view corresponding actions as rewarding, despite, or even because of, the lack of associated financial reward’ (Prendergast, et al., 2008, p.45). We act in a certain way based on altruistic behaviour (Dawney and Shah, 2005). Social theory is influenced by how individuals learn, and societies develop. Research by Bandura has looked at how people learn from others. It is apparent that people tend to do what other people do. Previous studies by social psychologists have focused upon societal norms and their effect on decision-making, including Solomon Asch’s experiment on visual discrimination by participants which showed people altering their own decisions based upon others’ answers (Asch, 1951). Likewise, American and Canadian farmers altered their practices in the 1930s after observing the changes that other neighbouring farmer had made, adopting similar practices once they saw the result (Nisbett, et al., 1976, p.227-236). What these experiments show is that perceived norms can have a substantial impact on behaviour. The reason for this is our desire to comply and conform. Individuals seem to comply by altering their behaviour to receive a reward, provoke a favourable reaction from others or avoid being punished. The change in behaviour is thought to occur because the person believes that the behaviour is the ‘right thing to do’, rather than because there is a tangible consequence for not doing the behaviour. If this is the case, then highlighting the consequences of climate change on

the local environment will have an effect, as people will be motivated into accepting the ‘normality’ of actions that are sustainable and promoting LISUD.

‘Cultural conventions and social norms underpin consumer behaviour’ (Southerton, McMeekin and Evans, 2011, p.9). In order that more people are encouraged to overcome misperceptions and persuaded to change their behaviours in favour of broader sustainability, such as through low impact flood prevention measures that would lessen localised flooding, it is important not only to influence individual behaviours but also the entrenched and unsustainable cultural conventions across social groups. ‘Addressing the social context of consumer behaviour involves attempting to shift the cultural conventions and social norms that underpin different activities’ (Southerton, McMeekin and Evans, 2011, p.9). This previously has been both difficult and problematic, as it involves ‘shifting the focus of initiatives away from individual consumer decisions towards shaping and intervening in the shared behaviours of social groups’ (Southerton, McMeekin and Evans, 2011, p.9). This can be undertaken at workplaces and schools, as places where people learn; within households and families and at ‘moments of transition’ when people come together and develop an agreed approach by re-framing the social context in which habitual practices are undertaken (Southerton, McMeekin and Evans, 2011, p.10).

‘These initiatives emphasise social identity and the importance of social networks for circulating information and expectations regarding appropriate behaviours. They offer the best of both worlds by seeking to support individual efforts to live more sustainably and influencing the individual’s behaviour by offering a recognised acceptable norm, governing both what it is that we like to consume as well as what we understand to be bad or an appropriate context’ (Southerton, McMeekin and Evans, 2011, p.10).

Because we fundamentally want to be seen to fit in and align certain groups, we adopt individual behaviours to align with what we feel the social group would find acceptable, using social norms to trigger behaviour change. However, groups also tend to stick to established patterns even when new needs or actions are called for. This is sometimes referred to as traditions, wherein actions that were previously adopted continue, either because it has always been so, or because of wider beliefs or values. The disadvantage of this effect is that the practices are sometimes continued long after the initial need has ceased, and even when currently there is no basis for its perpetual practice. ‘Pluralistic ignorance’ also plays a role in this (Kuran, 1998; Berkowitz, 2004). We may follow a

practice or tradition not because we like it, or even think it is defensible, but merely because we think that most other people like it (Thaler and Sunstein, 2008, p.63), or because we believe that most of our peers behave or think differently from us, when in fact their attitudes and /or behaviours are similar (Miller and McFarland, 1987; Prentice and Miller, 1996). ‘Pluralistic ignorance’ (that manifests itself as ‘misperception’⁷¹) may lead ‘individuals to suppress healthy attitudes and behaviours that are falsely thought to be non-conforming and encourage them to continue adopting unhealthy behaviours that are seen incorrectly as normative’ (Berkowitz, 2004, p.7). Recent research has extended this theory further by suggesting that in group situations, individuals adopt social roles that are defined by the context and situation in which they find themselves. These rules or expectations are collectively known as ‘social norms’ and include both widespread societal norms and peer-group norms and attitudes.

To be effective then, ‘norms must be visible and powerful enough to induce people to act in ways that do not correspond to their private thoughts or feelings’ (Prentice and Miller, 1996, p.162). This is problematic for actions that are mostly invisible in a community such water management, the concern of this research. Actions like water management are undertaken out of view and governed by many different individuals. To overcome these behavioural barriers, this research alongside other previous research proposes that universal prevention (social norms marketing campaigns), selective prevention (targeted social norms interventions), and individual prevention (individualised social norms interventions; Berkowitz, 2004, p.7) could all be used to some degree to overcome the misperceptions, with universal prevention and selective prevention seen as more successful within localised flood prevention and sustainable water management contexts than individual prevention.

4.10 Moral and Normative Aspects

Moral aspects also play a key part in motivation around decisions. A decision needs to be ‘the right thing to do’ even though it takes time, might be viewed as inconvenient, or has complex governance. Normative influences on behaviour deal with the impact of individual behaviour on others as much as on myself. ‘Even if I am not motivated to

⁷¹ Misperception in line with Berkowitz is used to ‘describe the gap between actual attitudes or behaviours, and what people think is true about others attitudes or behaviour, so that a misperception occurs when there is an overestimation or underestimation of the prevalence of attitudes and /or behaviour in a group’ (2004, p.7).

care about these impacts on others, I may care about expectations of others on me to act in anti-social ways' (Jackson, 2008, p.51). 'Adjusted expectancy-value theories such as the Theory of Reasoned Action and the Theory of Planned Behaviour incorporate normative influences on individual behaviour through the concept of the subjective norm – my beliefs about how others think I should behave' (Jackson, 2008, p.51).

One of the most widely applied theories of social behaviour drawing upon rational choice theory is that developed by Martin Fishbein and Icek Ajzen referred to as the Theory of Reasoned Action (TRA). This is based upon the 'expectancy-value construction, presupposing that people's behaviour is based on their beliefs about the outcomes and the values they attach to those outcomes' (Jackson, 2005, p.46). Fishbein and Ajzen suggest that 'beliefs and evaluations of outcomes lead to an attitude towards a given behaviour being formed, and this attitude is one of the two main influences on people's intention to act in each way (Fishbein and Ajzen, 1975, p.57). TRA departs from simple expectancy-value through the development of a person's subjective norm, the perception of how people who one regards as important think one should behave (Ajzen and Fishbein, 1980, p.57). The 'subjective norm' is an individual belief about what other people think of the behaviour concerned, not one's own personal belief about the morality of that given behaviour, referred to as the 'personal norm' (Jackson, 2005, p.47). The distinction between subjective norms and personal norms is disputed within research circles (Kashima and Kashima, 1998), and has led to a variety of different theories including Triandis' (1977) Theory of Interpersonal Behaviour, and Schwartz's (1970) Norm Activation model as noted by Jackson (2005, p.47).

As an extension of the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB) follows similar approaches, but also incorporates perceived behavioural control (PBC), which relates to both the individual subjective norm, intention and, ultimately, behaviour. This theory as expounded by Ajzen and Madden (1986), defines planned behavioural control as a 'person's belief as to how easy or difficult performance of the behaviour is likely to be', in so doing predicting actual behavioural achievement (Jackson, 2005, p.48). The theory seeks to demonstrate that success in carrying out our behaviour depends upon the strength of the belief in our ability to do so. The development of planned behavioural control has 'similarities to and indeed draws some historical pedigree from the concept of self-efficacy' (Jackson,

2008, p.49). Bandura's 'self-efficacy' (1977, 1982) concerns 'judgements of how well one can execute courses of action required to deal with prospective situations'. Bandura states that 'self-efficacy belief' is learned in various ways including personal experiences (Jackson, 2008, p.49). Just like perceived behavioural control, self-efficacy determines whether an individual attempts a task, and the degree of effort they assign to the task when difficulties are encountered, and ultimately the success assigned to the task (Jackson, 2008, p.49).

Extensive research by Bandura and his colleagues has sought to support the idea that people's actual behaviour is strongly correlated with their confidence in their ability to perform the action in question. This is the justification used by Ajzen (1991) to claim support for the concept of planned behavioural control within the Theory of Planned Behaviour. Of interest to this research, is its use in engaging collective action (Conner and Sparks, 1996) and exploring pro-environmental behaviour or promoting 'environmentally significant behaviour' (Stern, 2000) within groups, particularly attempts to understand or predict recycling behaviours, water conservation and ethical investment (Staats, 2003). However, this theory does not incorporate affective or moral antecedents of behaviour as it derives from an 'adjusted expectancy-value model' (Jackson, 2008, p.49).

Attempts have been made to adjust the Theories of Reasoned Action and Planned Behaviour to incorporate moral beliefs, as reviewed by Manstead (2000, p.7), concluding that 'the specific inclusion of moral beliefs improves the predictive power of the theory in a variety of applications'. 'There may be a key role for theories that focus explicitly on the moral and normative dimensions of human behaviour' (Jackson, 2008, p.51). The simplest normative model proposes that pro-environmental behaviour arises from specific value orientations in the individual: 'if I hold certain kinds of moral or altruistic values, I am more likely according to the model, to engage in pro-environmental behaviour' (Jackson, 2008, p.52). Value theory draws upon empirical evidence from Schwartz (1973, 1977) who ascertained that there are two or three main value orientations in society. 'Self-enhancement' is a self-regarding value orientation corresponding to the assumption of self-interest, and the basis of the rational choice model. 'Self-transcendent' is other-regarding value orientation. The third distinct value has only recently emerged in human history (Jackson, 2008, p.52) focuses on valuing the environment as distinct from other people. Referred to as 'biospheric' value

orientation, it was developed out of Dunlap and van Liere's (1978) New Environmental Paradigm, which stated that environmental problems stem at least in part from the values, attitudes and beliefs that prevail in society. These include 'our belief in abundance, our faith in science and technology, and our commitment to a *laissez-faire* economy, limited government planning and private property rights' (Dunlap and van Liere, 1978, p.10). They are all thought to contribute to the 'environmental crisis' (Jackson, 2008, p.52).

Dunlap and van Liere asserted that these values, referred to as a 'Dominant Social Paradigm', were being eroded by modern societies. The 'New Environmental Paradigm' whose values were distinct from the 'Dominant Social Paradigm' paid increasing respect to natural limits and the importance of preserving the balance and integrity of nature' (Dunlap and van Liere, 1978) or, put another way, 'post-materialist values' (Inglehart, 1990). Since Dunlap and van Liere's study a vast number of other researchers have tried to confirm the existence of the three distinct value orientations: biospheric, social and egoistic, as identified by Jackson, 2008, p.52).

Pro-environmental behaviours can be seen to be motivated by self-interest, altruism and biospheric values. Those with a primarily egoistic value orientation would appear less likely to engage in certain kinds of pro-environmental behaviour than those with pro-social or biospheric value orientations (Stern, et al., 1995). Likewise, those who adhere strongly to the Dominant Social Paradigm are less likely to hold pro-environmental attitudes (Kilbourne, et al., 2001). Norm Activation theory emerged from this context. It was developed by Shalom Schwartz in 1977 with 'the express aim to provide a framework for understanding pro-social, altruistic behaviours' (Jackson, 2008, p.52). 'It assumes that personal norms are the only direct determinants of pro-social behaviour, where personal norms are feelings of strong moral obligation that prompt people to engage in pro-social behaviour' (Jackson, 2008, p.52).

4.11 Social Practice

It is suggested here that changes in behaviours to facilitate EC are not enough, as suggested earlier in the chapter, unless institutions and infrastructures that provide the framework in which we live and work are also addressed, otherwise, we fall back into our old habits. Theories of practice emerged in the 1960s and 1970s and sought to address these wider issues. It was not until the 'second coming of practice theory' in

the 1990s (Warde, 2013, p.18) that practices were clearly articulated in the form utilised in this research, ‘practices as fundamental units of social scientific analysis, as opposed to individual action which had dominated economics, psychology, and most of micro-sociology in the neo-liberal times’ (Schatzki, 1996, 2002). Theories of practice drew from a long heritage, ‘from Wittgenstein’s location of intelligibility and understanding and his articulation of how intelligibility and understanding structure human action and the social realm’ (Schatzki, 1996, p.13), to Heidegger’s (1962) praxis as a source of meaning (Shove, et al., 2012, p.5). ‘It has been shown to draw on James and Dewey’s recognition of the importance of skills and know-how, and the contention that experience is best understood not as an outcome of events and intentioned actions, but as an ongoing process of flow, one in which habits and routines are continually challenged and transformed’ (Schatzki, 1996, p.13), as a ‘primary unit of analysis’ as concluded by Charles Taylor in the 1970s. Ultimately, however, it is Andreas Reckwitz who provides the most coherent definition of practice as ‘a routinized type of behaviour’ (2002, p.249), ‘practice exists as a “block” or a “pattern” which can be filled out by a multitude of single and often unique actions’ (2002, p.250). It consists of interdependencies between diverse elements including ‘forms of bodily activities, forms of mental activities, things and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge’ (2002, p.249). It is this routinized type of behaviour that the research seeks to understand.

Schatzki (1996) identifies two core features and two generic types of practice as highlighted by Warde (2015, p18): practice as an organised nexus defined as a ‘temporally unfolding and spatially dispersed nexus of doings and sayings’ (Schatzki, 1996, p89); and practice as performance of doing, where the ‘patterns are provided, and through successive moments of performance the interdependencies between elements which constitute the practice as entity are sustained over time’ (Shove, et al., 2012, p.7). Under this definition, ‘individuals feature as the hosts of the practice’, ‘elements and qualities of a practice in which the single individual participates’ (Reckwitz, 2002, p.22). As such, social practices can be defined as a cultural theory, focusing on the significance of ‘shared understandings, norms, meanings, practical consciousness and purposes – in effect a “social” phenomenon’ (Shove, et al., 2012, p.9). ‘It is also a theory of innovation, enabling an exploration of the parts “end-users” play as collaborators, experimental and co-producers of innovation’ (Shove, et al.; 2012, p.11).

Social practice aims to determine a way of integrating concepts from innovation studies with theories of practice.

Practice as an ‘organized nexus requires individual carriers to investigate the performances necessary for their existence’ (Warde, 2013, p.19) or, as described by Giddens, ‘Human social activities... are recursive. They are not brought into being by social actors but continually recreated by them via the very means whereby they express themselves as actors’ (1984, p.2). Practice as a performance requires regular enactment and refers more to the carrying out of practices, the performing of doings and sayings, which ‘actualizes and sustains practice in the sense of nexuses’ (Schatzki, 1996, p.90). Schatzki distinguishes between dispersed and integrative practices. ‘Dispersed practices’ (1996, p.91-92) which appear in many sectors of social life are described as, following rules, explaining, and imagining. It is all about ‘knowing how to do something, a capacity which presupposes a shared and collective practice involving performance in appropriate contexts and mastery of common understanding’ (Warde, 2013, p.20). It operates in association with and often through other integrative practices (Warde, 2013, p.21). ‘Integrative practices, on the other hand, are defined as the more complex practices found in and constitutive of particular domains of social life’ (Schatzki, 1996, p.98), namely ‘performances that are read as correct and acceptable even when innovative’ (1996, p.101-102). ‘A practice perspective encourages us to imagine what the “new normal” of everyday sustainability would look like – and suggest possible trajectories towards it’ (Southerton, et al., 2004, p.9).

By shifting behavioural change away from individuals to that of practices, it enables us to re-frame the question ‘How do we change individuals’ behaviours to be more sustainable?’ to ‘How do we shift everyday practices to be more sustainable?’ This research aligns with that of Spurling, et al., (2013, 2012) in that it aims to shift the sustainability challenge away from technological innovation towards shifting consumer choices in favour of more sustainable options and encouraging individuals to adopt more sustainable behaviours, while discouraging less sustainable ones. ‘Unlike the utilitarianism of Bentham and Mill that runs through contemporary versions of rational choice theory as described earlier, where behaviours are driven by beliefs and values, and action’, this research recommends ‘replacing less sustainable practices with more sustainable alternatives’ and ‘changing how social practices interlock’, so that ‘change ripples through interconnected practices’ (Spurling, et al., 2013, p.2), encouraging a

sustainable lifestyle. The reason this research recommends using social practices rather than innovating technology to change behaviours, is that the other approach has had little success in overturning unsustainable actions.

4.12 Motivating Action through CoPs utilising EC - the role of participatory planning

So how should social practices be modified to promote sustainability? This research argues that a sense of responsibility is needed if super wicked problems are to be addressed and overcome through resilient solutions. Super wicked problems as described previously relate to aspects that are either unknown or owned in common by some community. In line with Garrett's 'the tragedy of the commons', as we all have access to commons, it is easy to deplete them, overgrazing or overfishing. This situation can readily escalate to the point where it is in the interest of each person to take as much as they can before others deprive them of the chance, rather than all pulling together to protect the limited resources. In the face of a potential move towards possession of common resources on behalf of people, this research promotes an alternative, a more civil approach in which no one person possesses the common resources, but rather is motivated towards maintaining and replenishing the common resources for the greater good of all. There is no central control of the commons, as shown by Ostrom (1990) when illustrating game theory rational co-operative strategies. Instead, it is argued, there should be a common pool of resources managed as a stable asset by a local community, so that those with a right to them are clearly identified. What governing the commons illustrates, consistent with this research, is that 'when sufficiently localised, a common resource can be managed from below, by the people who share it, and within a broader regime of collective ownership'. The solutions to the tragedy of the commons depend on the rational self-interest of essentially co-operative people' (Scruton, 2012, p.144).

'Top-down regulation inevitably transfers both problems and solutions to a central decision-making body. In so doing it takes problems out of their context and prevents them from being localised and therefore solved. It removes the opportunities for groups to function as stewards' (Scruton, 2012, p.144). 'An environmental problem that once was solved by the small-scale wisdom of the human heart now stands unsolved and will soon be insoluble' (Scruton, 2012, p.170). Left to themselves people will try to rectify damage if it is not some anonymous 'they' responsible but 'we' (Scruton, 2012, p.171).

‘Rational self-interest, acting in conjunction with the co-operative instinct, opens an escape route from tragedy’ (Arrow, 1990).

Rational self-interest helps, but it is not always enough, especially when dealing with environmental problems that affect absent future generations such as global climate damage, as a super wicked problem. In these instances, ‘public spirit is required, developed from a sense of belonging and of shared and inherited belief. It comes from believing that the problem is ‘our’ problem, and therefore ‘my’ problem, and that as a member of the group with shared values and understanding we can solve the problem. It is a ‘relation of trusteeship’ (Scruton, 2012, p.174), in which the living has charge of assets inherited from previous generations, which they preserve for future generations, aligning with EC. But there is also a moral issue to all of this. Morality is rooted in the fact that we hold each other accountable for what we do. ‘Our world contains rights, obligations, and duties; it is a world of self-conscious subjects, in which events are divided into the free and the unfree, those that have reasons and those that are merely caused, those that stem from a rational subject and those that erupt into the stream of things without conscious design’ (Scruton, 2012, p.212). At a rational level, motive is seen as emerging from the reasoned dialogue between self-conscious beings, who address each other I to I. For those who also adhere to the ‘radical break’ thesis, it is only at the level of self-consciousness that moral motive fully emerges. For such thinkers ‘our feeling of responsibility and willingness to make the sacrifices that responsibility requires are grounded in reasons’ (Scruton, 2012, p.213). – belonging with freedom, shame, pride, and sense of humour, as part of the repertoire of interpersonal dialogue.

It is proposed here that personal responsibility is lost when the government uses its power, overriding liabilities and transferring costs to the taxpayer. It jeopardises the responsible use of resources. In effect, government intervention increases the environmental risks by discouraging citizens from acquiring the resilience needed to adapt to the issues. ‘Those who rely on others to rescue them in a crisis are transforming the cost of their folly and relying on systems that will inevitably break down if too many do the same’ (Scruton, 2012, p.177). There appear to be two levels of motive: instinctive, where adaptations lie deeper than reason, and personal motivation. The capacity for sacrifice arises, in one case as a blind attachment and in the other as a sense

of responsibility to others, to the gods of the moral law. It is this latter motive, which is the focus of this research, aligning with EC.

So, do social practices facilitate EC and how could they motivate low-impact sustainable urban drainage (LISUD)? To answer this, one must turn towards the people who undertake the practice. In a ‘classical structural analysis’, aspects of behaviour are explained by, and serve as empirical evidence for, pre-existing, ‘underlying’ systems. ‘Understanding is seen to arise from mental operations on objective structure’ (Hanks, 1991, p.17). In a classical intellectualist theory of learning, it is the ‘individual mind that acquires mastery over processes of reasoning and description, by internalizing and manipulating structures’ (Hanks, 1991, p.15). Like thinking, learning takes place in the individual when it is considered as

‘a process that takes place in participatory frameworks, not in an individual mind. This means, among other things, that it is mediated by the differences of perspective among the co-participants. It is the community, or at least those participating in the learning context, which learns. Learning is, as it were, distributed among co-participants, not a one-person act’ (Hanks, 1991, p.15).

For this research, for greater personal responsibility to be kindled motivating action towards localised flood prevention, learning needs to occur as part of wider social practices and this occurs better when undertaken within a social context as a social practice. For this research it is proposed that communities of practice (COPS) as defined by Lave (1993) provide the social context where social learning could occur, where ‘Learning is not a discrete activity, associated with formalised spaces of teaching or isolated contemplation, but more a matter of practical activity, as people learn from each other by mutually engaging in tasks’ (Lave, 1993), undertaking social practice. CoPs are defined as ‘groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis’ (Wenger, et al., 2002, p.4).

CoPs are not a new idea. ‘They were our first knowledge-based social structures,’ argue Wenger, et al., (2002, p.5). CoPs are important because they provide five critical functions: education, support, cultivation, encouragement, and integration;⁷² and a

⁷² As described by Wenger (1998) Communities of practice five critical functions include: Education by collecting and sharing information related to questions and issues of practice; Support by organizing

learning strategy, having the potential to connect people who might not otherwise interact.⁷³ To develop understanding and expertise so that we feel confident to change our behaviours, we need opportunities to engage with others face to face. ‘The knowledge of experts is an accumulation of experience – a kind of residue of their actions, thinking, and conversations. It is an integral part of their activities and interactions, and they serve as a living repository for that knowledge’ (Wenger, et al., 2002, p.4). Knowledge is tacit as well as explicit. Not everything can be codified as documents and tools (Polyani, 1966). The ‘tacit aspects of knowledge are often the most valuable’ (Nonaka, Takenchi and Umemoto).

Today’s complex problems require multiple perspectives. ‘What makes managing knowledge a challenge is that it is not an object that can be stored, owned and moved around like a piece of equipment. It resides in the skills, understanding and relationships of its members’ (Walsh and Ungson, 1991, pp.57-91. Wenger, et al., (2002, p.15) argue that CoPs connect local pockets of expertise and isolated professionals. They diagnose and address recurring problems whose roots cross boundaries and link and coordinate interconnected activities and initiatives. By participating in CoPs, participants benefit from both short-term value where there is help with immediate problems, and long-term value through ongoing practice that will serve the community’s long-term strategy. CoPs can be big or small, some involving only a few specialists, while others consist of hundreds of peoples. This lack of defined size makes them perfect for issues around flooding. For this research which is looking at localised flood prevention, and the mechanism for encouraging communities to develop solutions, small to medium sized CoPs are recommended, providing enough people for social learning to occur but not too many for deliberation and engagement to be stunted. They can be long-lived or short-lived. They can be ‘collated or distributed’ (Wenger, et al., 2002, p.25), in that they can operate with systems that are geographically located in the same place or be

interactions and collaboration among members; Cultivation by assisting groups to start and sustain their learning; Encouragement by promoting the work of members through discussion and sharing; and Integration by encouraging members to use their new knowledge for real change.

⁷³ Learning strategy including: Providing a shared context for people to communicate and share information, stories and personal experiences in a way that builds understanding and insights; Enabling dialogue between people who come together to explore new possibility, solve challenges and create new, mutually beneficial opportunities; Stimulating learning by serving as a vehicle for authentic communication, mentoring, coaching and self-reflection; Capturing and sharing existing knowledge to help people improve their practices, and Introducing collaborative processes to groups and organizations to encourage free flow of ideas in exchange for information.

distributed over wide areas. They can be composed of people from the same disciplines and functions (homogeneous) or bring people together from different backgrounds (heterogeneous). However, having a problem in common usually provides strong motivation for building a shared practice, even among people who start without any intervention. A shared practice might be spontaneously formed through mutual need as peers and learning partners; or intentionally developed to steward a needed capability.

While CoPs take a variety of forms, they all share a basic structure. They consist of three fundamental elements, according to Wenger, et al. (2002), which are as follows:

- ‘a domain of knowledge which creates a common ground and a sense of common identity, the topic that the group focuses on, inspiring members to contribute and participate, guiding their learning and giving meaning to their actions’;
- ‘a community that creates a social fabric for learning, fostering interactions and relationships based on mutual respect and trust that encourages a willingness to share ideas and expose ignorance’; and
- ‘a practice as a set of frameworks, ideas, tools, information styles, language, stories, and aspects that the community members share’ (2002, p.89).

Lave and Wenger define understanding, as ‘locating learning not in the acquisition of structure, but in the increased access of learners to participating roles in expert performances’ (Hank, 1991, p.17), learning practices as performance. Learners participate in communities of practitioners and the mastery of knowledge and skill is acquired through full participation in the socio-cultural practices of a community (Lave and Wenger, 1991, p.29). Learning is ‘situated’ in that it occurs where people’s thoughts and actions are in space and time, and where they involve other people or ‘were dependent for measuring in the social setting that occasioned them’ (Lave and Wenger, 1991, p.330). Under this approach, learning should be viewed as a special type of social practice, one associated with ‘legitimate peripheral participation’ (LPP). Learning as LPP is present in all sorts of activities, not just traditional learning environments but also as everyday situations in which people co-participate, thereby gaining access to modes of behaviour not otherwise available to them, eventually developing skills adequate to certain kinds of performance (Hanks, 1991, p.18). ‘Learning as increasing participation in CoPs concerns the whole person acting in the world’ (Lave and Wenger, 1991, p.49). By considering learning in this way, learning implies becoming a full participant, a member of the community, ‘emphasising the inherently socially negotiated character of meaning and the interested, concerned

character of the thought and action of persons-in-activity' (Lave and Wenger, 1991, p.51). Learning within CoPs can thus be indistinguishable from everyday practices of sustainability, in that it focuses upon learners.

A learning curriculum unfolds in opportunities for engagement in practice (Lave and Wenger, 1991, p.93). In line with this research, learning occurs from participation – of both absorbing and being absorbed in – the 'culture of practice' (Lave and Wenger, 1991, p.95). Through 'extended legitimate participation' or, for my research, active social learning within participatory planning frameworks, members of 'CoPs' gradually assemble 'a general idea of what constitutes the practice of the community', including 'who is involved; what they do; what everyday life is like;... (how community members) conduct their lives; how people who are not part of the community of practice interact with it; what other learners are doing; and what learners need to learn to become full practitioners. It includes increasing understanding of how, when and what' learners need to learn to 'become full practitioners' (Lave and Wenger, 1991, p.95). Under this approach social learning is a form of 'learning curriculum' (p.97). It consists of 'situated opportunities' including exemplars, often described as goals.

'A community of practice is thus a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice' (Lave and Wenger, 1991, p.98). In summary, rather than assuming learning is undertaken through replication or by acquiring knowledge transmitted in instruction, instead, in line with Lave and Wenger, learning is seen as occurring through 'centripetal participation in the "learning curriculum" of the ambient community.' The place of knowledge is within the community of practice, and therefore learning must be addressed within the development cycles of the community. Knowing is thus inherently in the growth and transformation of identities and membership in the community, located in relations among social organisations and the political economy of the community of practice (Lave and Wenger, 1991, p.102). But how should that process occur?

4.13 Process for Change in relation to CoPs and EC

As previously described in this chapter, civic environmentalism uses environmental education to inform people about the environmental and social costs associated with economic activities so that they will change their behaviours and practices and develop

a strong environmental and civic consciousness. The belief is that consumers should know about the environmental consequences of their actions, and, as a result, develop collective responsibility as a form of collective guilt, in effect a green conscience. This leads to more equitable decisions about the allocation of environmental benefits and burdens and, therefore, has aims in common with EC. Under this process people possess the bare minimum of environmental literacy, ensuring that the environmental consequences of both private actions and public policy are routinely identified and discussed. Moreover, considering the scientific nature of many environmental problems, technical data and information must be disseminated to stakeholders in an intelligible, meaningful way to enable them to make sound decisions. Environmental education helps to build social capital, a key aim of civic environmentalism, by creating positive feedback loops, second-order learning processes of social learning. As stakeholders become more knowledgeable about environmental issues it has been proved that they become more interested in participating in environmental decision-making and programme implementation (Shutkin, 2000, p.136). Environmental education has been seen to develop awareness among stakeholders of the civic resources and regulatory systems that promote environmental protection a strong emphasis of EC.

Civic environmentalism demands an ‘awareness of the distributive aspects of environmental protection and a commitment to democratic justice’ (Shutkin, 2000, p.139). It complements broad EC in its aim to break down the injustices in the structural systems that currently threaten certain neighbourhoods over others, based purely upon their wealth; and promotes a democracy where everyone lives, works, and plays in a safe, healthy environment, with social justice implying environmental health for all. Drawing upon environmental justice, civic environmentalism emphasises the structural conditions surrounding the democratic process and asks, ‘are ordinary people, especially the disenfranchised, participating in the decision-making procedures of institutions that fundamentally regulate our lives?’ (Shutkin, 2000, p.135). If not, how do we encourage them to be better represented? By striving to empower individuals to participate in and take control over decisions that affect their health and environment via active social learning and fully participatory process in CoPs, environmental justice increases the civic capabilities of the community and ensures lasting environmental results at the community level, enhancing adaptive capacity, a key criterion of EC. This

research maintains that people's currently unsustainable private and public practices could be altered through active social learning processes via full participation in decision-making through participatory planning mechanisms, and that if focused on EC and the primary virtue of justice in relation to ecological footprints and in particular water footprints, changes in behaviours, norms and practices could occur that facilitate adaptation to climate change and motivate LISUD.

4.14 Chapter Summary

This chapter has reviewed the case for adaptation to climate change and planned adaptation. It noted that decision makers have high levels of awareness around climate change and understand the case for adaptation but, that until recently, communities have failed to grasp the advantages. In that regard, framing was considered important, particularly around 'wickedness', with the framings and underlying assumptions considered extremely influential in governing the goals of adaptation, assessment of risk, and prioritisation of options which in turn determined who should be involved in adaptation efforts.

The chapter extensively reviewed the history around environmentalism, environmental justice, and sustainability and, in the context of climate change adaptation, assessed the roles currently undertaken by communities. It looked in-depth at modern civic environmentalism as an emergent policy framework that recognises the limits of top-down command and control and reviewed the multiple ways in which local solutions to environmental problems are developed.

It assessed the role of ecological citizenship (EC) as a politics of obligation, which acknowledges that self-interested behaviour will not always protect or sustain the environment. It also highlights the obligations that encourage justice, care, compassion, protection, stewardship and conservation, that remedy injustices for localised solutions to flood prevention, water conservation and sustainable water management. EC has been shown to offer means for overthrowing top-down command of flood prevention and for facilitating bottom-up approaches, when undertaken within CoPs undertaking participative planning.

From a review of the traditional responses of policymakers seeking to alter behaviours, this chapter has examined the limitations of rational choice, and the advantages of behavioural economics, and individual behavioural drivers. This chapter has noted that

many issues, including localised flood prevention and sustainable water management, demand collective behavioural change. In this regard, the influence of peer pressure and social influence, social norms, and moral and normative aspects were analysed, in pursuit of greater understanding around misperceptions and value action gaps. The chapter highlights that for local responses to flooding and sustainable water management, both individual and collective behavioural change is required which is both long-term and sustained, and that for this to occur, this will require structural changes to the wider systems if we are not to revert quickly to our old ways.

This chapter seeks to understand the context surrounding the development of social theories of practice, and then to assess the role that communities of practice (CoPs) could play in facilitating and enabling change to super wicked problems of climate change. Social theories of practice as a cultural theory and theory of innovation were analysed to determine the role, they might play in shifting consumer choices in favour of more sustainable behaviour. It looked at how social practices interlock so that interconnected practices take hold, and highlighted how ‘value action gaps’ that currently inhibit sustainability could be challenged

As stressed earlier, for enduring and sizeable shifts towards sustainability, collective changes are required. EC undertaken in CoPs provides means for raising awareness of the injustices surrounding ecological footprints and in particular water footprints, and emphasises that for such changes to occur, a sense of responsibility is needed if super wicked problems are to be overcome through the adoption of resilient solutions. It surmises that a greater sense of responsibility for our environmental injustices could be fostered in CoPs, helping to raise awareness to the issues and motivate pro-environmental action. In particular, the structure of social learning within CoPs as part of wider participatory planning initiatives could serve, in the context of flood prevention and sustainable water management, to build awareness of LISUD and motivate action.

Chapter 5. Research Methodology and Methods

5.1 Introduction

The aim of the research as set out in the introduction was to address a series of problems, centred on why people are reluctant to implement sustainable urban drainage flood prevention measures at a local level, and to consider measures which might overturn this reluctance. It sought to ascertain whether terminology played a part in motivating action and to understand the frameworks around flood prevention, looking at the various parties involved and exploring whether bottom-up organisations can be influential in localised flood prevention, or whether top-down measures are also required. These problems were detailed as core research questions.

Table 5-1. Research questions and methods

Core research questions	Research methods
To what extent can people be motivated into adopting pro-environmental/social behaviour to facilitate personal and collective responses to sustainable water management and localised flood adaption?	surveys, and focus groups
To what extent are bottom-up organisations able to achieve this, or are top-down measures required?	surveys, focus groups and case studies
To what extent can EC / CoPs play a proactive role in supporting localised flood adaptation?	surveys
To what extents can we learn lessons from case studies in the UK and elsewhere?	case studies

An extensive literature review of the UK planning policy and controls framework towards localised flood prevention and water management, alongside participatory planning, sets this work in the wider context of climate change adaptation. It examines and critiques theories, to determine what approaches could facilitate the wider implementation of LISUD. The review identifies existing gaps in the literature and highlights the distinctive contribution of this research.

Online surveys, questionnaires, face-to-face interviews and focus group workshops were facilitated, as detailed in the introduction, to support or refute the theoretical findings from the literature reviews and highlight best practice localised flood prevention methodologies. Recent examples of climate change engagement methodologies from the case study programmes that promote LISUD were also analysed so that a methodology could be developed that other CoPs could use to raise awareness of adaptive solutions that encourage implementation. Finally, the theoretical findings from the research were tested through participatory research.

A mixed research methodology comprising both quantitative methods (e.g., surveys and questionnaires) and qualitative methods was adopted. Quantitative methods were used for measuring, categorising, identifying patterns and making generalisations, and qualitative methods (e.g., interviews and focus groups) were used for describing, interpreting, contextualising, and gaining insight into specific concepts and perceptions. The quantitative research approach used closed questions within the surveys and focus groups so that statistical data could be formulated between the various respondent groups researched. All the groups had witnessed flooding in the last five years, and the questions asked focused on the issues faced by the communities, their understanding and awareness, and solutions that they would be inclined to install, as detailed in the introduction. This multi-faceted approach meant that the results, whilst not individually quantitatively significant, painted a collective picture from which inferences were made.

The qualitative research approach predominated, associated with the social constructivist paradigm which emphasises the socially constructed nature of reality and extends the quantitative research. Qualitative research recognises the importance of value and context, setting the participants' frames of reference, whilst acknowledging the existence and interplay of multiple views and voices' (James and Busher, 2009, p.50). The knowledge derived from qualitative research can only be understood in the context of the 'meaning that individuals attribute to that knowledge – their thoughts, feelings, beliefs, and actions' (Illingworth, 2006). Through open questions in the surveys, focus groups, and case studies, the qualitative approach focused on recording, analysing, and attempting to uncover the deeper meaning and significance of human behaviour and experience in the communities, including contradictory beliefs, behaviours, and emotions. Even though there are debates about the validity and reliability of qualitative research, in this instance in line with Noble and Smith (2015, p.34), 'validity refers to the integrity and application of the methods undertaken and the precision with which the findings accurately reflect the data'. Reliability describes 'consistency within the analytical procedures employed'. Lincoln and Guba offer qualitative criteria for demonstrating rigour namely, truth value, consistency and neutrality and applicability (1985). They aim to design and incorporate methodological strategies to ensure the "trustworthiness" of the findings (Long and Johnson, 2000) including accounting for personal biases which may influence findings (Morse et al.,

2002), acknowledging biases in sampling and ongoing critical reflection on methods to ensure sufficient depth and relevance of data collection, and meticulous record keeping (Sandelowski, 1993). Other strategies include establishing a comparison case so that similarities and differences can be identified (Morse, et al., 2002); demonstrating clarity in terms of thought processes during data analysis; respondent validating that invites participants to comment on the interview transcript and the final themes and concepts ensuring that they adequately reflect the phenomenon being investigated; and data triangulation (Long and Johnson, 2000).

5.2 Methodologies

The construction of knowledge is underpinned by epistemological stances that provide a philosophical grounding. A 'realist perspective assumes the existence of a single meaning that is independent of the observer', whilst a 'relativist perspective acknowledges multiple realities having multiple meanings, with findings that are observer-dependent' (Yin, 2014, p.16). For this research, the epistemological stance is constructivism, where truth or meaning are constructed, not discovered.

Researchers such as James and Busher (2009) have argued for the need to focus social inquiry on understanding subjective meanings and values of individual actions. Such a view is linked to Max Weber's (1864-1920) 'Verstehno' (understanding). The aim is to understand how individuals interpret their world, so that researchers can engage with phenomena and make sense of them (Crotty, 1998). Symbolic interactionism assumes interactions take place in such a way that individuals continually interpret the symbolic meaning of their environment. Hermeneutics assumes meaning is participative, and as such is not produced by the researcher. For this research, a hermeneutical position is adopted, allowing time and space to explore what is understood, as well as clarifying the conditions in which understanding has taken place, so that meaning is discovered. This research advocates the epistemological standpoint of social constructionism and the philosophical lens of hermeneutics. The research methodologies and methods draw on the interplay of interpreting participants' voices and stories, constructs of knowledge, and on the dynamics of the situation, to seek a deeper understanding of participants' lived experiences (Illingworth, 2006).

A multiple case study analysis was undertaken. This approach was selected because it enabled research of the topic using set procedures and entailed combinations of data

collection including semi-structured interviews and documentary evidence. It facilitated an empirical investigation of a phenomenon within its real context and offered an exploratory analysis of people involved in CoPs undertaking climate change adaptation in three European cities. The emphasis was on researching and understanding the complex social phenomenon of motivation in CoPs concerned with flood prevention and sustainable water management, and to determine what role consensus planning played in facilitating that process.

The multiple case study methodology follows a two-fold definition. First, it is an ‘empirical inquiry that investigates a contemporary phenomenon, the ‘*case*’, in-depth and within its real-world context, especially when the boundaries between phenomenon and context may not by definition be clear’ (Yin, 2014, p.16). The second part of the definition concerns ‘methods of inquiry’, with the features of the case study being defined as a ‘technically distinctive situation in which there will be many more methods of interest than data points; one which relies on multiple sources of evidence, with data needing to converge in a triangulating fashion; and one that benefits from the prior development of theoretical propositions to guide data collection and analysis’ (Yin, 2014, p.16). In essence, a case study methodology, as defined for this research, is an ‘all-encompassing method – covering the logic of design, data collection techniques, and specific approaches to data analysis’ (Yin, 2014, p.16).

5.3 Methods

5.3.1 On-line Surveys and Questionnaires

Surveys are considered appropriate methods of research due to being clearly structured, flexible, and adaptable. They are based on personal interaction and can be controlled within a survey environment (Holbrook, et al., 2003; Alreck and Settle, 2004; Szolnoki and Hoffmann, 2013). However, there are also some disadvantages, namely interviewer bias, high cost per respondent, geographical limitations and time pressure on respondents, and social desirability bias because of the interviewer’s presence (Duffy, et al., 2005). For these reasons, online surveys have predominated, offering lower costs and higher speed. Eight groups were surveyed for this research between 2014 and 2018, using four different surveys, two online and two as questionnaires.⁷⁴

⁷⁴ Refer to Chapter 6 for further details and analysis of the online surveys and questionnaires.

For this research, questionnaire surveys were used initially to establish people's views on flood prevention and water management, and their feelings and values with regards to sustainability and adaptation, to support – and augment once developed – generalised conclusions. Online questionnaires were utilised with some of the groups where face-to-face was not appropriate. They are efficient for gathering a large amount of data from different sources and assessing a wide range of information, such as attitudes, beliefs, values, and past behaviours. They were also suitable for focused questions on specific areas of climate change, behaviour, practice, and motivation. Krosnick (1999) suggests that three factors influence whether people are inclined to complete questionnaires and the success of the questionnaire and likelihood of achieving meaningful levels of response: respondent ability, respondent motivation, and task difficulty/questionnaire design. In addition, ethics surrounding the questionnaire and confidentiality⁷⁵ also influence success, alongside getting the questionnaire in front of the right people at the right time.

Online survey design considers several factors to avoid 'questionnaire fatigue' and hence incomplete responses. In this instance, this included an initial clear explanation of research aims and objectives; a logical structure with clear and concise language; preliminary questions seeking simple attribute information on the participants, followed by more demanding/tougher questions seeking findings on values, behaviours, practices, and norms, so that barriers to action could be discovered, and motivation drivers understood. A range of question types can be used in surveys including open questions, closed questions, quantity, lists, category questions, ranking/scales (Polit and Hungler, 1999) and grids. To yield qualitative data including non-numerical observations and narrative data a higher proportion of open questions should be used. This advice was heeded, and the questionnaires included a combination of both closed and open questions. In closed questions respondents were offered a choice of alternative replies, while open questions expected responses providing narrative and qualitative information (Parahoo, 1993), to qualify in more detail individual and group responses. A variety of question types were used including multiple choice and a matrix of choices with single and multiple answer options. Many of the questions also had lists where respondents could select more than one response as these were not mutually exclusive,

⁷⁵ Refer to Section 5.5 for a description of the research ethics.

and a comment field to gain additional information to assist follow-up surveys. A question logic function was used to enable respondents to skip sections of the survey that were not pertinent to them. These multiple question options generated initial quantitative statistical information on the issues faced by the communities, including barriers to actions, drivers to overcome those issues, and potential measures to adopt, alongside qualitative attitudes, and beliefs with regards to those measures, and motivators for action.

Questionnaires were undertaken with CoPs⁷⁶ including a residents' group in Kenley, Surrey which had experienced flooding at the start of this research in 2013; a transition group⁷⁷ in Cambridge who live in an area susceptible to flooding, and university students in Salford, who witnessed flooding. The diversity of groups provided a wide sample across all ages and demographics. These groups were chosen as they had either witnessed flooding (Kenley Resident's Association and University Students in Salford) or were predicted to be at risk from flooding (Cambridge Transition Group) and had shown interest in sustainable water management techniques to potentially reduce the risk from flooding (Cambridge Transition Group and Salford University). The questionnaires set out to assess the awareness of the issues around flooding within the CoPs; to determine individual and group values towards sustainable water management and flood prevention; to ascertain motivation for action; to challenge the misperceptions and value action gaps that have been seen to inhibit action; and to understand structural solutions needed, as well as the scale of those solutions, so that LISUD could be encouraged. An industry standard online survey tool (Survey Monkey TM) was used to administer the online surveys.

In May 2014, Kenley and District Residents' Association in Surrey became a pilot project. An introductory email was sent to the target community of practice, following an initial presentation by myself of the overall research project. The introductory email explained the nature of the research project and the studies already undertaken. Piloting was essential to check the reliability and validity of the questionnaire (Youngman,

⁷⁶ In this context, Communities of Practices are defined as 'a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice' (Lave and Wenger, 1991, p.98).

⁷⁷ Transition Groups are defined as voluntary, non-profit organisations, which aim to address climate change issues through the promotion of sustainable living in the community.

1978) and whether it yielded data suitable for analysis, so that any flaws could be removed and, if necessary, the questionnaire redrafted. To determine whether the length was suitable or might lead to reduced response rates (Jack and Clarke, 1998), and whether shortening the questionnaire would improve the likelihood for the questionnaire being completed, a question was included at the end to provide that information. It was also considered important at the piloting stage to consider ‘acquiescence bias’, where subjects characteristically agree with statements irrespective of their content (Polit and Hungler, 1999). As a way of avoiding this, Likert scaling was used including strongly dislike or strongly agree questions stated alternately near the beginning, so that degrees of opinion and even no opinion could be determined within the quantitative data and analysed relatively easily.

The data derived from the piloted questionnaire was analysed and checked to ensure it produced useable results. This analysis concluded that the questionnaire was too long and might put off some of the respondents and was consequently redrafted and significantly reduced in size.

Following the pilot, the updated questionnaire was issued officially to Kenley Residents’ Association members between May and September 2014. The Kenley and District Residents’ Association (KENDRA) has a membership approaching 1,500 households, although the core membership is around 50. (Refer to Appendix A for a copy of the Questionnaire.) The number of responses was monitored on a regular basis. As responses became less frequent, a second reminder email was sent to those who had not attempted the survey. A follow-up telephone call to the resident association’s key stakeholders who had not responded was made to try and persuade them, in a polite manner, to complete the survey, and the committee was also tasked with persuading residents. This resulted in twenty-two responses. In 2015 a separate introductory email was sent to all residents’ groups and environmental organisations in Cambridge and prompted participation from Cambridge’s Transition Group.⁷⁸ Cambridge was chosen as it had witnessed ground and surface water flooding due to Cambridge’s low-lying

⁷⁸ Transition Cambridge was established nearly eight years ago as part of a wider network of Transition Cities. Today it provides a local platform for social networking and knowledge exchange for Cambridge to facilitate discussions and catalyse change with regards issues that directly affect Cambridge homeowners and residents. It has close to 2,000 followers with approximately 1,900 newsletter subscribers and functions through voluntary contributions of its members’ time, energy, organisational skills, and technical expertise.

nature. Eighteen responses were received from the Cambridge Transition Group. In 2017 university students in Salford were also included, to extend the communities consulted and widen the findings of the study. Participating students numbered 22. (Refer to Appendix C for the Grey Street/Green Street Questionnaire.) In 2018 a further introductory email was sent via the National Flood Forum Facebook page to all Flood Action Groups in the UK, to explain the nature of the research project and the findings gleaned so far, and to seek involvement from those groups currently undertaking flood prevention measures across the UK. (Refer to Appendix D for the Flood Action Group Questionnaire.) Each participant responding to the online surveys was invited to take part and directed to a link enabling the completion of the survey. Four flood action groups participated. In 2021, two of the flood action groups were recontacted and semi-structured interviews were undertaken focused around a series of questions to enlighten the responses provided within the surveys. Refer to Appendix E for the Flood action group Semi-Structured Interview Questions.

5.3.2 Flood Forum

A flood forum was organised in July 2016 by the researcher with assistance from Transition Cambridge. It was held in a well-known venue in a central location in Cambridge, to facilitate a large attendance. The flood forum was the culmination of a series of events. It drew on the Dutch Dialogue principles, which form a dialogical communication participation model of engagement developed by Waggoner Ball. It has been used in the USA and Holland to transform land use through a collaborative exchange between city professionals, academics and community leaders on planning, stormwater management, resilience, and other interests, focusing first on water (Wbae, 2013). The flood forum aimed to bring people together from all walks of life in Cambridge to discuss the issues, highlight the challenges, facilitate social learning around flood prevention and develop solutions, focusing on sustainable water initiatives.

Residents' groups and associations, businesses and transition members were contacted via email and on the telephone two weeks prior to the event. They were sent an explanation about Transition Cambridge Learning to Stay Dry sub-groups aims and aspirations, and the format of the flood forum. A social marketing poster campaign was run to promote the flood forum to visitors, local businesses, schools, and university college students. The poster campaign drew upon previous poster campaigns organised

by Learning to Stay Dry and wider empirical research carried out by Visual Communicators.⁷⁹ Drawing upon this research's wider focus on social learning within CoPs as a way of motivating pro-environmental behaviours, the posters highlighted the common barriers to flood prevention, the reliance on someone else to do something, and the assumption that protection was by others. It reminded people, both visually and through a simple use of words, that we are all responsible for changing our behaviours, a premise recently highlighted within the IPCC's latest findings (IPCC, 2018), and aligning with EC principles.

A series of large-scale maps were also reproduced and distributed around the venue, drawn from the current Cambridge City Council surface water flood management plans. The maps illustrated the urban form of Cambridge, the rivers and water courses that flow through Cambridge. The recorded incidences of flooding were represented geographically, alongside the potential for infiltration based upon geological and hydrological mapping, and the likelihood of surface water flooding in various areas across Cambridge shown visually. At the flood forum groups of participants met to discuss the issues, were taken through technical information by the flood officer, and then shown alternative measures that could be developed to lessen the risks currently faced and enhance resilience, by means of sustainable water management. A series of low impact sustainable urban drainage solutions to localised flooding were also provided as visual communication, distributed throughout the venue. These were drawn from a list of 57 possible LISUD solutions highlighted in the case studies (Amsterdam Rainproof) but reduced in number to suit the area. They illustrated LISUD measures that might reduce flooding issues within Cambridge, including those operating at business, neighbourhood and individual household levels. The flood forum presented the images alongside mapping, and people were asked to look at them and then complete a flood survey with 40 questions arranged around various issues, potential solutions, attitudes, values, and preferences. The survey was handed to each attendee to complete when they entered the forum. Completion was encouraged individually, but as the people started to complete the survey and provide their answers, questions

⁷⁹ Visual Communicators is an internet-based image collective, aimed at utilising visual communication to disperse key messages to influence people.

were raised which were discussed more widely, leading to some of the questions inevitably being completed in groups.

5.3.3 Focus Groups

To overcome weaknesses inherent in surveys and questionnaires and to allow for affective aspects of the responses inhibited by closed questions, focus groups were also used. The range of application fields for focus groups demonstrates their adaptability.

They have been referred to by some researchers as ‘in-depth group interviews employing relatively homogeneous groups to provide information around topics specified by the researchers’ (Hughes and DuMont, 1993, p. 776). Others define them as ‘a carefully planned discussion designed to obtain perceptions on a defined environment’ (Kreuger, 1998, p.88), or ‘an informal discussion among selected individual about specific topics’ (Beck, et al., 1986). The method relies upon interaction between individuals during the discussion, often referred to as the ‘synergy of the group’ (Kitzinger, 1994). One advantage of using focus groups is that they permit researchers to observe a large amount of interaction on a specific topic. This was the case for this research, with respondent groups discussing the issues around flooding and interacting with each other, developing understanding, and discussing solutions. In practice, the groups tend to be based on availability rather than representativeness of the sample (Pini, 2002). Compared to surveys, focus groups offer ‘more flexibility in the way questions are asked’. They suit research ‘where in-depth knowledge about the reasons for people’s behaviour is required’, and are considered suitable ‘when there is a gap in experience and understanding, because they encourage communication and provide insights into how others think and talk’ (Morgan, 1998). They ‘combine both context and depth, they encourage investigation into and comparison of different preferences and provide reasons for individual opinions and experiences’ (Morgan, 1998). But there are often problems with setting up and organisation, obtaining the right number and diversity in the groups.

Focus groups historically have fallen into one of two camps: a more structured approach which originated in market research, where moderators are usually paid to find out specific answers for a client, and therefore need to be active and visible in the group; and a less structured approach which has emerged from ‘social research, where the goal is typically to understand participants’ thinking, where the moderator is aiming to

facilitate discussion rather than direct it' (Morgan, 1998; Smithson, 2008). The focus group procedure follows a relatively unstructured interview, which generates a list of topics for discussion (Smithson, 2008). The aim, as in semi-structured interviews, is to cover the topics set by the research, but with some flexibility to allow for related topics to emerge, aligning grounded theory. The moderator guides the discussion, making sure that all topics are covered and that all group members are given the chance to speak. For this research, the less structured approach was undertaken, so that a discussion around localised flooding and water management could occur. The various themes discussed drew from the themes developed within the surveys and questionnaires, including reasons for flooding locally, consequences, wider scientific claims such as climate change and terminologies, and the implications for local participants. Communication and engagement around water management and flooding were also considered, including those currently involved, together with ways of reducing powerlessness and increasing responsibility for flood prevention and adaptation.

Originally it was intended to use the survey and questionnaire groups for the focus groups so that affective responses from those groups could be ascertained, and solutions to the issues surrounding localised flooding in their areas determined. However, this proved impractical because the resident's association in Surrey confirmed that it was not in their remit to implement solutions surrounding water management and flood prevention, relying upon other organisations for that purpose, so they were reluctant to participate. Likewise, Salford University students also did not have empowerment to implement solutions, so they also declined to participate. However, Transition Cambridge confirmed that they were interested in implementing solutions and were very keen to undertake focus group discussions, so Cambridge became the focus of this aspect of the research method, allowing for an extension of the findings from surveys and questionnaires.

Social media were used, with the sub-group launch publicised via Transition Cambridge's monthly newsletter, sent to all sub-groups, all members (around 200 people) and other like-minded individuals and businesses (around 2000 people). A weekly follow-up E-shot was also sent to remind people shortly before the launch. Local newspapers and radio stations were contacted a week before the launch and the organisers interviewed on the reasons for forming Learning to Stay Dry, and the issues surrounding flooding in Cambridge, which helped to galvanise local interest in the new

group, its aims and actions. This campaign led to 30 people attending the launch event, a good turn-out for a new Transition sub-group.

Provocations, dialogues, and discussions are considered important ways to instigate engagement with people on issues that affect their lives, later facilitating the development of solutions and strategies within a social learning engagement environment. These strategies were adopted within Learning to Stay Dry. Following an initial film that contextualised my research, which was shown to the group in February 2016, a discussion was facilitated with the attendees. This took place in two groups around a series of icebreaker and community problem-solving questions. The two groups each comprised professionals, council employees, transition group members and community participants. The icebreaker questions, ‘provocations’ were presented to get the audience to think about what they had seen and to start to discuss the issues. (Refer to Appendix B for the Provocations, Dialogues and Discussions Ice Breaker Questions.

So that the energy galvanised within the first event in February 2016 was captured and extended, a second event was planned a month later in March 2016. The participants for the second focus group all attended the initial one. The second focus group workshop was more focused, consisting of two facilitators and six attendees, people who belonged to Transition Cambridge and those from resident associations who had been flooded. The targeted focus group discussion aimed at providing a learning environment within a small and intimate group to enable the issues raised at the initial event to be discussed at length and in more detail, and from that, solutions developed with like-minded people. The focus group discussions were recorded, with consent being given by the participants in advance. From those recordings’ transcripts were taken followed by open coding and then axial coding using grounded theory, to determine key nuances from the language of the participants.

5.3.4 Multiple Case Study Method

The case study method required components of the research design to be defined including core research questions, theoretical propositions (Sutton and Shaw, 1995) characterising analytic generalisations (Yin, 2014); unit(s) of analysis, and application of ‘conceptual frameworks’ (Miles and Huberman, 1994); and the linking of ‘data to propositions and criteria for interpreting the findings’ (Yin, 2014, p.16).

The core research questions, the case(s) and its boundaries, and the type of case study to be conducted were all established. The selection of a specific type of case study design was guided by the overall study purpose. There are many different types of case study design as defined by Yin (2014) and Stake (1995), which relate to whether the research is seeking to describe, explore or compare cases. In this instance, an explanatory case study method is undertaken, seeking to explain causal links in real-life interventions that are too complex for alternative qualitative methods such as survey or experimental strategies. In evaluation language, this explanatory multiple case study seeks to link EC undertaken as active participatory transformative and social learning, or '*curriculum of learning*' in CoPs undertaking city-level climate change adaptation, with city-based climate change adaptation strategies. The aim is to assess whether the 'level' and/or 'structural framework' influences the degree of transformation and social learning practices undertaken, and the motivation for implementing LISUD.

The value of the case study approach over pure theoretical study, as explained by Cherulnik (1993, p.53) is that it 'can establish actual impacts on environment and behaviour and often the benefit of local contexts in terms of climate, local resources, infrastructure etc., they apply theory and research in a reciprocal relationship and can have a proselytising function by enhancing impacts on target audiences. A detailed case study permits adequate descriptions relating to setting, defining problems, programmes, design process, use and the generation of a useful behaviour theory or research.

According to Remeny, et al. (2002, p.4) a case study should have the following characteristics:

- It is a story.
- It draws on multiple sources of evidence.
- Its evidence needs to be based on the triangulation of these sources of evidence.
- It seeks to provide meaning in context.
- It shows both an in-depth understanding of the central issue(s) being explored and a broad understanding of related issues and context.
- It has an adequate focus on organisations, a situation, or a context. It must be reasonably bound. It should not stretch over too wide a canvas, either temporal or spatial.

Collection of case study evidence includes documentary, archival records, interviews, and direct observations. All evidence should be reviewed on a case-by-case basis to

enable evidence formulation on each case separately. The use of both qualitative and quantitative data gathering methods has allowed triangulation with the evaluation of different sources of data. Zeisel (1984, p.37) states that these techniques 'are particularly useful to gather information about such topics as people's perceptions, their attitudes, their values and the meaning the environment holds for them'. In face-to-face encounters, researchers use a variety of research methods to 'study everyday life and social interactions, to reveal the rich symbolic world that underlies needs, desires, meanings, and choices' (Atkinson and Hammersley, 1998; Flick, 2002). These methods, as described by James and Busher (2009), 'develop an analytic understanding of individual perspectives, activities and actions that are likely to be different from, perhaps even conflict with, how the people themselves see the world' (Hammersley, 2006, p.5). 'They can include both group and individual interviews, providing a wealth of data about people's experiences, thoughts, and feelings, and becoming the sites for the construction, integration, understanding and representation of experience'. For these reasons, semi-structured interviews were carried out with organisers of the programmes for each case study so that the meaning of conversation and interaction could be negotiated mutually in an act of interpretation rather than simply being discovered (James and Busher, 2009).

'Interviews are verbal interchanges where one person, the interviewer, attempts to elicit information from another person' (Dunn, 2005, p.79). There are three types of interviews, structured, unstructured, and semi-structured which can be placed along a continuum (Dunn, 2005). Structured interviews, as described by Dunn follow a 'predetermined and standardised list of questions. The questions are always asked in almost the same way and in the same order, ensuring consistency'. In unstructured forms of interviewing the conversation is directed by the informant rather than by the set questions. 'Semi-structured interviews draw upon both types with the interviews following some degree of predetermined order, whilst ensuring flexibility in the way issues are addressed by the informants' (2005, p.80). 'Semi-structured interviews and focus groups are similar in that they are conversational and informal in tone. Both allow for an open response in the participant's own words' (Longhurst, 2016, p.145). Semi-structured interviews were used within the multi-case study analysis.

Multiple case designs have distinct advantages in comparison to a single case design, with the evidence from multiple cases often considered more compelling, and the

overall study is therefore regarded as being more robust (Herriott and Finestone, 1983). Understanding a multiple or collective case study enables analysis within each setting and across settings to occur. This research adopts a multiple case study analysis to explore differences arising both within and between European city climate change adaptation CoPs to ascertain differences in their approaches to similar climatic contexts, and to determine whether the city-based consensus-planning programmes overcame the limitations witnessed in the UK.

In using case study analysis instead of other methods including experiments, survey, archival analysis and history, the line of inquiry was developed. The focus was on ‘how’ and ‘why’ questions. These questions lead to a more explanatory analysis, that deals with ‘operational links traced over time,’ rather than ‘what’ questions, which concern ‘mere frequencies or incidences’ (Yin, 2014, p.10). The ‘how’ and ‘why’ questions are used when the behaviour of those involved in the study cannot be manipulated, when the contextual conditions are significant for the phenomenon under study, or where the boundaries are not clear between phenomenon and context. The ‘how’ and ‘why’ questions in the case studies were drawn from the literature on the wider topic (Cooper, 1984) of the benefits of transformative and social learning in CoPs undertaking consensus planning, water management and flood prevention. From a dissection of studies relevant to this research, a series of unanswered questions were defined that led to the ‘how’ and ‘why’ questions of the case study analysis.

To assist with the direction of inquiry, theoretical propositions were developed, that directed attention to specific aspects for examination within the scope of the study. The role of theory development and formulation of theoretical propositions prior to any data calculation defines case study research, as opposed to other qualitative methods such as ethnography (Lincoln and Guba, 1985; Van Maanen, 1988) and grounded theory (Corbin and Strauss, 2007), which deliberately avoid stating theoretical propositions at the outset of an inquiry (Yin, 2014, p.37). Theoretical propositions, as noted by Sutton and Straw (1995, p.370) are a [hypothetical] story about why acts, events, structure, and thoughts occur, characterising analytic generalisations (Yin, 2014, p.40). The theoretical proposition represents issues from research literature and elaborates a complex pattern of expected results (Rosenbaum, 2002, pp.5-6, and 277-279), enabling a stronger design and enhanced ability to interpret the eventual data (Yin, 2014, p.38). The theoretical propositions for this multiple case study analysis include:

- Consensus-planning processes encourage collaborative responses to issues, which in these cases facilitate CoPs in water management through bottom-up approaches.
- Bottom-up approaches to consensus planning enable greater understanding around local issues, encouraging individual responsibility in the form of EC through conservation and protection measures.
- By facilitating greater EC in CoPs, collective responsibility is fostered, which encourages LISUD.

The multiple case study questions were based on four main areas of research: the process of sustainable communication and engagement; attitude and behavioural change mechanisms; social learning fostering both individual responsibility and collective action responses; and institutional culture changes in governance.

To assist with the questions, the case (s) were defined as a ‘phenomenon of some sort occurring in a bounded context’ (Miles and Huberman, 1994), in effect, the ‘*units of analysis*’. The units of analysis for this research are CoPs participating in city-level climate change adaptation strategies. The lines of inquiry posed by the questions and the theoretical propositions emphasise group learning, focusing on how the interactions of actors influence individual values, leading to changes in behaviour and attitude, and ultimately fostering collective actions.

Once the general definition of the case(s) is established, other clarifications sometimes called ‘bounding the case’ (Yin, 2014, p.33) become important. These clarifications hint at aspects which can further narrow lines of inquiry within this research: persons to be included within the group, the immediate topic of the case(s) study, as distinguished from those outside of the group; and the main programme as opposed to existing programmes in force. In collaborative planning initiatives many different actors and agencies are involved, including local community members, businesses, organisations, facilitators, and experts. The case boundaries place limits on a case, preventing an explosion of inquiry (Yin, 2014; Stake, 1995), and include time and place (Creswell, 2005), time and activity (Stake, 1995), and definition and context (Miles and Huberman, 1994). Binding the case ensures the study remains within scope. The units of analysis for this multiple case study were all actively involved in city-level climate change adaptation within the last ten years, promoting water management and flood prevention initiatives.

Both Stake and Yin refer to conceptual frameworks. Defined by Miles and Huberman (1994), conceptual frameworks serve ‘several purposes including identifying who will be included in the study; describing what relationships may be present based on logic, theory, and experience; and providing the researcher with the opportunity to gather general constructs into intellectual bins’ (Miles and Huberman, 1994, p.18). In effect, it serves as an anchor for the study. For this research, the conceptual framework is defined as CoPs in European cities within Holland and Denmark, who are formed through climate change adaptation processes and facilitate multi-level city-based water management and flood prevention, undertaking transformative and social learning concepts to promote LISUD.

All evidence was reviewed on a case-by-case basis to enable evidence formulation on each case to be undertaken separately, so that the specifics of the programmes in Denmark and Holland could be ascertained prior to multi-case analyses. Reviews of the documentation enabled verification of spellings and names of people and organisations to be interviewed, with specific details to corroborate information from other sources and inferences offering clues worthy of further investigation. Archival records to be reviewed covered ‘public use files’ such as city-based climate change adaptation programmes made available by municipalities, national, and local governments, alongside records kept by programme organisers, and survey data produced by others, all of which recorded differences between the case study questions asked for the research. All were reviewed from a vicarious observer perspective, reflecting communication among other parties. (Refer to Chapter 7 for the case study analysis).

5.4 Reflective Thematic Analysis Method (TA)

‘Qualitative approaches are diverse, complex, and nuanced’ (Holloway and Todres, 2003, p.347). ‘Thematic analysis offers an accessible and theoretically flexible approach to analysing qualitative data’ (Braun and Clarke, 2006, p.2). In this research and in-line with Braun and Clarke, thematic analysis (TA) is seen as a ‘method for identifying, analysing, and reporting patterns (themes) within data: it minimally organises and describes the data set in (rich) detail’ (2006, p.6).

Braun and Clarke highlight that ‘thematic analysis can pursue an essentialist or realist method, which reports experiences, meanings and the reality of participants; or it can adopt a constructionist method’, which examines how events, realities, meanings, and

experiences ‘are the effects of a range of discourses operating within society’. There is also the

‘contextualist method, sitting between the two poles of essentialism and constructionism, and characterised by theories such as critical realism, which acknowledge the ways individuals attribute meaning to their experience and, in turn, the ways the broader social context impinges on those meanings, while retaining focus on the material and other limits of ‘reality’ (2006, p.9).

A reflective thematic analysis (TA) was undertaken with each focus group transcript and each semi-structured interview as part of the multiple case study analysis. A six-phase process was in line with Braun and Clarke (2006, pp.17-23), which involved:

1. Familiarisation with the data – involving reading and re-reading the data, to become familiar with its content.
2. Coding – involving generating succinct labels (codes) to identify important features of the data that might be relevant to answering the research question.
3. Generating initial themes – involving examining the codes and collated data to identify significant broader patterns of meaning (potential themes). It entails collating data relevant to each theme, so that data can be analysed, and the viability of each theme reviewed.
4. Reviewing themes – ‘involving checking the themes against the dataset, to determine whether they tell a convincing story and one that answers the research question. In this phase, themes are typically refined, which sometimes involves them being split, combined, or discarded’. Under Braun and Clarke (2006), themes are defined as patterns of shared meaning underpinned by a central concept or idea.
5. Defining and naming themes – involving developing a detailed analysis of each theme, working out the scope and focus of each theme, determining the ‘story’ of each. It also involves deciding on an informative name for each theme.
6. Writing up – involving weaving together the analytical narrative and data extracts and contextualising the analysis in relation to existing literature.

Themes can be developed at a ‘semantic or explicit level’, or at a ‘latent or interpretive level’ (Boyatzis, 1998). However, a ‘thematic analysis at the latent levels goes beyond the semantic context of the data to identify and examine the underlying ideas, assumptions, and conceptualisations’ (Braun and Clarke, 2006, p.13). Therefore, latent thematic analysis was undertaken from a constructionist paradigm (Burr, 1995), seeking to theorise the socio-cultural contexts and the structural conditions of individual accounts provided. The themes in this research ‘capture something important about the data in relation to the research question and represent some level of patterned response or meaning within the data set’ (Braun and Clarke, 2006, p.10). A rich

description of the data set was undertaken so that the important themes across the whole data set predominate, with identification, coding, and analysis of the themes accurately reflecting the content of the entire data set, and not just detailed, nuanced accounts of one theme. The themes and patterns within the data were identified in an inductive way (Frith and Gleeson, 2004), with the themes developed from the focus groups bearing little relationship to the specific questions asked of the participants.

5.5 Ethical Considerations

The main ethical issues with conducting research using thematic and case study analysis via surveys, questionnaires, focus groups and semi-structured interviews are ensuring quality and integrity of the research, seeking informed consent from the participants, respecting confidentiality, and anonymity of the research respondents, ensuring the participants participate voluntarily, avoiding harm to the participants and fair participant selection. An ethical statement was prepared prior to any participatory research to consider and assess the above issues and ensure appropriate measures were taken. Ethical approval was provided by Kingston University and updated as the research progressed.

5.6 Chapter Summary

A range of philosophical and epistemological stances may underpin research. For this research, the epistemological stance is 'constructivism, where truth or meaning are constructed, not discovered. This research adopts a hermeneutical position, allowing time and space to explore what is understood, as well as clarifying the conditions in which understanding has taken place, so that meaning is discovered.

It is based upon a philosophy of engagement, both participation and observation. Knowledge was gained through interaction with local communities through several research methods, including surveys, questionnaires, focus groups, semi-structured interviews and a multi-case study analysis. A series of themes were developed by the participants and respondents (including me as active engager) by adopting latent reflective thematic analysis (TA) on perspectives, perceptions, and responses to lived experiences around localised flooding and sustainable water management associated with climate change. Themes were tested to assess how they aligned with notions of EC, and the degree to which EC enhances a bottom-up response to climate change adaptation.

Chapter 6. Empirical Findings from Online Surveys, Questionnaires, Semi-Structured Interviews and Focus Groups

6.1 Introduction

This chapter details the findings from online surveys, questionnaires and focus group forums with perception groups and semi-structured interviews with flood action groups to establish whether EC undertaken by CoPs facilitates climate change adaptation and motivates flood prevention and LISUD. It presents successful practices, failings and opportunities for sustainable behavioural changes that overcome ‘misperceptions’ and ‘value action gaps’.

6.2 Online Surveys and Questionnaires

The results from the online survey data and questionnaires are subject to an in-depth analysis to establish an understanding of the respondents’ awareness and perceptions of the issues, their ecological values, and the degree to which they currently undertake EC. The analysis also seeks to understand the nature and scope of proposed solutions, alongside the changes necessary, whether to behaviours, norms, or practices to enhance EC and motivate action. A point to note is that the surveys were undertaken with existing communities who had expressed an interest in flooding, or who had been flooded and belonged to groups that implemented small-scale, localised solutions. This means that the numbers undertaking the surveys were very small, and therefore the results offer mainly qualitative findings and are not statistically valid in quantitative terms.

The intention is that the analysis yields an overview of the various types of active participatory social learning within CoPs which might be used in promoting flood prevention and adopting LISUD. The surveys and questionnaires offer insights as to how CoPs operate, provides a greater awareness surrounding ‘misperceptions’ and ‘value action gaps’ that restrict flood prevention and LISUD in the communities, and identifies motivators that might overturn those barriers. Once the CoPs are understood, it is also hoped to enhance understanding of the current extent of EC in CoPs, and to learn how far promoting EC in CoPs via social learning might further motivate LISUD.

6.3 Details of the Online Surveys and Questionnaires

Eight groups were surveyed for this research between 2014 and 2018, using four different surveys, two online and two as questionnaires. All the groups live or work within areas that are susceptible to flooding. Kenley Residents Association in Surrey was the first to be surveyed, and was surveyed three times, initially as part of the pilot to test the survey in 2014, once with the committee of the resident's association in 2014 and then again with the whole resident's association in 2015. Transition Cambridge was surveyed twice, both times in focus groups (Learning to Stay Dry in 2015 and a Flood Forum in 2016). That group also undertook a focus group discussion. That was also analysed to enable more detailed research findings to be determined. The University of Salford were surveyed in 2017 to provide findings comparable with those from Kenley and Transition Cambridge, to ascertain whether age played any part in influencing motivation in the respondents. Those three groups were subsequently referred to as perception groups, being groups whose findings offered perceptions on flooding and flood prevention. Four flood action groups were also surveyed online in 2018 (Aberaeron Flood Reaction Group, Crosby on Eden, FLAG – Flooding on the Levels Action Group in Somerset, and Keswick FAG) to examine whether there were similarities or differences in opinions between the perception groups and those formed specifically for flood prevention. Aberaeron, Crosby on Eden and Flooding on the Levels all lobby for action. Keswick lobbys for action but is also involved in partnership working with professional actors, such as United Utilities as part of Cumbria strategic flood partnership. The survey with the flood action groups sought to determine whether the theories around motivation derived from the perception surveys and questionnaires with the other groups, concurred with groups formed specifically to tackle flood prevention, and to understand whether EC was undertaken by the flood action group CoPs and whether that facilitated climate change adaptation and motivated LISUD. Two of the flood action groups (Aberaeron Flood Reaction Group and Keswick FAG) also participated in a semi-structured interview in 2021. Those findings were also analysed, and the results detailed below.

Four flood action groups, all coalitions of local community members engaged in a variety of flood prevention measures from across the country, responded to my request to participate: Keswick in Cumbria, The Levels in Somerset, Eden in Derbyshire, and Aberaeron in Wales. The groups that responded were all rural but had towns and

villages which faced similar issues to those researched earlier in Kenley in Surrey, Cambridge, and Salford and Manchester; so, it was acknowledged that the geographical locations were not an issue. The survey with the flood action groups consisted of only 17 questions and took on average ten minutes to complete. The survey was designed specifically to be easy to understand and complete, for the express purpose of encouraging people to complete it.

The initial questions were devised to gather information on the group's name, date of formation and number of members. The groups were all formed between 2005 and 2015, ensuring that the opinions of the groups were current and relevant. The Keswick flood action group was the only one formed from a top-down initiative by the Environment Agency (EA). The rest were formed from bottom-up initiatives by the community, following either flooding events (Aberaeron and FLAG), or public notices or meetings due to the threats of flooding.

The number of members in the flood groups varied considerably, from 20+ in Keswick FAG and Crosby on Eden, to about 100 in Aberaeron and over 10,000 in FLAG – Flooding on the Levels Action Group. These results reflect the extent to which the communities are affected by flooding, and their ability to tap into the resources needed to form flood action groups that can act on their behalf. All the groups are closed groups, with membership through a selection process whereby potential members can apply via Facebook. Because of the number of members in some of the groups, an elected representative of the group completed the surveys.

6.4 Focus Group Workshops

6.4.1 Workshops Undertaken

Three focus group workshops were conducted for this research in 2016 as described in the preceding, all with participants living and working in Cambridge. Purposeful sampling is a widely used technique in qualitative research whereby those cases most likely to be information-rich are selected to use limited resources effectively (Patton, 1990). All the participants attended the initial workshop and volunteered to attend a second event, to allow a more in-depth discussion. The first, 'Learning to Stay Dry' Provocations, Dialogues and Discussions was undertaken in February 2016. It was facilitated with 30 people who lived and worked in Cambridge, divided into two groups, and involved a series of icebreakers and community problem-solving questions. The

second, ‘Misperceptions, Barriers and Opportunities’ was held a month later in March 2016. It was a more focused workshop, consisting of only six participants, half of whom were Transition Cambridge members. The final focus group workshop was held three months later in July 2016. This was different to the other workshops in that it was organised as a flood forum, based upon broad EC, and was conducted as a ‘Dutch Dialogue’ (Waggoner and Ball, 2008) – a dialogical communication participation model of engagement aimed at transforming land use through collaborative exchange between city professionals, academics and community leaders. Matters around planning, stormwater management, resilience and other interests focused on water were discussed.⁸⁰ People were invited to participate in planning their area in a manner like that of neighbourhood planning but focusing on flood prevention and sustainable water management mechanisms.

Large-scale maps were distributed throughout the venue illustrating the urban form of Cambridge, the rivers and watercourses that flow through the city, the incidence of flooding, the potential for infiltration in various parts of the city-based upon geological and hydrological mapping and the likelihood of surface water flooding. Alongside these, a series of low-impact sustainable urban drainage solutions to localised flooding were displayed to aid understanding. The flood forum also highlighted aspects of EC, including social justice around flooding, care, compassion, and resourcefulness. This enabled broad EC to happen alongside social learning on the technical aspects of flood prevention.

6.4.2 Focus Group Workshop Objectives and Aims

The objectives of the focus group workshops were to

- Determine whether the communities understood the level of flooding in Cambridge and whether any of them had experienced flooding;
- Seek to understand the causes of flooding;
- Reveal the solutions available to the communities;
- Understand the degrees to which EC⁸¹ was undertaken by the groups;

⁸⁰ https://wbae.com/projects/dutch_dialogues_new_orleans.

⁸¹ Key characteristics of EC were considered as the language of virtues (Dobson, 2004, p.18), including justice (a just distribution of ecological space), care, compassion and taking care of the vulnerable; expressed as inter-generational and intra-generational equity, fairness and justice, non-reciprocal obligations, public and private sphere actions that extend beyond the boundaries of state.

- Identify the changes in behaviour and practices needed, and the extent to which misperceptions and value action gaps affect motivations, limiting change, and
- Elicit why the communities implemented so few LISUD solutions, drawing upon findings from the extended literature reviews and earlier surveys that suggest that wider structural changes might be needed.⁸²

6.4.3 Focus Group Workshop Thematic Analysis

The findings and transcripts of the workshops were analysed using latent reflexive thematic analysis (TA). This involved a six-phase process of analysis in line with Braun and Clarke (2006), which sought to identify, analyse, and report patterns (themes) within the data (Braun and Clarke, 2006, p.6). Initially, the transcripts were read and then re-read to identify potential themes. The second level of analysis involved a review of the initial codes, which highlighted overarching themes and sub-themes, informed by the core research questions. During the third stage analysis quotes were identified that were congruent with the overarching themes. These themes were reviewed prior to defining and listing them. Finally, once the themes were finalised, the whole process was presented, and overarching findings summarised (Refer to the preceding Chapter for a more detailed analysis of the method and process). The analysis produced eleven themes and a series of sub-themes across all workshops and semi-structured interviews.

6.5 Summary of Results, Analysis and Key Findings

There now follows a summary of the key findings in relation to engendering action at a community level in response to the impacts of climate change and the role that EC as a framework plays for understanding the wider issues around localised flooding, and in particular motivating flood prevention and LISUD under the main headings highlighted through the thematic analysis.

⁸² Thirty people attended the launch event Learning to Stay Dry in Cambridge in February 2016. Those participants consisted of Transition Cambridge members and people who lived or worked in Cambridge. A second more focused group workshop Provocations, Dialogues and Discussions was organised in March 2016. Ten participants attended that workshop. They had all attended the initial workshop. A third workshop (Flood Forum) was organised in July 2016. This was not specifically aimed at Transition Cambridge members, but rather anyone who lived or worked in Cambridge, and was organised as a Dutch Dialogue.

6.5.1 Awareness of Issues

Having an awareness of the issues is a prerequisite to understanding the problem and motivating environmental responses.

Almost all the respondents reported that understanding the issues was vital if solutions were to be developed. The survey sought to establish whether the groups had a flood risk that they were aware of and whether there had been incidents of flooding in their communities over the last 20 years. All three perception groups and four flood action groups confirmed that this was the case, however, the responses to flood risk varied between the groups. Kenley, Surrey, and Cambridge had both witnessed flooding, with the respondents having been flooded multiple times over the last five year. A larger proportion from Kenley, Surrey had been flooded than Cambridge. Twenty-two of the Kenley, Surrey respondents had been flooded once,⁸³ nine twice and four on five separate occasions. This illustrates a significant threat to the respondents and was verified against flooding data held on the area.⁸⁴ Keswick FAG⁸⁵ and Crosby on Eden⁸⁶ confirmed that they faced flood risks. FLAG also confirmed flood risk,⁸⁷ emphasising the point with an exclamation mark, alongside persuasion of the Environment Agency (EA) and others to do adequate maintenance. Aberaeron Flood Reaction Group also cited flood risk but explained that their circumstances were different to the others in that they had multiple causes including wind direction influencing tidal harbour swells by 2m and spring tides causing flooding of residential and commercial premises within their town.

⁸³ For all findings following this initial one, they are expressed as a fraction of the total number of responses for ease of understanding. So, in Kenley, this finding would be expressed as (7/22). Cambridge would be expressed as (7/18), and Salford and Manchester expressed as (7/22).

⁸⁴ Kenley in Surrey is susceptible to flooding from the River Thames, the River Mole and the River Wey, as well as surface water flooding from the Caterham Bourne. The last severe river flooding was from the River Thames, the River Mole and the River Wey in 2013/2014 and the overloaded Caterham Bourne leaving 340 properties in Egham and Staines filled with floodwater, and surface water flooding along the low-lying parts of the valley, along the Godstone Road and feeder roads in Purley and Kenley Close (<https://www.croydon.gov.uk>, 2019).

⁸⁵ Keswick Flood Action Group was formed after serious flooding in 2005 to apply pressure for increased flood defence measures and to help the community reduce the risk of further flooding in the future. It faces risks from significant river flows that need to be managed upstream, bridges restricting water flows to the floodplains, and reservoirs not having enough capacity, requiring reduction in levels during the winter.

⁸⁶ Crosby and Eden face risks from the River Eden, which caused severe flooding to the village in 1995, 2005, 2009, 2015 and February 2020 when Storm Ciara hit the country.

⁸⁷ FLAG faces risks from the Rivers Tone and Parrett.

Perceptions regarding changes to the frequency of flooding were important to understand if responses to those changes were going to better understood

The respondents in Surrey confirmed that widened river courses were considered the most likely cause of flooding for them at 23% (8/22), followed by old sewers and drains, increased populations at 18% (6/22), and changes in maintenance at 15% (5/22). Only 9% (3/22) thought climate change and increased precipitation caused a change in the frequency of flooding, with just one person citing changes in regulations or policy. Cambridge rated old sewers and drains highly at 29% (6/18), followed by more housing at 24% (5/18), changes in precipitation at 19% (4/18) and climate change and increased populations at 14% (3/18). Salford and Manchester rated the causes differently, with climate change being the highest rated at 28% (18/22), followed by population increases at 16% (10/22). Under-capacity in sewers and drains and more rain were cited by 13% (8/22) followed by increases in impermeable surfaces and more housing at 9% (6/22). These findings demonstrate the subtle differences between the groups, in that the Surrey and Cambridge residents considered themselves more at-risk from river and drain flooding than the Salford and Manchester respondents, whereas the Salford and Manchester respondents considered climate change and increase in population as significant factors causing their risk of flooding.

All respondents of the surveys and questionnaires acknowledged the significant risks associated with flooding in their area, with some citing changes in climate, including a loss of value; a susceptibility or likelihood of being harmed; and emotional loss and wellbeing, which threatened their current lifestyles. They recognised the seriousness of the issues, highlighting that the risk to their current ways of life was likely to increase in the future, that large gaps in knowledge were apparent, and that they were unsure of the problems that they would face in the future.

Fear and risk associated with flooding leads to powerlessness in individuals and an overreliance on top-down measures.

The groups recognised the seriousness of the issues, however despite this acknowledgment, there also appeared to be large gaps in knowledge, with respondents unsure of the problems that they would be likely to face in the future. One of the respondents who had been a long-standing member of Transition Cambridge emphasised how dramatic flooding was, with climate change being considered horrific. They emphasised that very few things were considered large enough to illustrate risks

in the way that climate change and flooding did, providing perfect opportunities for motivating action. The respondents in the focus groups reported that they felt powerless to action anything that could avert the catastrophe as they saw it, instead acknowledging an ‘overreliance on top-down systems’, which currently predominate, reducing personal responsibility for flood prevention and water management. These responses highlight how the current understanding around flood prevention measures are inaugurated, showing professional organisations taking the lead in assessing the issues and developing measures. It highlights that the mechanisms need to change so that greater partnership working occurs, increasing community involvement with flood prevention decision making. These responses illustrate how changes in structural systems could shift the current emphasis away from professional organisations developing solutions to the issues on their own or as part of partnership working, to a community focus, in so doing improving personal and collective responses to sustainable water management and localised flood adaptation, supporting one of the researches questions, whether bottom up organisations could achieve sustainable actions for LISUD, or whether top down measures were required? This analysis emphasises ways in which the former could occur aligning the research premise.

Almost all the respondents reported that understanding the issues was vital if solutions were to be developed

In their accounts, most respondents from the focus groups recognised how their confusion around specific terminologies such as 1:100-year events, extremes of issue and flood and sustainable water management acronyms, inhibited understanding and increased their fears. The groups had not appreciated that a 1:100 event referred to the probability of 1:100 chance of flooding. This chance could occur at any time in one year or not at all, this realisation shocked some people. The respondents considered smaller issues as equally important in their areas to the major ones, but felt they were often overlooked by professional organisations, favouring larger flood prevention measures, emphasising the current focus on top-down measures being implemented with regards flood prevention.

Survey respondents in Salford and Manchester indicated the degree of concern they had with regards to climate change. Of the respondents, the majority (15/22) ‘thought it a major concern’, a few considered it ‘a huge, big, or massive concern’, and others considered it ‘a big concern’, which they indicated needed to be overthrown to help

create a better and safer world, aspirations that they highlighted aligned their understanding around EC. Only one person felt it was 'not a huge concern', although they recognised, they had a responsibility to look after the world for future generations. These responses confirmed that the respondents agreed with the research premise that climate change and its causes were issues that needed to be considered, and that they recognised that their actions in response to the risks aligned EC discussed later. Which hints at ways of promoting sustained action for LISUD a key research question.

The survey and questionnaire respondents also clarified that they considered the increases in rainfall (commonly associated with climate change) an issue and discussed the problems they saw this increase of rain might cause, exploring both physical issues and behavioural aspects. A resounding 78% (15/22) in Surrey, 63% of those answering the questionnaire in Cambridge (5/18) and 65% (13/22) in Salford and Manchester considered the increases in rainfall a problem. Of those 65% in Salford and Manchester who thought it was a problem, 42.8% (7/22) cited flooding as a likely consequence, followed by 33.3% (5/22) referring to disruption to everyday life, and 4.76% (1/22) inconvenience. All in the three areas combined surveyed, believed that flooding, in general, was increasing. The questionnaire in Cambridge clarified this further with individual answers providing more detailed analysis on the types of flooding thought to occur, including increased flows in the rivers and drains, additional fluvial flooding, additional surface water flooding, and additional groundwater, all issues that Cambridge has witnessed over the last five years and issues that the respondents felt should be tackled.

To gain a wider understanding of the context, sources of flooding were analysed, identifying three main ones affecting the respondents. In Surrey (9/22) respondents considered river (fluvial) flooding the main source, followed by eleven of the respondents considering surface (pluvial) and groundwater as a source of their flooding. In Cambridge, (4/18) considered river (fluvial) flooding a problem, with (6/18) citing surface (pluvial) flooding, and (4/22) groundwater flooding. Both groups also stated that they understood there were other types of flooding including estuarine, coastal, and inter-urban flooding, but that those did not affect their areas, however, both estuarine and coastal flooding affected the flood action groups surveyed. The survey and questionnaire respondents were also asked whether they considered flooding a single or multiple cause issue. Of those surveyed, (17/22) in Surrey and (7/18) in Cambridge

thought flooding arose due to multiple causes (Figure 6.1). These findings suggest that, when looking at influencing an individual or group of people implementing flood prevention and LISUD, multiple aspects will need to be explored if the unpredictable, complex nature of flooding is to be alleviated.

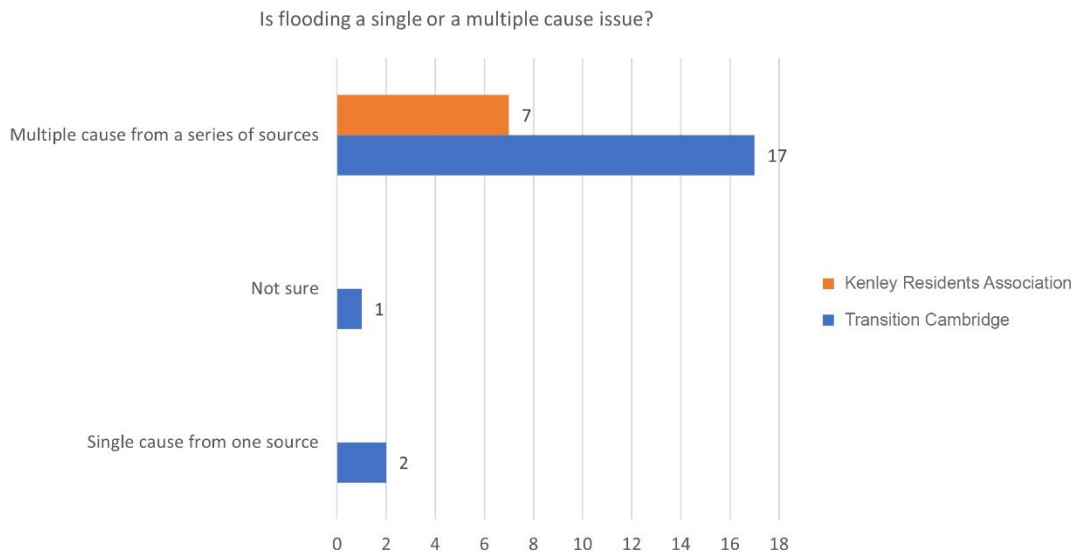


Figure 6-1. Flood survey questionnaire. Combined results Kenley 2014 and Cambridge Transition 2016

There was a surprisingly astute awareness surrounding the issues associated with flooding, frequency of flooding and responsibility for flood prevention within the surveys and questionnaire responses as described above, with respondents in all areas agreeing, that increased rainfall was a problem, and that localised flooding due to increases in rainfall and changes in climate was an issue in their areas. Of the causes thought likely to lead to flooding, widened river courses were considered the most likely, followed by old sewers and drains, increased populations, and changes in maintenance, leading to increased surface water and groundwater flooding. The significant risks associated with flooding were acknowledged by all, including a loss of value; a susceptibility or likelihood of harm, and emotional loss and wellbeing, which threatened current lifestyles. The respondents admitted a lack of understanding around terminologies, with similar terms being misinterpreted, and acknowledged that technical knowledge regarding water management in cities was currently limited. The findings also emphasise that flooding was considered a multi-cause issue, and as such should be thought of as a super wicked problem, a type of complex issue.

One of the reasons commonly cited for flooding is a change in surfacing, from permeable to non-permeable. In Surrey, of those who said they had front gardens, six

respondents had grass and two had hardstanding with a further eleven respondents having both. In Cambridge, two had grass and another both grass and hardstanding. A sixth of the respondents in Surrey (4/22) acknowledged that they had changed the surface of their front gardens, and of those four had removed grass and shrubs, one had removed loose-fill and replaced with fixed material, and another removed loose-fill and was now using it for parking. Therefore, of the sixth of respondents who confirmed they had changed the surface of their front gardens, all had changed it from soft to hard. In Cambridge, that figure was lower with only a single respondent having changed the surfacing. None of the Cambridge respondents replied to the question about any changes they had made. What these findings hint at, albeit with only limited findings from Cambridge, is that changes in surfaces are occurring both at an individual property level, as highlighted by these surveys, and at a larger scale in new developments. Moreover, of the 58% in Surrey and 67% in Cambridge that confirmed that flooding was an increasing problem, 50% in Surrey and 100% in Cambridge acknowledged that new developments needed to be designed to improve existing conditions and thereby reduce the likelihood of flooding. This implies a desire amongst respondents for changes to be made so that flooding is lessened, although it is not explicit that they themselves need to make changes to lessen the risk.

6.5.2 Water Conservation, Sustainable Water Management and Flood Prevention Measures

The respondents acknowledged that policy surrounding flood prevention and sustainable water management, currently prioritised sustainable measures. However, the respondents felt that little was actioned at an individual or community level. When asked what type of LISUD measures the respondents would be likely to install, they confirmed that individual property level measures were the most likely, including rain barrels/water butts, rain gardens, green roofs, and temporary flood boards. The groups were also asked whether they felt that there was a distinction between water conservation, flood prevention and sustainable water management, to determine which the respondents thought was most effective at lessening flooding, and whether certain measures were considered only suitable for particular functions. It was clear from the surveys and the interviews that flood prevention could be implemented (and similarly promoted) under many different guises, for instance, water conservation, flood prevention or sustainable water management. The findings revealed that currently when

talking about flood prevention, it tended to be large adaptation measures installed on people’s behalf that were perceived to be the most effective. At an individual or community level, respondents were inclined only to implement property-level water conservation measures.

Clarifying this response, the perception responses in Salford and Manchester were asked ‘*Do you think water collection measures lessen or prevent flooding?*’ Over a half (12/22) of respondents agreed, with only five disagreeing. A couple clarified further by noting that water collection measures were more to do with water dispersion and management than flood prevention. Positively, over three quarters of those surveyed in Salford and Manchester acknowledged that water conservation measures might lessen or prevent flooding.

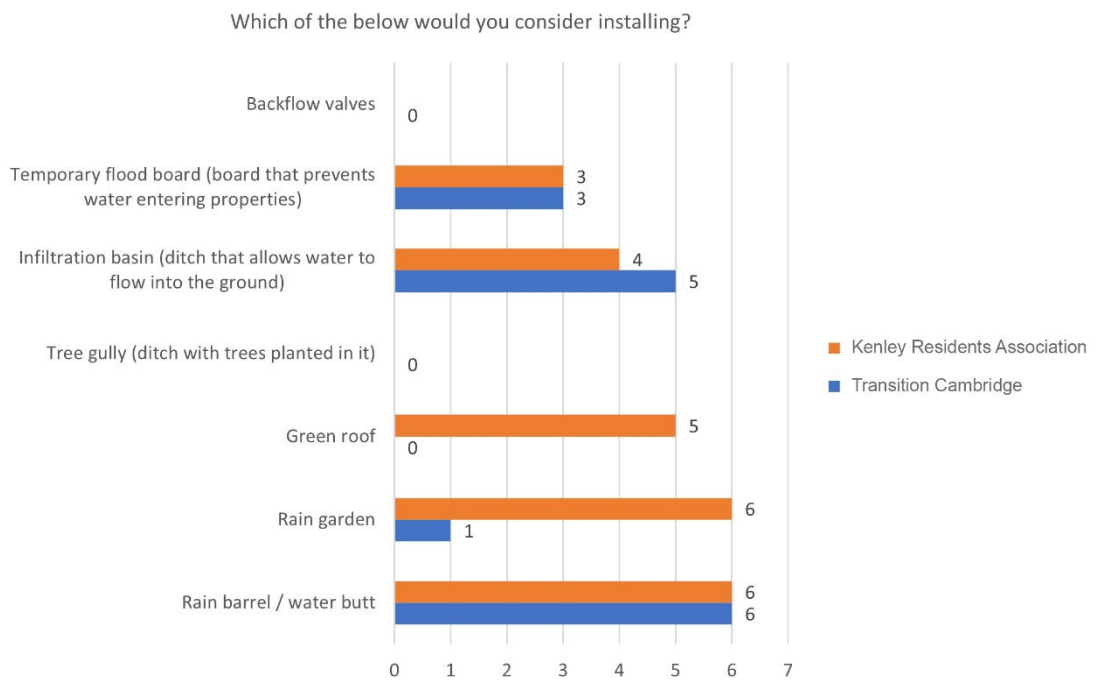


Figure 6-2. Flood survey questionnaire. Combined results Kenley 2014 and Cambridge Transition 2016

To determine whether perceptions around the terminology played a part in whether measures were implemented and whether the type of property in which they lived also played a part, the perception groups were asked which measures they would consider installing? Of the Surrey respondents, (6/22) considered installing rain barrels/water butts, with five respondents considering infiltration basins, three temporary flood boards and a further respondent considering a rain garden. Of the Cambridge respondents (6/18) would consider installing rain barrels/water butts, the highest-rated

alongside rain gardens, followed by five respondents for green roofs, four respondents considering infiltration basins and three respondents considering temporary flood boards. Neither group rated tree gullies or backflow valves (Figure 6.2).

Of those measures favoured by Salford and Manchester respondents, installing green roofs and rain gardens received the highest score with (12/22) considering installing them, followed by eight considering permeable paving, six considering rain barrels/water butts, five considering infiltration basins and backflow valves and three considering retention basins. This question was asked to determine whether there might be a correlation between measures installed and the type of property people occupied, and whether certain measures were installed for specific purposes? Interestingly, there appeared to be little correlation between the type of property and measures installed, although available space around the property did play a part in motivation, with more water butts being installed to detached and semi-detached properties in Surrey and Cambridge, and fewer installed to flats, even where the flats had outdoor space. Also, perhaps surprisingly, especially for the Cambridge respondents who had suffered from groundwater flooding in Riverside, neither Surrey nor Cambridge respondents considered installing backflow valves, whereas a little under a fifth of the respondents from Salford and Manchester (6/22) considered installing them. This may reflect perceptions around measures, in that backflow valves are technological measures, and as such were often cited as measures that others implement on people's behalf, whereas water barrels and rainwater butts are commonplace in gardens for water conservation purposes and readily installed.

Both Surrey and Cambridge perception groups were asked which measures they currently utilised, to gauge understanding of the measures and preferences. Of the Surrey respondents, twelve currently collect water from their roofs via water butts. In Cambridge, only two respondents currently do so. This shows that a good number of the surveyed residents in Surrey already undertake water conservation practices, although there could be a greater uptake by those in Cambridge, especially as they had the space to install them. In the next question, the Salford and Manchester respondents were asked which of the measures previously listed they thought would be most effective in flood prevention? This could be significant in indicating the types of measures that respondents would consider installing to prevent flooding. Retention basins and permeable paving with efficient drainage were the highest rated with (4/22)

respondents considering both as the most effective. Three respondents each considered green roofs and backflow valves, and two respondents each considered rain gardens/roof gardens, basins, rain gardens/infiltration basins and rain gardens/green roofs. These findings illustrate that when talking about flood prevention, adaptation measures that are perceived to be the most effective tend to be large technological solutions that other people install on people's behalf. However, when talking about water conservation or sustainable water management, many of the measures installed are small-scale, property-level measures, that individuals and groups could install. These findings hint at distinctions made by the respondents regarding the risks, terminology, and suitable measures to lessen the risks and the likelihood of installing certain measures and the potential for people being motivated into adopting LISUD, aligning the main research question.

The perception groups also clarified that 'there were many solutions that had been piloted in and around Cambridge' however, many in the group 'did not know that they were there'. Awareness raising around water conservation, sustainable water management and flood prevention measures within the community via pilot projects was considered important if more solutions were to be developed and more people inspired to install those measures.

Respondents from the flood action groups confirmed that they would work with professional organisations to develop all types of measure, flood prevention, water conservation and sustainable water management, if they believed those measures would alleviate the problems they faced. However, they prioritised flood prevention measures over the others, as those alleviated their immediate issues and where largely the reason why their organisations were formed following flood events.



Figure 6-3. Practical Element Mill Road (Image Source: Dawn Purves)



Figure 6-4. Practical Element Awareness Raising Social Norm Mill Road (Image Source: Dawn Purves)



Figure 6-5. Practical Element Mill Road (Image Source: Dawn Purves)

Sustainable solutions are positive for lessening flood risk.

The respondents from the perception groups confirmed that sustainable solutions were seen as positive for lessening flood risk. They clarified that flooding was largely seen by the groups as being mainly due to ‘unsustainable solutions having been previously installed’. In Cambridge, the respondents noted that ‘the main reasons for flooding appeared to be that houses were built over the girts and the occasional streams’. Awareness-raising was considered important by the groups as a way around the current unsustainable practices, promoting sustainable measures more widely, whether to new developments or via retrofitting, hinting at the role that EC might play in promoting changes to behaviours, social norms, and practices.

6.5.3 Scale of Measures

Having established that there were perceived differences between water conservation, sustainable water management and flood prevention measures, the flood action groups were asked what scale of measure the groups tackled to determine the scope of measures discussed by the groups and elicit what levels of measure and which types of measure they might consider. Keswick FAG, and Crosby on Eden considered all levels of flood prevention, from the individual to the city. FLAG considered all and added a

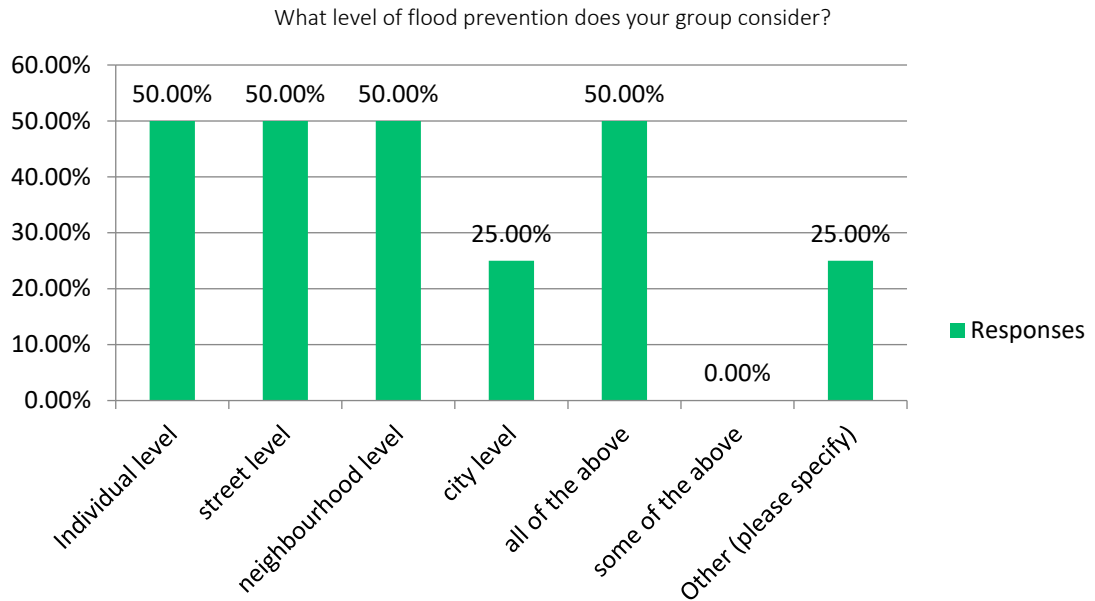


Figure 6-6. Community resilience survey: combined responses from flood action groups, 2018 further ‘area level’ as their area covered the Somerset Levels,⁸⁸ and Aberaeron Flood Reaction Group tackled individual, street and neighbourhood levels (Figure 6.6).

These findings show that equal numbers of the groups pursued individual, street and neighbourhood level measures, but only a third undertook city-level measures. Overall, these findings illustrate that all levels of measures are pursued across the areas to tackle the variety of flood risks observed by the groups, and that the scale of the measures did not influence motivations.

6.5.4 Environmental Concern and Values

Values influence incentives and motives. Appreciation of values is needed.

It was clear from many of the surveys, questionnaire, and interviewees that environmental concern was a key driver for the community groups, and that environmental values and the perceptions of the issues, influenced motivation by the groups.

The role of personal values in motivating actions has been researched by others. However, only limited research has looked specifically at whether personal values play a role in persuading people to act to limit localised flooding and in motivating water conservation and sustainable water management. The surveys and questionnaires

⁸⁸ A recognised geographical area that was distinctly different to the other groups.

confirmed overwhelmingly that the respondents were motivated by environmental concerns. Yet despite this acknowledgement, fewer than half acknowledged personal responsibility for localised flooding, failing to action measures that would prevent flooding. A significant number of the perception survey and questionnaire respondents confirmed that they held underlying beliefs that regarded incremental contributions to the greater good of others as important, promoting respondents' altruistic self-image and an equitable global society. Such principles align with EC virtues of justice, care, compassion (Dobson, 1998) alongside taking responsibility for the vulnerable, and resourcefulness (Hayward, 2006, p.441). therefore, a significant number of the respondents held environmental values that could be seen to promote EC.

A lack of community feeling, and reticence were seen as currently contributing to the general lack of action. Respondents reported that people needed to become more aware of the issues, to better understand the reasons for acting now, and if reluctance and apathy were to be overthrown, aims promoted by the engagement undertaken with the CoPs.

Surveys indicated that a large proportion of the community acknowledged that the current way of life was unacceptable, and that an alternative way might be beneficial, both for themselves, their neighbours, and the wider planet. Many of the survey responses in Surrey (9/22) and (4/18) in Cambridge described themselves as altruistic, while a further three respondents in Surrey and five respondents in Cambridge described themselves as biospheric, and thus duly motivated to protect the environment.⁸⁹. However, Transition Cambridge respondents acknowledged that solutions were not always implemented due to altruism, but instead sometimes implemented for economic reasons. The perception focus groups concluded that personal values influence incentives and motives. They understood that a wider appreciation of common values was needed, so that a greater understanding was gained that incentivised and motivated to encourage further action.

With regards to motivating communities to install measures that align those equitable values that right the current injustices, a third of the respondents in Surrey (7/22) and the same number in Cambridge listed professionals as those considered most influential

⁸⁹ In this context, holding values that would lend themselves to being persuaded into action on ethical or environmental grounds, aligning with ecological citizenship.

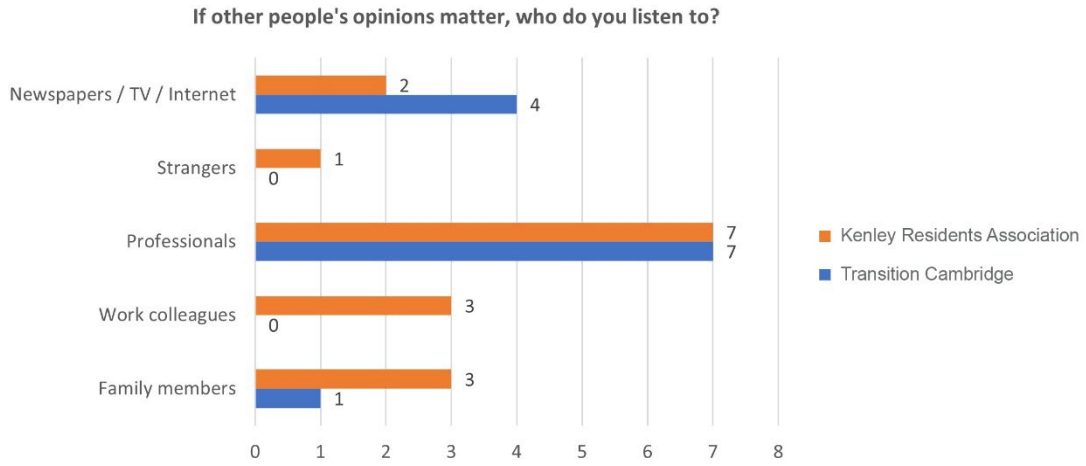


Figure 6-7. Flood survey questionnaire. Combined results Kenley 2014 and Cambridge Transition 2016

in swaying their opinions on the matters. Surrey respondents (4/22) and two in Cambridge drew opinions from newspapers or TV and the Internet. Three were influenced by family members in Surrey and three in Cambridge, alongside the same number being influenced by work colleagues (Figure 6.7). The respondents confirmed that they were most likely to listen to professionals, indicating the potential of involving professionals in climate change adaptation via CoPs, to increase the acceptability of the measures and the process.

All but one of the respondents in Salford and Manchester survey also confirmed that they would be more inclined to install measures that protect themselves and their neighbours from flooding, than just those measures that focus upon only themselves. They also confirmed unanimously that it was important to collect, conserve and reuse water on their property, preventing flooding to others and increasing social justice. When coupled with the previous responses that point towards the respondents being motivated by environmental concerns and holding biospheric and altruistic values, which might prompt action on ethical or environmental grounds; the findings from these questions illustrate the degree to which EC is currently being undertaken by the respondents. It indicates the scope for EC within the CoPs surveyed. Professionals and other ‘trusted’ sources, by providing personal commitments that act as positive examples for others, encourage a greater uptake in water conservation, sustainable water management and flood prevention measures, based upon environmental beliefs and values.

6.5.5 Barriers

Having established that the respondents were aware of the issues, held environmental values, and recognised different measures that could be implemented on a variety of scales, and under a variety of different terminologies including water conservation, sustainable water management and flood prevention, a series of questions were asked including why these measures were not implemented more often within the groups? and what were the barriers to motivation and action.

Four respondents in Surrey considered technology a barrier and a single person cited ownership, incentives, space, and knowledge. In Cambridge, four respondents felt knowledge and ownership were barriers, followed by three considering perception and space barriers. Two respondents mentioned incentives and a further person referred to technology (Figure 6.8). Salford and Manchester were similar, in that seventeen respondents claimed money was a barrier and eight respondents identified knowledge, ownership, and ease of installation. However, just seven respondents claimed time was a barrier followed by five respondents considering space, with habits hindering three people, and two further respondents considering perception, aesthetics, and technology. These findings illustrate that money is ranked as the highest barrier for all respondent

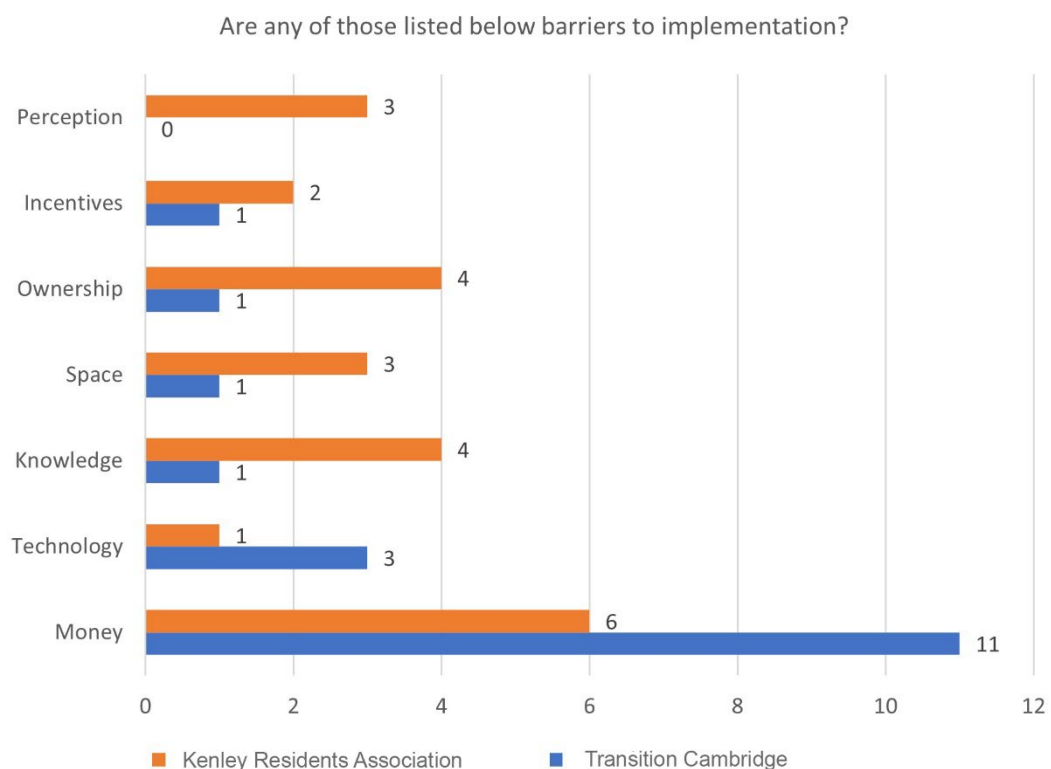


Figure 6-8. Flood survey questionnaire. Combined results Kenley 2014 and Cambridge Transition 2016

groups, followed by knowledge and then ownership. Ownership is considered a higher barrier in Cambridge, than Salford and Manchester mainly because many more of the respondents in those areas were younger and renting, therefore felt that not owning their property hindered action. The Surrey respondents were more settled and predominantly owned their properties, so did not feel that ownership was such a barrier to installation. They felt that technology was a greater barrier to implementation, reflecting more the demographics of the group, and that older respondents needed to be confident in the technology and knowledge for motivation to be kindled.

Uncertainty around funding inhibiting action was considered a major barrier to motivating implementation. A large proportion of the perception respondents in Surrey (11/22) and six in Cambridge felt that money was an issue. Both the perception groups and the focus groups confirmed that they were unsure of the available funds for solutions, and therefore were reluctant to implement solutions if they felt that they did not know where funds would come from to enable the solutions to be developed. It was felt that greater transparency around funding availability for solution development should be made more apparent to encourage more discussions around implementation of solutions within community groups. An example of available funds highlighted within the focus groups were city deal funds, which were available for the groups to receive funding to assist projects.

The perception groups were also asked ‘Why aren't more flood measures in place generally?’ Hinting at barriers to facilitating personal and collective responses to sustainable water management and flood adaptation. This open question allowed for personal responses. Money and time were considered significant reasons, followed by lack of skills, cost, ignorance and old technology. Other more personal responses included ‘because it’s all a prediction’ alongside ‘because it’s only now becoming a really serious issue’, as well as ‘people are not aware, and they don’t want to think about it’ and ‘no one bothers’. Lack of knowledge was also highlighted, with ‘people got no knowledge about it’ and ‘they are not advertised as much as they should be, so many people are not aware’. These responses point towards differences in age and demographics influencing motivation in the groups. Younger people were more inclined to make changes based upon wider concerns and issues such as social justice and environmental responsibility, possibly pointing towards EC benefiting younger

people, whereas older people relied upon their own resources more and the advice from professionals.

6.5.6 Behaviours, Norms and Practices

Behaviours, norms, and practices need changing to motivate solutions.

The focus groups highlighted, that sustainable solutions were not currently implemented and that changes in behaviour would be needed to encourage greater solutions to be developed. The surveys and questionnaires sought to understand what changes in behaviours, norms and practices might be needed to shift current unsustainable practices, before LISUD measures could be encouraged, as the focus group respondents highlighted those sustainable solutions did not appear to be readily implemented by community groups. To this end, the survey looked at motivations for action, and asked whether individuals would undertake measures that were not currently implemented by the majority. Sixteen perception group respondents in Surrey and five in Cambridge agreed that they would adopt measures to prevent flooding even if others did not.

The next question focused on the role of group pressure and social learning as a way of changing behaviour and practices, aspects that the literature reviews had indicated could influence motivations and asked, 'Would you be more inclined to install measures that protect your property from flooding, or measures that protect you and your neighbours?' 100% agreed with the latter statement. These findings support other research that underlines the role of social learning in swaying opinions and motivating action. People start to consider the task acceptable if others whom they trust are undertaking the task.⁹⁰

The surveys and questionnaires also sought to understand whether aesthetics would influence the likelihood of respondents installing water conservation, sustainable water management or flood prevention measures. Ten perception respondents in Surrey and seven in Cambridge said they would install measures that they did not like the look of. These findings suggest that motivations for installing measures were not based upon aesthetics, provided they were perceived as successful at preventing flooding.

⁹⁰ In this context, social learning refers to the 'shared learning of independent stakeholders as a key mechanism for a desirable future, advocating interactive (or participatory) style problem solving, whereby outside intervention takes the form of facilitation' (Leeuwis and Pyburn, 2002).

The next series of questions sought to understand distinctions between behaviours and everyday practices. It focused on everyday practices to assess how far ‘normal’ motivates behaviours and practices, clarifying what respondents considered normal in relation to water conservation, sustainable water management and flood prevention, findings drawn from the literature reviews, which hint at ‘normal’ measures being more accepted and more likely to be recognised as being undertaken. The perception groups were asked, ‘Which of the following everyday practices do you consider normal, when normal is defined as commonplace?’ This question was asked to determine whether if something was considered normal, more people were likely to adopt it. It was also posed to ascertain distinctions around types of practice. Watering the garden with stored water scored the highest with ten respondents confirming, followed by (7/22) considering reusing already stored water rather than using water from the mains. Installing a water butt /rain garden to collect water from a downspout was considered by six respondents, followed by re-circulating greywater for irrigation by two respondents The most normal water management practices were those that many people undertook every day when gardening, and did not involve large expenditure; whereas the less ‘normal’ everyday practices were considered re-circulating greywater for irrigation, as this is not something usually installed. It requires extra investment and considerable expertise and technology, alongside the need for conformity to best practice standards. These findings demonstrate that some practices are considered ‘normal’ and already undertaken regularly, such as storing water in the garden and reusing that water rather than drawing upon mains water, so little persuasion would be

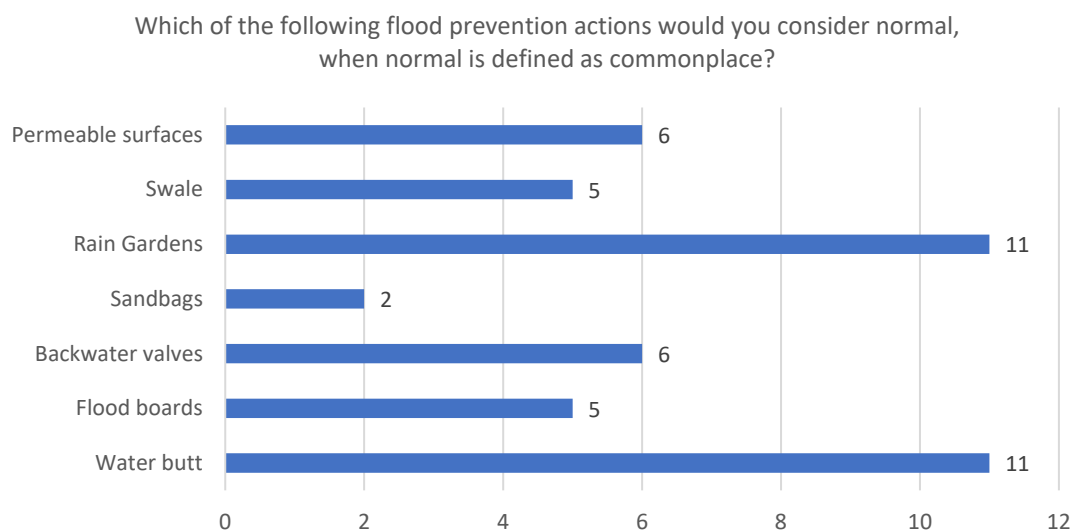


Figure 6-9. Flood survey questionnaire. University of Salford 2017

required to encourage more of those water conservation practices. The findings also confirmed that more people could be encouraged to invest in such solutions and day-to-day practices, that are perceived as normal everyday measures.

6.5.7 Motivations and Responsibility

Ordinary people are often reluctant to act. Reasons for acting now need to be better understood to overturn reluctance and apathy.

The reasons for acting now need to be better understood. As highlighted earlier the focus group respondents observed that confusion and reticence tended to restrict action. What they were expressing was a lack of efficacy. Barriers were seen to impede ordinary people acting and tackling issues as previously highlighted. One such barrier noted by the focus groups was 'a lack of community feel'. They acknowledged that 'it was difficult to develop proposals if at home on your own'. The groups saw apathy as restricting action. It was felt that a transition was needed to planned adaptation if measures were to be implemented.

To determine responsibilities around flood prevention and ascertain respondents' motivation to undertake local level flood prevention interventions, the perception groups were asked whether they were environmentally motivated to determine their underlying belief systems. These findings are crucial to the research to determine whether those who associate themselves with environmental values, including preservation, conservation, care, and compassion, are more inclined to adopt measures that are seen to align those values. 76% (13 respondents) in Surrey and 86% (6 respondents) in Cambridge acknowledged that they were motivated by environmental concerns (Figure 6.10).

All the flood action groups also confirmed that they were motivated by environmental concerns, both individually as expressed in interviews with the flood action group organisers and as a group through the surveys. Environmental issues were considered at the forefront of the flood action group representatives' personal values, and flood action group collective values, hinting at the potential for values to incentivise actions. With one representative expressing 'I do care, you know, I care passionately about this environment'.

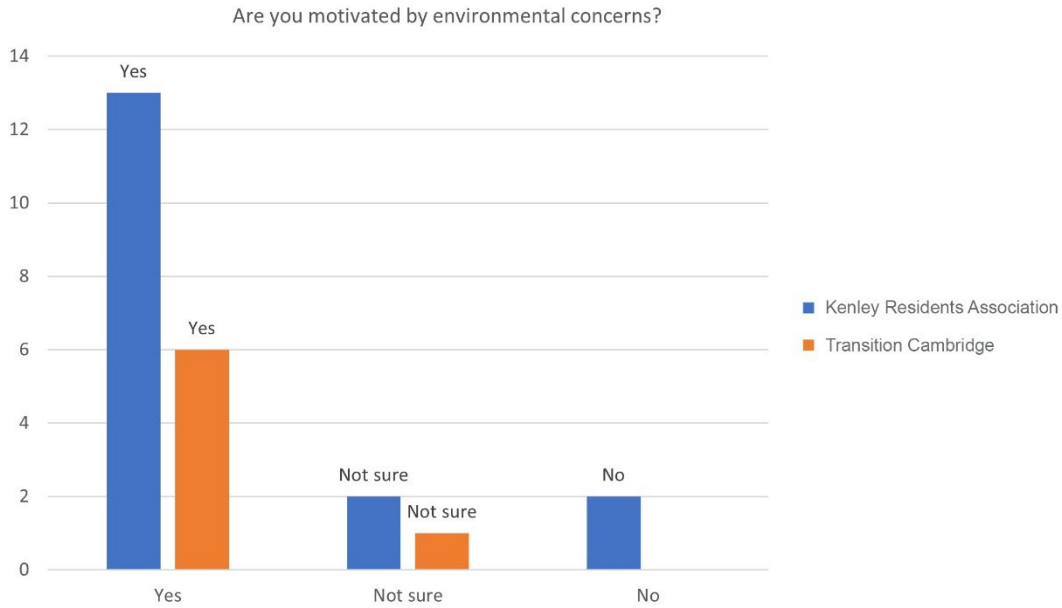


Figure 6-10. Flood survey questionnaire. Combined results Kenley 2014 and Cambridge Transition 2016

As a large proportion of the perception groups acknowledge motivation due to environmental concerns, they were also asked ‘When walking along the street you notice that the gully at the side of the road is full of leaves and debris. Would you clear it or expect others to clear it?’ They were asked this question to understand the extent of their motivations, and the scale of those motivations. Twelve respondents in Surrey and three in Cambridge would expect others to clear debris from a gully, with only three respondents in Surrey and two in Cambridge stating that they would clear it themselves, and one clarifying that they would clear it if it was outside of their property.

Next, the perception respondents in Salford and Manchester were asked, ‘Which of the below would persuade you to adopt a flood prevention measure?’ This question was asked to determine respondents’ motivation regarding adaptations. Nine respondents thought science would persuade them, seven clarified ease of buying, six said perceived effectiveness and everyday normal practices highlighted as environmental, two cited advertising and media, and a single respondent mentioned social justice. The ease of buying aspect of this question was followed up with a subsequent question that asked, ‘If water providers or developers supply these measures would this encourage you to collect, conserve and re-circulate water?’ The majority of Salford and Manchester respondents at (16/22) confirmed that it would. These findings suggest that supply is a motivator for action, in that people would be inclined to use features if others installed them.

The next question sought to understand whether respondents would change their practices and utilise measures if they were already installed. 100% said they would. This positive result emphasises the potential for people to be motivated into changing their existing practices and adopting new ones overthrowing maladaptive behaviours that currently restrict LISUD. 76% confirmed that they would alter their practices to include recirculated water (a currently rarely undertaken practice) if measures were put in place, rather than reverting to connecting their hosepipe to the mains water. This finding emphasises the motivator of everyday practices, illustrating that installations may precipitate actions? 72% also agreed with the statement that they could see the benefits of LISUD, even if they were not environmentally motivated.

The final question in this section sought to establish whether if officially recognised institutions and organisations implemented measures for collecting; conserving and recirculating water, this would influence outcomes. Nearly all the respondents (94%) confirmed that if water providers, environmental organisations or developers supplied the measures, they would be encouraged to collect, conserve, and recirculate water. What these latter questions in this section sought to understand was the responsibility people felt towards localised flood prevention, people's awareness of everyday commonplace social practices, and motivations to changes those practices. The aim is to identify changes that would increase responsibility, improve implementation, and sustain long-term alterations. The findings demonstrate that respondents currently felt limited personal responsibility towards flood prevention. While there is a wide variety of everyday water conservation practices that would prevent flooding implemented, there is a need for greater awareness of interconnected actions: providing measures for people to use; assisting with installation; raising awareness of responsibilities for localised flood prevention so that people were prompted to adapt and change their everyday practices.

Drawing on these findings, next the respondents were asked directly, who is responsible for flood prevention? To assess whether bottom-up organisations were seen as influential in this, or whether top-down measures were perceived as being required. The literature reviews had pointed to a lack of individual-level responsibility amongst those who had been flooded, hinting at responsibility being seen to lie with others neglecting community level responses. Over 43% of those surveyed in Surrey (19/22) assumed that responsibility lay with local authorities, followed by 34% (15 respondents) who

believed that it was the Environment Agency (EA), and 11% (5 respondents) central government. Only 9.5% (two respondents) understood responsibility to lie with local organisations such as Resident Associations (RAs), Business Improvement Districts (BIDs), or Transition Groups (TG), the very organisations to which the respondents belonged, and even fewer at only 4.8% (one respondent) believed responsibility lay with themselves.

Interestingly the Cambridge respondents were less reliant on others, with (3/18) citing themselves as responsible. These findings may reflect subtle differences in the demographics and socioeconomics of the two groups alongside environmental values and hint at potential motivators for overthrowing value action gaps and misperceptions. The resident's association was predominantly middle-aged and affluent, all living in the same part of Kenley. The Cambridge group was more varied, consisting of people from their mid-twenties through to early retirees, brought together around a common cause unrelated to where they lived. They felt that central government, the Environment Agency (EA), and local authorities had a role to play (60%) alongside local organisations (10%). One possible reason for the differences in opinion between the groups is that the younger participants rely less on others and accept more personal responsibility. The respondents in Salford and Manchester concurred, with 13% (3/22) relying upon local authorities, the Environment Agency (EA), and central government, with a 1/4 of those surveyed understanding responsibilities to lie with themselves (5/18).

If as this research postulates, local-level individual actions are crucial in solving flooding issues and promoting sustainable water management, then these findings suggest significant structural changes are necessary, if more measures are to be implemented by individuals or local organisations. Respondents were seen to rely heavily upon central and local government organisations being responsible for flood prevention on their behalf. It was concluded that prevention was not the same as adaptation and that the nature of preventative action determined where responsibilities lay. If local action was to be encouraged then changes in perceptions would be needed prior to seeing changes in behaviour or practice, so that preconceptions and misperceptions around responsibility were overturned.

Grass-roots action was seen as positive for pushing solutions and overthrowing the powerlessness expressed that led to inactivity.

Despite the previous findings, the focus groups did however understand motivations to lie with the community not the government. ‘Country folk are used to resolving problems themselves’. The focus group respondents felt that the government was not capable of resolving the problems, and that they felt strongly that the community needed to resolve the issues themselves. They understood grass roots action as one way of achieving this, overthrowing the powerlessness that they currently experienced, which they understood led to inactivity. However, they did acknowledge that for flood prevention solutions to be developed that the community and professional organisations needed to work together better, as the solutions were too large for the community to develop on their own and that partnership working was imperative. Findings agreed by the flood action groups.

Collaboration motivates collective understanding and community resilience.

The perception focus groups understood that to increase collective motivations, ‘it was all about supporting people in the community’. The groups thought more joined-up thinking was needed to aid understanding, focusing on, or else producing an integrated and coherent result. Collaborative design was thought by the groups to encourage and increase responsibility, which in turn would motivate action. It brought the community together around issues. Engagement was understood to be needed to encourage and motivate people to look at the issues and work together to develop a solution.

Planned action was seen as a way of reducing costs and promoting sustainable solutions.

An important theme from the focus group workshops seemed to be that planned strategies and adaptation lessened the risks. Respondents currently felt powerless to avert events that caused great or sudden damage/suffering. Taking responsibility in the form of planned action was considered a way of overcoming that powerlessness. Planned action was also seen as a way of reducing costs: The focus groups understood that ‘planned action before catastrophe, saved money’.

6.5.8 Governance

Top-down systems needed to promote solutions; however, this reduces personal and collective responsibility, leading to powerlessness, which inhibits actions.

The respondents recognised that with flood prevention top-down systems currently predominated. They saw this approach reducing personal and collective responsibility, which extended the powerlessness they felt in relation to flood prevention, and inhibited action. They suspected that the structures and systems currently operating were too inflexible, with prioritisation of agencies and other organisations tackling water issues on behalf of the community. They felt like ‘customers’ who had no real connection with the management of water, and no collective responsibility for water, undermining personal responsibility. Top-down systems give power to organisations on behalf of others, which diminishes personal responsibility. Too much emphasis was currently placed on public agencies and other organisations tackling water issues on behalf of residents and businesses to the detriment of people who needed to become responsible for their own spaces.

The focus groups concurred with the above sentiment expressed by the perception groups, acknowledging that today’s structures and systems appeared to be too inflexible, and that they needed to become more flexible, with greater community involvement, so that the communities learnt to become more resilient. Interconnected complex systems were seen to require integrated and coherent thinking, facilitating cooperation between planners, environmental organisations, and the community. Top-down systems were seen to lead to a loss of responsibility, which respondents felt should be challenged with greater emphasis be focused on promoting bottom-up grass-roots organisations, so that people assume more responsibility for their own spaces.

Current policy focuses upon partnership working under FCERM, which should be appalled, however, this system was seen by the focus groups as being detrimental to the people who needed the flood prevention, denying responsibility for their own space. According to the focus groups ‘people tend to blame the incompetence of the government, or their neighbours when facing large issues such as flooding, issues so large that they could not fully understand them’. To avoid people favouring blame due to powerlessness which restricted action, the focus groups thought greater joined-up thinking was needed, with organisations and professionals combining forces with local groups, to look at the issues and devise solutions together.

As a way of overcoming the sense of powerlessness and lack of responsibility, and instilling community appreciation around flood prevention and sustainable water management, greater communication and engagement was thought necessary overcoming the negative focus on flooding and current difficulties associated with it. This would lessen confusion, increase understanding, and promote a more positive approach to sustainable water management.

Policy prioritises sustainable measures, but implementation is still restricted.

The focus group participants acknowledged that policy was currently focused upon learning to live with water. Policy promotes sustainable measures. However, little is actioned at a bottom-up level. The groups highlighted that top-down systems seemed necessary to provide the structure to kick start the process, however better partnership working was required if that process was to be successful, otherwise powerlessness occurred.

Collective social identity and community resilience around water management is needed if sustainable solutions are to be implemented.

The groups and the respondents of the focus group workshops suggested that there appeared to be a lack of collective social identity surrounding water management and flood prevention. They felt that this impeded action and that community groups had a part to play if sustainable solutions were to be developed. The findings from the community resilience surveys concur with those of the earlier perception surveys and questionnaires, with the flood action groups pointing to the disadvantages of the top-down over-reliance on government bodies and other bodies acting on behalf of others, in limiting responsibility. They highlighted the potential benefits of bottom-up approaches initiated in the communities where people live and work. CoPs, embracing EC as part of wider consensus planning, encourage social cohesion and community resilience and fostering greater personal and collective responsibility around the wider issues of flood prevention and sustainable water management.

6.5.9 Communities of Practice (CoPs)

In this respect, CoPs were acknowledged by the perception surveys, the questionnaires, the focus groups, and the flood action groups as having a role to play. CoPs provide a framework for greater communication and engagement, that could lessen confusion and increase understanding around the issues, whilst promoting positivity in the form of sustainable water management. The respondents thought CoPs could reframe the issues

away from focusing on environmental concerns, values, and awareness, via EC engagement, to focus instead on communities, promoting and facilitating the ‘normal’ activities of water management and flood prevention, as part of active participatory social learning, in so doing promoting the benefits more widely and potentially encouraging greater adaptation.

All the flood action groups in the UK understood their groups to be CoPs. They tackled issues in their areas both directly from a flood-specific point of view, and broadly through participatory placemaking consistent with EC. Issues were communicated through conversations and discussions as part of wider social learning. The common principles in all the flood action groups within the CoPs were open dialogue and multi-level participation. These findings emphasise that the groups currently operate a ‘learning strategy’ for the participants based on EC, as advocated in this research. ‘They connect people who might not otherwise have an opportunity to interact’, so that they can ‘communicate and share information, stories and personal experiences in a way that builds understanding and insight and highlights current injustices’ (Wenger, et al., 2011), surrounding localised flooding which could be corrected through implementation of small-scale measures. The CoPs promote open dialogue on flooding matters and water management, encouraging members to come together to explore possibilities, solve challenges and create new mutually beneficial opportunities that overthrow social norms, whilst capturing and sharing existing knowledge to help improve their practices. They also stimulate learning, by providing a vehicle for ‘authentic communication’ and self-reflection, aspects that the literature reviews had revealed could be beneficial in motivating change to behaviours, norms, or practices within groups.

6.5.10 Learning Strategy

The respondents perceived information distribution and filtering as important in influencing, understanding, aligning the literature reviewed on social norms. Other research had shown how people failed to grasp ‘how aspects of their normal lives linked to climate change’, and therefore were ‘resistant to change’ (Corner, Webster and Teriete, 2015). To overthrow that resistance, the respondents in this research, aligning Climate Outreach, acknowledged that the links between problematic behaviours and climate change needed to be illustrated at a scale people could relate to and were familiar with. This should be done via discussions and dialogues in CoPs, which could

bring people together to debate provocations and negotiate a shared understanding, reducing the information deficit and addressing the pluralistic ignorance at the root of misperceptions. When undertaking learning in this way it was shown that the groups that advocated universal and selective prevention alongside proposed solutions, held enhanced understanding around the issues, which corrected misperceptions and promoted measures that ordinary people could implement more readily. Positive messages around LISUD that explained the scale of the issues and the risks, were shown to expose misperceptions. They served to remind people both visually and verbally that ‘we are all responsible for changing our behaviours’, thus conditioning pro-environmental behaviours, and endorsing sustainable water management concepts to the respondents.

The findings demonstrate that the flood action community groups surveyed currently undertake social learning in CoPs. In some the social learning is narrowly focused, looking specifically at flood prevention, while in others there is a wider focus encompassing measures at all levels, from property, street, and the city, and therefore offering the means for encouraging LISUD. EC is recognised amongst the flood action group respondents, with them considering care and preservation alongside social justice, fairness, and equality. These findings demonstrate that a little adjustment to consider wider matters was needed. CoPs offer the perfect model for promoting increased individual and group responsibility around localised flood prevention, alongside wider water conservation and sustainable water management. They offer more localised governance of water management and flooding and could motivate greater levels of LISUD within the community.

Information distribution and filtering to the public are seen to influence understanding.

The respondents perceived information distribution and filtering as important in influencing, understanding, and aligning social norms. Other research had shown how people failed to grasp ‘how aspects of their normal lives linked to climate change’, and therefore ‘resistant to change’ (Corner, Webster and Teriete, 2015). To overthrow that resistance, the respondents in this research, aligning Climate Outreach, acknowledged that the links between problematic behaviours and climate change needed to be illustrated at a scale people could relate to and were familiar with. This could be achieved via discussions and dialogue in the CoPs, which brought people together to

debate provocations and negotiate a shared understanding, reducing the information deficit and addressing the pluralistic ignorance at the root of misperceptions in the groups. It was shown through the surveys that the groups that advocated universal and selective prevention alongside proposed solutions, enhanced understanding around the issues, corrected misperceptions and promoted measures that ordinary people could implement. Positive messages around LISUD that explained the scale of the issues and the risks, were shown to expose misperceptions. They served to remind people both visually and verbally that ‘we are all responsible for changing our behaviours’, thus endorsing sustainable water management concepts to the respondents.

How information is distributed to the community was also considered important to prevent alienation and misunderstanding. As one respondent expressed ‘I don’t feel this is a flood. I feel this is a future event with water’. The nuance of that statement was plain for all to see. The way that information was presented and explained, emphasised the way in which the information was received. Localised relevant information was seen as more important by the community than worldwide information in CoPs’ engagement aligning previous studies reviewed in the literature, so that the respondents gained a true picture of their own situations. In the literature reviews, information was seen as imposing pro-environmental behaviour change if targeted; addressing the community personally so that it was more likely to grab attention and influence behaviours and norms, which would motivate action. Emotionally intensive materials were considered as more successful when aligned with guidance on practical action, so that the emotional aspect did not overpower the guidance aspects.

These findings demonstrate that, currently, the community have limited personal responsibility toward localised flood prevention. The research points towards a wide variety of everyday water conservation practices and sustainable water management techniques that could prevent flooding if adopted more widely in the form of LISUD. It also underlines how illustrating the benefits of implementing new measures can improve understanding and be a motivator for changing existing everyday practices. However, changes in perceptions were needed, challenging preconceptions about the views of others or about responsibility being with others, which currently constrained actions. Only then would behaviours and norms be likely to change.

Education, dialogue, and engagement were considered important for lessening confusion and increasing understanding of issues to promote solutions

Confusion around solutions was considered by the focus groups to inhibit understanding and action. It was felt that water conservation, sustainable water management and flood prevention solutions needed to be introduced to communities in such a way that they were better understood by all. The focus group respondents agreed that a discussion would be useful on what more information was needed in order that people could understand the issues and the sustainable solutions available to them, so that they could start to determine whether they could implement themselves, or whether they needed assistance.

Engagement was thought vital to encourage and motivate people to look at the issues and work together to develop solutions. Discussion and dialogue around the issues was considered a positive way of reducing the information deficit, enhancing understanding around the issues, and promoting solutions that ordinary people could implement. A practical way in which the perception groups felt this could be undertaken was for the CoPs to highlight other places that were at risk from flooding or had water management issues, and potential solutions talked about within the group and the means for developing these solutions to rectify these issues discussed. Sustainable solutions discussed included ‘more permeable surfaces to be promoted to both existing homes and businesses, and on new development to lessen flood risk and surface water run off’, and ‘water from roofs to be redirected into sustainable solutions link rain barrels or water butts, which the water companies would fund, and or pay savings’.

Proven solutions are needed to educate people on measures and influence the likelihood of implementation.

The groups reflected upon the limited numbers of proven examples of sustainable water measures, and the perceived benefits of case studies and pilot projects in educating people on what was possible, to galvanise and inspire. There are many solutions that have been piloted in and around Cambridge, but the perception groups did not know that they were there until professionals within the focus group workshops highlighted the measures. The perception groups felt that more pilot studies should be developed, and that more residents should be involved in streetscape design to redesign the spaces outside of their properties in collaboration with residents’ associations and other professionals if a greater number of sustainable measures were to be implemented.

Social learning was recognised by the respondents as important, both through knowledgeable people and through the media

The perception focus groups highlighted the need for knowledgeable people to prime those who had been flooded with key issues so that those who had been flooded understood the issues better and would be more inclined to promote sustainable measures, aligning literature highlighted in the reviews. The media was considered vital to this process. As one respondent expressed ‘People are as important as plants. It’s about how to change the world, make it a better place. Not bludgeoning people but teaching them the way to do it’. The media should be encouraged to promote potential solutions to the risks, rather than just focusing on the dangers and scaring people.

Overall, these findings demonstrate that the flood action groups surveyed currently undertake social learning in CoPs. In some the social learning is narrowly focused, looking specifically at flood prevention, while in others there is a wider focus encompassing measures at all levels, from property, street, and the city, and therefore offering the means for encouraging LISUD.

EC as an engagement methodology

The respondents recognised that EC as an engagement methodology could be one way to reframe the issues surrounding localised flood prevention, as tested in this research under the Learning to Stay Dry initiative. This initiative seeks to rekindle responsibility for how water is managed in our cities, and motivating changes in behaviours, norms, and practices. It aims to encourage small-scale action, encouraging both environmental protection and democratic renewal in the form of participatory processes. In this way, it would enable communities to make changes in their daily lives to be environmental citizens all day, every day (CEP, 2001). EC is recognised amongst the flood action group respondents, with them considering care and preservation alongside social justice, fairness, and equality.

6.5.11 Inauguration

It was clear from the surveys and interviews that inauguration of flood prevention differed from motivation and implementation of water conservation and sustainable water management and that strategies to encourage adaption to climate change needed to respond to this. Britain is the most centralised among G7 nations as highlighted within the policy section. Decision making is concentrated in London, with the Treasury having the ultimate say on most infrastructure spending. As highlighted

earlier, flood prevention largely falls under flood and coastal erosion risk management (FCERM), whereas water conservation and sustainable water management is largely supported by spatial planning. The FCERM system focuses upon regulated professionals working in partnership to devise strategies to reduce risk to areas, overseen by environmental regulators.

The surveys and interviews with flood action groups largely confirmed that despite all the respondent CoPs being community flood action groups, centralised environmental organisations largely inaugurated flood prevention within their areas, with one also citing professionals on behalf of the group. ‘Community influence was limited due to the centralisation of decisions surrounding flood prevention and water management, leading to frustration within community groups who felt under engaged and not listened to’. Success of those partnerships was varied, with ‘environmental regulators often not exercising regulatory or supervisory authority over environmental endeavours, including flood prevention measures, instead acting more like partnerships with limited power to act or develop solutions’. Environmental regulators have influence to deliver significant improvements to flood prevention and sustainable water management in collaboration with other regulators, professional organisations, and community groups, however, currently limited accountability and or regulation of professional organisations associated with flood prevention and water management by those centralised organisations was undertaken, which inhibited progress. The ‘community groups were progressively becoming exasperated by the limited powers enacted by environmental organisations and or regulators surrounding flood prevention, which appeared to stall solution development. There needed to be a greater acknowledgement that decisions made by organisations affect community groups and that greater collaborative working between professional organisation, environmental regulations and the community are more likely to provide long-term localised solutions to the problems.

The research had hoped that more bottom-up local initiated measures including ‘by the group through small-scale initiatives’, ‘by the group through multiple interconnected measures’, and ‘by interest groups on behalf of the group’ might have been undertaken. However, the surveys confirmed that none of these were the case with flood action groups. (Figure 6.11). The reasons for the responses seem to reflect how the groups were formed and their remit. All but one of the groups was set up by the community around the specific issue of flooding in their area and registered under the National Flood Forum. The groups were formed following flooding, and many of the participants had been flooded. The remit of the groups was flood prevention not climate change adaptation. What these findings demonstrate, in line with the perception and focus groups, is that when focusing on flood prevention rather than water conservation and sustainable water management, the natural inclination by the respondents was to think that ‘others needed to instigate the measures on their behalf’, as they were costly and required funds that might not be available within their core group. The findings from the perception surveys and questionnaires however, showed a greater inclination for bottom-up action when considered ‘individual, street and or neighbourhood level measures’, and when the issues tackled were localised, including flood prevention via

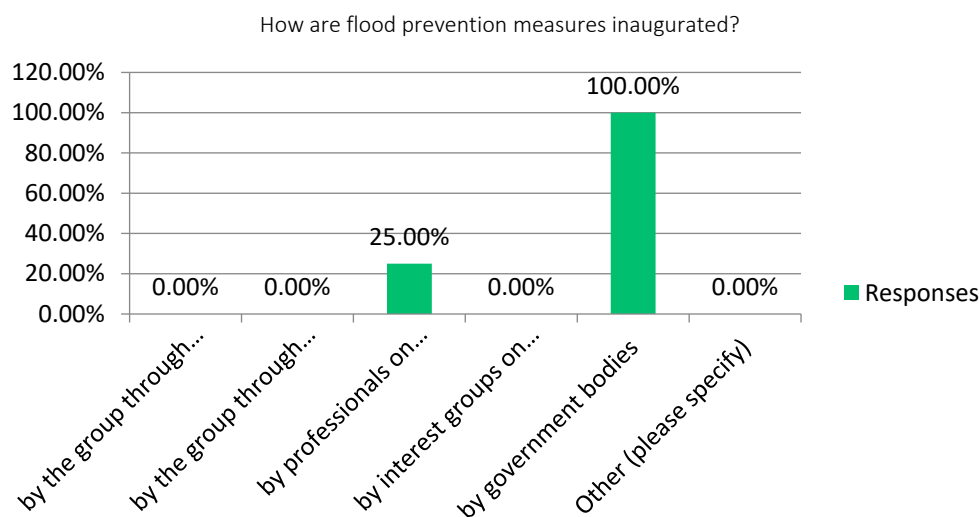


Figure 6-11. Combined responses from all four flood action groups, 2018

water conservation and sustainable water management techniques, that also incorporated wider climate change adaptation, aspects which the respondents felt more able to tackle themselves.

These findings suggest that CoPs can provide a forum for individuals to come together around issues, and via learning practices, develop solutions that promote greater

collective responsibility, a key premise of this research. However, responsibility is not a sufficient motivator to overturn value action gaps and misperceptions that currently inhibit action, if the CoPs are narrowly focused, prioritising only localised flood prevention. Instead, CoPs need to be broad focused so that issues surrounding localised flood prevention including EC aspects of sustainable water management, participatory planning and wider value belief systems of equality and justice alongside preservation, conservation, care, and compassion are considered, otherwise, groups rely too heavily on others to implement measures on their behalf, significantly lessening their functionality and ability to implement LISUD.

6.6 Chapter Summary

Returning to the research questions, the following conclusions can be drawn from the surveys, questionnaires, and semi-structured interview analysis:

A good level of awareness of the global issues around flooding is evident in the community. Increased rainfall was acknowledged as a problem, and climate change and the consequent flooding were considered issues. Perceptions regarding changes to the frequency of flooding were important to understand if responses to those changes were going to be better understood. Fear and risk associated with flooding leads to powerlessness in individuals and an overreliance on top-down measures. Communities acknowledged that they felt powerless to action anything that could avert the catastrophe as they saw it, instead acknowledging an ‘overreliance on top-down systems’, which currently predominate, reducing personal responsibility for flood prevention and water management.

Understanding the issues was vital if solutions were to be developed. Confusion around specific terminologies such as 1:100-year events, extremes of issue and flood and sustainable water management acronyms, inhibited understanding, and increased community fears. Smaller issues were considered as equally important to the community as the major ones, but the community felt they were often overlooked by professional organisations, favouring larger flood prevention measures instead.

Flooding was considered a multi-cause issue, with multiple sources affecting communities, including river flooding (Fluvial), Surface water flooding (Pluvial), Ground water flooding, and flooding due to sea level rises, and as such should be considered a super wicked problem, a type of complex issue.

Changes in surfacing is often cited as one of the main reasons for flooding. Changes in surfaces are occurring both at an individual property level, as highlighted by these surveys, and at a larger scale in new developments, and that was considered a concern for the respondents.

Interestingly, most of the perception surveys and semi-structured questionnaires felt that responsibility for developing and implementing flood prevention solutions currently lay with central government or environmental organisations such as the Environment Agency (EA) and lead local flood authorities (LLFA's), with only 10% of the respondents (mainly younger respondents) acknowledging that responsibility might lie with local organisations or themselves.

Policy surrounding flood prevention and sustainable water management, currently prioritises sustainable measures. However, little was actioned at an individual or community level. Individual property level LISUD measures most likely to be implemented by the community, including rain barrels/water butts, rain gardens, green roofs, and temporary flood boards

Flood prevention could be implemented (and similarly promoted) under many different guises, for instance, water conservation, flood prevention or sustainable water management. Communities perceived differences between water conservation, sustainable water management and flood prevention measures. Large adaptation measures installed on people's behalf were perceived to be the most effective with regards to flood prevention. All levels of measures are pursued across the areas to tackle the variety of flood risks observed, and that the scale of the measures did not influence motivations. However, at an individual or community level, respondents were inclined only to implement property-level water conservation measures.

Behaviours, norms, and practices need changing to motivate solutions. Social learning can sway opinions and motivate, as groups considered the task acceptable if others whom they trust were undertaking the task.

Environmental concern was a key driver for the community groups, and environmental values and the perceptions of the issues, influenced motivation. The community were motivated by environmental concerns, holding underlying beliefs that regarded incremental contributions to the greater good of others as important, promoting participants' altruistic self-image and an equitable global society, aligning EC virtues

of justice, care, compassion alongside taking responsibility for the vulnerable, and resourcefulness. They understood it was important to collect, conserve and reuse water on their property, preventing flooding to others and increasing social justice. Yet despite this acknowledgement, fewer than half acknowledged personal responsibility for localised flooding, failing to action measures that would prevent flooding. A lack of community feeling, and reticence were seen as currently contributing to the general lack of action. People needed to become more aware of the issues, to better understand the reasons for acting now if reluctance and apathy were to be overthrown.

Personal values were seen to influence incentives and motives. A wider appreciation of common values was needed, so that a greater understanding was gained that incentivised and motivated to encourage further action.

Uncertainty around funding inhibiting action and was considered a major barrier to motivating implementation. Groups confirmed that they were unsure of the available funds for solutions, and therefore were reluctant to implement solutions if they felt that they did not know where funds would come from to enable the solutions to be developed. Greater transparency around funding availability for solution development should be made more apparent to encourage more discussions around implementation of solutions within community groups.

With regards to motivation, there was little correlation between the type of property owned or rented and the measures installed, although available space around the property did play a part in motivation. Also, aesthetics played no part in motivating adoption provided they were perceived as successful at preventing flooding.

Some practices are considered 'normal' and already undertaken regularly, such as storing water in the garden and reusing that water rather than drawing upon mains water, so little persuasion would be required to encourage more of those water conservation practices. More people could be encouraged to invest in such solutions and day-to-day practices, if they are perceived as normal everyday measures, offering motivations to actions. Sustainable practices that include recirculated water rather than reverting to connecting hosepipes to the mains water (a currently rarely undertaken practice could be improved if the supply of the measure was increased, emphasising motivators of everyday practices, and illustrating that installations may precipitate actions.

Respondents currently felt limited personal responsibility towards flood prevention. While there is a wide variety of everyday water conservation practices that would prevent flooding implemented, there is a need for greater awareness of interconnected actions: providing measures for people to use; assisting with installation; raising awareness of responsibilities for localised flood prevention so that people were prompted to adapt and change their everyday practices.

Motivations for LISUD lie with the community not the government. Grass-roots action was seen as positive for pushing solutions and overthrowing the powerlessness expressed that led to inactivity.

Mechanisms needed to change so that greater partnership working occurred as promoted under FCERM and spatial planning, increasing community involvement with flood prevention decision making. For flood prevention solutions to be developed, the community and professional organisations needed to work together better, as the solutions were too large for the community to develop on their own, promoting partnership working

To increase motivation, awareness raising around water conservation, sustainable water management and flood prevention measures within the community via pilot projects was considered important, ensuring more solutions were developed and more people inspired to install those measures. Different organisations prioritised different measures. The flood action groups prioritised flood prevention measures over the other measures, as those alleviated their immediate issues and were largely the reason why their organisations were formed following flood events.

Top-down systems needed to promote solutions; however, this reduces personal and collective responsibility, leading to powerlessness within communities, which inhibits actions. As a way of overcoming the sense of powerlessness and lack of responsibility, and instilling community appreciation around flood prevention and sustainable water management, greater communication and engagement was thought necessary overcoming the negative focus on flooding and current difficulties associated with it. This would lessen confusion, increase understanding, and promote a more positive approach to sustainable water management.

CoPs were seen as a way of providing a framework for greater communication and engagement, that could lessen confusion and increase understanding around the issues,

whilst promoting positivity in the form of sustainable water management. CoPs could reframe the issues away from focusing on environmental concerns, values, and awareness, via EC engagement, to focus instead on communities, promoting and facilitating the 'normal' activities of water management and flood prevention, as part of active participatory social learning, in so doing promoting the benefits more widely and potentially encouraging greater adaptation.

Open dialogue and multi-level participation as part of a 'learning strategy' undertaking EC was seen as one way in which CoPs could connect people who might not otherwise have an opportunity to interact', so that they can 'communicate and share information, stories and personal experiences in a way that builds understanding and insight and highlights current injustices' (Wenger, et al., 2011), surrounding localised flooding which could be corrected through implementation of small-scale measures. A learning strategy could bring people together to debate provocations and negotiate a shared understanding, reducing the information deficit and addressing the pluralistic ignorance at the root of misperceptions.

Positive messages around LISUD that explained the scale of the issues and the risks, were shown to expose misperceptions, serving to remind people both visually and verbally that 'we are all responsible for changing our behaviours', thus conditioning pro-environmental behaviours, and endorsing sustainable water management concepts.

How information is distributed to the community was considered important to prevent alienation and misunderstanding. Localised relevant information was seen as more important by the community than worldwide information, so that the community gained a true picture of their own situations.

Engagement was thought vital to encourage and motivate people to look at the issues and work together to develop solutions. Discussion and dialogue around the issues was considered a positive way of reducing the information deficit, enhancing understanding around the issues, and promoting solutions that ordinary people could implement. A practical way in which this could be undertaken was for the CoPs to highlight other places that were at risk from flooding or had water management issues, and potential solutions talked about within the community and the means for developing these solutions to rectify those issues discussed.

Chapter 7. Case Study Analysis – Copenhagen, Amsterdam, and Rotterdam

7.1 Introduction

This chapter presents the findings of three European case studies, all of which sought to evaluate how successful CoPs were in facilitating EC in relation to managing water. These three cities were chosen as they had comparable populations relative to similar geographical areas and were all within Europe, and so aligned with European policies. They had experienced flooding and were all delta cities affected by rising sea levels. They all had also embarked on city-wide climate change adaptation plans in the last ten years, with local programmes being developed with communities to facilitate the process. In effect they are vanguard cities, leading the way in terms of sustainable water management in their delta locations.

By evaluating these cities' climate adaptation plans and interviewing the facilitators of the process, the hope was to learn how factors inhibiting action amongst UK CoPs might be overcome. Also of interest was the wider role that personal and collective responsibility plays via consensus planning in influencing behavioural, norm and practice changes. The aim was to ascertain how far structural changes might facilitate LISUD⁹¹ adaptation by individuals and groups.

The three cities were evaluated using secondary documentation and reflective thematic analysis of semi-structured interviews with the facilitators of the three case study programmes. As in the preceding chapter, and consistent with Braun and Clarke (2006), thematic analysis was used in an open-ended way (Refer to Chapter 5 for a more detailed analysis of the method and process).

7.2 Identification of the Problem – An Overview of Challenges Facing Copenhagen

Copenhagen covers an area of 88.25km, with 602,481 inhabitants as recorded 2017.⁹² It is predicted that Copenhagen will witness more precipitation (between 25-50% more

⁹¹ A typology developed specifically for this research, referring to low impact development and sustainable urban drainage.

⁹² Copenhagen currently covers an area of 178.46 sq.km, with the urban area covering 606.5 sq.km. It has a population of 1,346,485 as of 2020. (<https://worldpopulationreview.com/world-cities/copenhagen-population>).

precipitation by 2100), sea level rises, higher temperatures, and a greater number of more intense heatwaves, all of which will put pressure on the city and its biodiversity. With more rain and heavier rain, the stormwater sewers will become full, with no space in the sewer system. The pipes were built 150 years ago to different specifications than apply today. 'When heavy rain falls, the sewers are too small, and the sewage therefore runs off on the surface towards the low points' (City of Copenhagen, 2011, p.14). In future, therefore, even greater volumes of untreated wastewater will be discharged into nature.

7.3 Framework for Action – Copenhagen

On 2nd July 2011, Copenhagen faced the most significant weather event it had witnessed in recent history with more than 150mm of rain falling within two hours, causing close to 1 billion Euros of damage to critical infrastructure. The event drew much political attention both nationally and locally to the issues of climate change, illustrating the need for the city-wide adaptation plan. The plan prepared for 100-year events alongside other changes in legislation and offered financial incentives to encourage shifts away from hidden engineered solutions, in favour of sustainable (green) surface solutions.

Changes in policy enshrining the EU Floods Directive, required all Municipalities to prepare action plans for climate change adaptation and modernize watercourse and water supply legislation. The City of Copenhagen initiated its climate adaptive measures following the climate summit, COP 15 held in Copenhagen in December 2009, and adopted the Copenhagen Climate Adaption Plan, which set out the framework for the implementation of climate adaptive measures in the city administrative area in 2011. The adaptation plan promoted municipality integrated planning of the city and its infrastructure, and integrated development of green spaces to reduce heat, manage storm water, and increase recreational facilities. The focus was on hydrological capacity as there was minimal capacity for huge pipes to transport the surface water. Instead, the Copenhagen model recommended assessing ecosystem services (SLA, 2017). Copenhagen's Adaptation Plan recommended 300 engineering projects across the city, under the overarching umbrella of the Nordic built challenge. Under that initiative, the City of Copenhagen and private organisations researched

hydrological capacity and developed the Copenhagen model which recommended assessing ecosystem services.

Copenhagen drew up their climate adaptation plan in 2009, prior to the weather event referred to above, but that plan had only identified the likelihood of a deluge. It listed the principal challenges that climate change posed for Copenhagen and proposed 5 adaptation initiatives in response:

- measures to tackle heavy downpours, acknowledging Copenhagen's green open spaces;
- establishing green solutions to reduce the risk of flooding;
- increasing the use of passive cooling of buildings;
- protection against flooding from the sea, and
- the preparation of a combined climate adaptation strategy (City of Copenhagen., 2009, p.26).

'The plan recommended a flexible approach to adaptation that responded to the predictions of the time, whilst taking account of the need for climate-proofing in municipal planning, so that development ensured appropriate and staged implementation of climate adaptation measures' (CAP, 2011, p.5). The plan involved municipally integrated planning of the city and its infrastructure, integrated development of green spaces to reduce heat, managing of stormwater and increased recreational facilities. The focus was on hydrological capacity, as there was a minimal capacity for huge pipes to transport the surface water. Instead, the Copenhagen model recommended assessing ecosystem services (SLA, 2017). 'Copenhagen was promoted as a climate-proof and greener city, one with more trees, green roofs, green and blue spaces, a city capable of tolerating the weather' (CAP, 2011, p.5). This climate-proof and greener city would capture and store rainwater and, in the cases of cloudbursts, some of the green spaces would be used as temporary collectors (City of Copenhagen., 2011, p.58). 'Climate proofing was assumed to occur best when the city was being developed, modified and/or renewed, or where there was an increased risk of floods' (CAP, 2011, p.5).

The Cloudburst Management Plan 2012 developed out of the climate adaptation plan of 2009, and were coordinated with Kobenhavns Energi (Copenhagen Energy), the city of Frederiksberg, and Frederiksberg Forsyning (Frederiksberg utility company). In Copenhagen, most of the sewage system is still a combined system where wastewater

and rainwater flow in the same pipes. The Cloudburst Management Plan (2012) included a cloudburst mitigation plan and a catchment level plan, identifying the parts of the city most at risk from future cloudburst events, and proposed a toolkit of solutions to increase the city's resilience to flooding.

The Cloudburst programme undertook detailed analysis of watersheds across the city, looking at topography, the built structures, the current routes water took, the problem areas, and the overall volume of water– including extreme rainfall, and disconnecting measures that could be accommodated, (alongside possible LISUD solutions), whilst fighting the densification that disrupts the natural water cycle by disconnecting the water environment (Strickland and Divall, 2011).

The overall principles of the strategy were:

- to retain rainwater in the upper catchments;
- to provide robust and adaptable drainage for the lower-lying areas, and
- to focus on implementing green and blue solutions via Cloudburst 'fingers', that would convey run-off located between the major roads in the city centre, and the interconnecting roads, focusing upon green retention roads.

Further plans were developed post-2012 under the wider umbrella of The Copenhagen Cloudburst Formula, although those further programmes are not analysed here, as the analysis was conducted using documents active up to 2012.

The measures were funded through real estate tax revenues gained by the measures being given to the Municipality to fund further measures and reduce damages due to cloudburst adaptation.

7.4 The Roles of Communities of Practice (CoPs)

Denmark has a strong public spirit and a long track record in promoting collective responsibility, termed *samfundssind* (King, 2020), 'the notion that the greater communal good outweighs individual interests'. This approach is like that of EC as described in Chapter 4. 'It is one of the core values of Danish society and along with high levels of trust (in each other and in the authorities), is a key contributor to the country's famously contented outlook on life' (King, 2020). These core values extend into every area of life setting a framework by which the Danes live.

The Cloudburst programme stemming from city-wide adaptation plans undertook an extensive engagement process undertaken via municipality and Frederiksberg utility company, aimed at awareness and attitude change to facilitate behaviour change. The engagement was largely a top-down initiative, with various scheme organisers engaging with the CoPs. It sought to extend the commonly held public spirit mentioned above; to facilitate collective responsibility towards localised flood prevention and sustainable water management; to instil personal responsibility for one's own property flood prevention; and to enhance local and political dialogue. This was affected through already formed CoPs consisting of residents and businesses. Various scheme organisers engaged with the CoPs on a top-down basis, with development proposals based on technically designed schemes. This engagement was led by the municipality via a consultation process with residents and businesses, respecting the aspirations of the authorities.

7.5 Process Outcomes – Copenhagen

Copenhagen's climate change adaptation plan recommended that green spaces be utilised to enable Copenhagen to cope with the weather in the future. The plan commissioned several studies and analyses of rainwater, biodiversity, and the urban heat island effect. The analyses and studies supported the notion of Copenhagen's green structures being used as a tool for reducing and preventing stormwater floods and ensuring an agreeable climate and diverse urban nature. The proposed solutions illustrated within the city adaptation plan and the Cloudburst Management Plan 2012 were SuDS, defined as consisting of several different elements, all of which serve the purpose of managing stormwater locally. These included 'separation systems that disconnected stormwater from the sewers and other green features. These elements serve to either delay, store or treat the water before discharge to bodies of surface water or as percolation of the stormwater' (CPA, 2011, p.26).

The wider benefits of the Cloudburst proposals were physical benefits such as reduced air pollution and flood prevention, as well as added real estate value (roughly 1% per ha. for urban green space), and increased responsibility for the issues and solutions. The real estate tax revenues gained by the measures were to be given to the municipality to fund further measures and reduce damages due to cloudburst adaptation (CPA, 2011, p.26).

‘Under the Cloudburst Plan, 200 site-specific projects were developed including structures that allow rainwater to be led out to sea, such as roads, canals, and tunnels; developing storage for surface run-off such as emergency flood channels; and the building of blue-green infrastructure throughout the city’ (EEA, 2016). There was a realisation that "The people of Copenhagen need to think differently. They need to consider the hydrological circuit, the use of biotopes and bioswales, and start to re-use water for irrigation and grey water” (SLA, 2017).

The city’s adaptation plan and Cloudburst programme are top-down initiatives, based on the belief that only city-wide initiatives would be adequate to tackle the immense challenges that Copenhagen would face. ‘It is considered expensive for the individual citizen and municipality to adapt to climate change, although at present responsibility for protection of individual properties in Copenhagen rests with the owners of the building. If the property is privately owned, then the individual owner bears the economic burden and responsibility for any damage that occurs through inadequate drainage, defective sewer systems at the property or failure of the building structure’ (CPA, 2011). Since the 1991 Flood Act, flood insurance in Denmark is publicly provided and (partly) publicly managed, via a tax-financed compensation scheme. All private properties are insured (Hallegatte, et al., 2008). Realisation that "The people of Copenhagen need to think differently. They need to consider the hydrological circuit, the use of biotopes and bioswales, and start to re-use water for irrigation and grey water” (SLA, 2017).

Brian Vad Mathiesen (cited by Braw, 2013) expressed this simply as ‘In Denmark, sustainable city planning is not a niche; it’s just what we do.’ Braw observes that Copenhageners have realised that doing the right thing for the environment brings jobs and higher living standards to the city (2013).

One failure of the process was down to the top-down nature of the programme, this limited semi-autonomous formation of CoPs to tackle flood prevention, instead favouring top-down reliance on measures developed by others on behalf of the community. Participation and engagement was project focused, so reducing the scope for wider community involvement. Institutional structures were also not altered through the process. Overall, responsibility for climate change adaptation still rests with the Municipality and Waterboards.

7.6 Identification of the Problem – Overview of Challenges Facing Amsterdam

Amsterdam covers an area of 291.3sq km, with approximately 821,752 inhabitants as recorded in 2015.⁹³ ‘Incidents of exceptionally heavy rainfall in recent years were a wake-up call for The Netherlands’ (Dai, Worner and van Rijswick, 2017, p.1). Amsterdam is familiar with the consequences of heavy downpours. ‘All the most torrential downpours in The Netherlands were recorded over the last 15 years. In July 2012, twice the average rainfall (200mm) was recorded, with a quarter of the monthly precipitation falling on 14th July, causing disruption and damage’ (Municipality of Amsterdam, 2014). The current sewer system is based upon an average of 20mm of rainwater per hour. This is too small for the increasingly heavy rainfall events witnessed, with serious flooding caused in many different areas of Amsterdam.

There are major differences between the city’s districts. In some cases, the street profile provides sufficient space for temporary rainfall storage, and in others that process is less effective. The city analysis revealed that streets and courtyards allowed water to pool causing flooding, and that 10 to 20% of the city was likely to suffer damage to its buildings due to extreme precipitation (more than 20cm depth of water), which would amass at the façade of the buildings, and likely find its way inside. The worst predictions were in the city centre, where around 40% of the buildings risked damage by extreme precipitation.

Amsterdam’s ground is peat soil. For this reason, Amsterdam’s adaptation strategy focuses on rainwater storage capacity, rather than on drainage (Municipality of Amsterdam, 2014).

Until the early 20th century, rain flowed from rooftops and roads to the canals in Amsterdam. As construction transformed the city into a more compact and denser city, problems arose, and water flows were impeded. In the centre of Amsterdam, wastewater (as well as rainwater) is collected in a combined sewer system like Copenhagen and conveyed to the wastewater treatment plant. The rainwater flows in the same conduits as the dirty water. If the combined sewers were to become full, there are special

⁹³ Amsterdam currently covers an area of 291.3 sq.km, with a population of 1,148,972 as of 2020. (<https://worldpopulationreview.com/world-cities/amsterdam-population>).

reservoirs for temporary storage that prevent the polluted rainwater flowing straight into the canal. However, traditional infrastructure in Dutch cities such as canals and sewage systems have been shown to lack the capacity to cope with the increases in stormwater, especially in dense urban areas like Amsterdam, where ‘infiltration systems do not sufficiently drain off the rainwater’ (Boer, 2012).

7.7 Framework for Action Amsterdam

On 14th July 2012 a quarter of the monthly precipitation fell in on day, twice the average rainfall (200mm). The sewer system at that time was designed to accommodate an average of 20mm of rainfall per hour. Participation and engagement project focused, reducing the scope for wider community involvement ‘Amsterdam’s objectives are to cope with rainfall of 60mm/hour by 2020 without damage to buildings and vital infrastructure, and to be fully rainproof by 2015’ (Dia, Worner and van Rijswick, 2017). The municipality is responsible for collecting and processing the rainwater on public land and obliged to provide facilities to discharge the run-off and to efficiently process water under those duties of care (Dutch Parliament, 2006).

‘The Netherlands is a decentralised unitary state where different governmental levels share responsibilities for spatial planning and flood risk management. Formal responsibility and policy instruments are based on the Water Act (Dutch National Government, 2009), the Spatial Planning Act (Dutch National Government, 2006) and the Environmental Management Act’ (Dia, Worner and van Rijswick, 2017, p.653). At the national level, the National Adaptation Strategy, and the Delta Programme develop policies concerning adaptation to climate change (Dia, Worner and van Rijswick, 2017) based on the Water Act. The above acts ‘provide municipalities and regional water authorities with the powers and policy instruments to enable them to deal with the effects of climate change, such as flash floods that cause pluvial flooding and share responsibility between local government and residents’ (Dia, Worner and van Rijswick, 2017, p.653)., enabling them to determine strategic development plans and legally binding spatial zoning plans. The Municipality is responsible for collecting and processing the rainwater on public land and obliged to provide facilities to discharge the run-off and to efficiently process water under those duties of care. Municipalities and Regional Water Authorities with a set of powers and policy instruments to enable them to deal with the effects of climate change, such as flash floods that cause pluvial

flooding and a shared responsibility between local government. The Municipality is responsible for collecting and processing the rainwater on public land and obliged to provide facilities to discharge the run-off and to efficiently process water under those duties of care. Municipalities and Regional Water Authorities (Amsterdam Waternet, Water Board Amstel, G001 and Vetch) with a set of powers and policy instruments to enable them to deal with the effects of climate change, such as flash floods that cause pluvial flooding and a shared responsibility between local government and residents.

7.8 The Roles of Communities of Practice (CoPs)

The roles of CoPs in Amsterdam under the policy programme Amsterdam Rainproof were limited. ‘Amsterdam Rainproof provided a top-down initiated temporary platform to mainstream the issues in all municipal policies’ (Municipality of Amsterdam, 2014; Uittenbroek, 2014). The program cost 1.75 million Euros, from an overall budget of 70-77 million Euros (Waternet, 2016). Implementation projects from Amsterdam Rainproof were funded by the Municipality via co-funded green projects (Municipality of Amsterdam, 2015). The programme was implemented in close cooperation with the various stakeholders – governments and private parties – by using ‘soft policy instruments like those that encourage, inform and activate residents, business owners, government officials and knowledge workers to work on the design of roofs, streets, gardens, parks and squares together, so that they can better handle intensive rainfall’ (Dia, Worner and van Rijswick, 2017). Quoting Mees, et al., 2016, Dia, Worner and van Rijswick (2017) claimed that ‘Municipalities nation-wide have increasingly involved residents in the design of spatial planning projects and stimulated “bottom-up” projects through subsidies.’ CoPs delivered individual and street-based measures facilitated by Waternet under the top-down programme. Extensive engagement was undertaken via the online platform to mainstream the issues, operating both as top-down initiative via service level agreements, and a bottom-up initiative promoting flood prevention measures.

7.9 Process Outcomes – Amsterdam

Amsterdam Municipality conducted a thorough study to identify the consequences of rainfall of more than 60mm / hour. The measures were promoted ‘Via Dutch policy discourse and the Delta Programme, advancing the need for cooperation and exchange of good practices along with the idea that landowners and other relevant actors should

not shift water problems to neighbouring areas' (Kressen et al., 2016). Climate adaptation, focused on urban water storage in Dutch Water Governance, acknowledging the necessity for cooperative spatial planning and flood management (Glissen, 2015; Van Deorn – Hoekveld et al., 2016; Ward, Pauw, van Buuren, & Marfai, 2012). Waternet the public enterprise water company for Amsterdam and its surroundings, developed a climate adaptation strategy and established the policy programme Amsterdam Rainproof, containing several measures to address increased rainfall alongside wider policies associated with economic growth. These included a 'Structural Vision for Amsterdam, which aimed at accommodating 70,000 new homes within the existing city boundaries by 2040, and making the existing city rainproof, which called for tailor-made small and large solutions for each neighbourhood, street, garden, or roof, that function independently and together to drain rainwater away from "wet spots" (Dia, Worner and van Rijswijk, 2017). It is difficult and costly to render the city rainproof in one fell swoop or to undertake interventions for rain proofing in isolation, so 'mainstreaming' was proposed, whereby smart coordination ensures that operations planned by the city authorities, residents and businesses were adopted (Claassen, Uittenbroek and Hartog, 2013).

Amsterdam Rainproof was a collaboration between Waternet and the regional water authority, which aimed to foster 'greater individual responsibility for collecting, storing, and putting to efficient use excess rainwater' (Olah, 2016). It was a publicly funded top-down project. 'It was created to encourage both town planners and individual citizens to adopt rain-saving initiatives across Amsterdam' (Olah, 2016), therefore operating both as a top-down initiative via service level agreements, and bottom-up in promoting flood prevention measures.' It provided a platform for users to share their experiences across the city, as well as a toolkit and neighbourhood fact sheet for those implementing large scale designs; including details of the streets, alleyways, and buildings prone to flooding, and a geotagged system of water-related complaints received from residents' (Olah, 2016).

'Public perception of flood management in Amsterdam has steadily changed affecting shifts in culture. What was once considered an external threat to be dealt with by crisis response teams is now viewed as a design challenge by the city's local government, and increasingly, DIY enthusiasts are leading an emerging trend for weatherproofing one's own home' (Olah, 2016), leading to the mantra 'live with water, don't fight it'.

‘Amsterdam stresses that its duty of care focuses on assisting residents in taking their own responsibility instead of ensuring that the Municipality meets the service level agreements’ (Waternet, 2016). Following large storms ‘everyone was looking to Waternet to provide answers on the impacts of extreme weather,’ said Daniel Goedbloed. It was Waternet’s role therefore to communicate with everyone living and working in the city ‘that it is our shared responsibility to retain rainwater, particularly in spots prone to flooding’ (Olah, 2016), sentiments endorsed by this research.

Mainstreaming city-wide measures under Amsterdam Rainproof included:

- A crowdfunded rooftop with rooftop gardens (polder systems) to slow rainwater, realised by the Green Business Club on top of the Old School creative hotspot at Zuidas, that opened in October 2013.
- Cigarette type filters-installed to percolate water that gathers in the surrounding tributaries – a system that maximises the amount of water held on the roofs, while providing ample storage to last through the drier months.
- Exaggerated convex roads, which store greater volumes of water at the sides of the roads than conventional designs.
- Rain-proofing principles using the Puccini Methods, the standard model for street design in Amsterdam, enabling the street profile to be more water-resilient (Claassen, Uittenbroek and Hartog, 2016).

Measures promoted by Amsterdam Rainproof were also aimed at individual homeowners, including rain-saving barrels and rain retentive panels, in collaboration with garden centres and homeware stores across the city. “Amsterdam Rainproof provides a temporary platform to mainstream the issues in all municipal policies” (Municipality of Amsterdam, 2014; Uittenbroek, 2014). Within the five years that Amsterdam Rainproof ran (limited timescale devised at point of instigation), a considerable number of measures were delivered throughout Amsterdam, via its commitment to ‘mainstreaming’.

Failures of the programme appear to be that they were set up and facilitated by Waternet the water utility. Emphasis of the programme focused upon resolving issues highlighted by the water utility within the overarching city-wide climate change adaptation. However, Waternet’s role as utility supplier shifted during the process to communicator so that everyone in the city understood that it was their shared responsibility to retain rainwater, particularly in spots prone to flooding. By the time their scope had shifted, there was limited scope to extend the programme to promote CoPs to facilitate projects that were not specifically related to water management.

7.10 Identification of the Problem – Overview of Challenges Facing Rotterdam

Rotterdam covers an area of 325.8 sq. km., with approximately 626,652 inhabitants as recorded in 2015.⁹⁴ Like many other delta cities including Copenhagen, another of the case studies reviewed for this research, Rotterdam is vulnerable to the consequences of climate change. The rise in sea levels and increases in water levels will directly influence the city's flood risk, and in periods of extreme rainfall, it is difficult for water to drain away (RCCAS, 2013, p.14).

Rotterdam is made up of a series of dyke areas including outer-dyke areas containing the main port, and inner dyke-areas. The outer-dyke regions are directly exposed to the river and the sea, and there are no protective dykes for these areas. The consequence of this is that they are much more likely to flood than the inner-dyke areas. Responsibility for the outer-dyke regions lies mainly with the Municipality as well as the inhabitants and specific parties using the area (RCCAS, 2013, p.15). The national government and the water boards are primarily responsible for inner-dyke flood protection.

The dykes in Rotterdam serve more than just to protect the city against the water. They also form part of the spatial structure of the city and are frequently interwoven into the urban fabric. In some places the dykes are green and recreational, but elsewhere they are an integral part of the urban infrastructure (RCCAS, 2013, p.43).

The urban water system keeps the polders of Rotterdam stable and dry. This robust system consists of surface water outlets (canals, lakes, and waterways) that drain the water, and a sewer system in which rain and wastewater is first treated then discharged into the Meuse (RCCAS, 2013, p.49). This system is rather inflexible. During extreme rainfall, the vulnerability of the system becomes apparent. Peak downpours have already been seen to cause disruption and damage as water floods the streets, cellars become inundated and sewer overflows discharge directly to the canals and waterways (RCCAS, 2013, p.49). Climate change is expected to lead to a greater intensity and duration of heavy downpours compounding the problems already witnessed. The

⁹⁴ Rotterdam currently covers an area of 325.79 sq.km, with a population of 1,010,026 as of 2020 (<https://worldpopulationreview.com/world-cities/rotterdam-population>).

KNMI has calculated that for each degree rise in temperature, the intensity of the rainfall will increase by 14% (RCCAS, 2013, p.49).

A series of rainfall events highlighted Rotterdam's vulnerability. Peak downpours have already been seen to cause disruption and damage as water floods the streets, cellars become inundated and sewer overflows discharge directly to the canals and waterways' (RCCAS, 2013, p.49).

7.11 Framework for Action – Rotterdam

In response to these pressures, a climate change adaption strategy and a resilient city programme were developed. Rotterdam's climate change adaption strategy aimed to create a climate-proof city, both now and in the future – 'a city that is both attractive and economically prosperous' (RCCAS, 2013, p.6). The inhabitants of Rotterdam are made aware of the effects of climate change and know what they themselves can do, 'being conscious of their own responsibilities'.

The adaptation strategy was to be carried out in five ways:

- by maintaining and strengthening the existing storm surge barriers, dykes, canals and lakes, sewers, and pumping stations.
- making better use of the entire urban environment including small-scale measures within the 'arteries of the city'.
- working together so that projects are linked including those undertaken by the City of Rotterdam, the water boards and the national government;
- providing a framework to facilitate and stimulate linked adaptive measures to other spatial development projects, known as 'moving to the rhythm of the city', and
- adopting 'green adaptation' intended to simultaneously make the surroundings more attractive, whilst acting as a catalyst for green growth, which would inspire people of Rotterdam to actively participate in climate change adaptation (RCCAS, 2013, p.6).

'All the projects within the Rotterdam adaption plan were top-down – funded and organised by the municipality and/or the water boards to alleviate the issue. There was a need to politically facilitate change. That meant that the focus initially was on water management, which historically had been focused below ground' (DeUrbanisten, 2014).

Making the city climate-proof was envisaged as running alongside other measures that made the city attractive, so that the whole urban environment was improved by 'making space for water storage'. 'The idea was to make something that has a limited time span, implemented in a project area, and connected to the existing system, whilst also

relieving the existing system. A prototype that could be replicated' (DeUrbanisten, 2014). Smaller-scale initiatives were promoted drawing upon the larger prototype projects encouraging individual involvement in the wider process of green adaptation, facilitated by private organisations on behalf of the Municipality. This would create new and attractive public areas such as Bethemplein water square in Zoho close to the centre of Rotterdam, where the 'water storage was used to create an attractive public area in the heart of the neighbourhood; or waterproof designs that extend the green-blue network while simultaneously densifying the city' (RCCAS, 2013, p.6). At a smaller scale, individuals and groups were also encouraged to create added value to the environment via initiatives to remove paving and replace it with plants (RCCAS, 2013, p.29), a type of LISUD.

7.12 The Roles of Communities of Practice (CoPs)

To be resilient and flexible, Rotterdam's strategy proposed that 'climate change adaptation should become the responsibility of many parties, not just the local authorities' (RCCAS, 2013). It was developed and ratified by Rotterdam City Council; Port of Rotterdam NV; DCMR Rijnmond environmental department; and Deltalinqs (umbrella organisation for Rotterdam industry). For individual and street-based measures in specific areas that came out of the climate change adaptation strategy, STIPO and DeUrbanisten alongside CoPs were responsible, overseen by the City Council. The climate change adaptation strategy envisaged that inhabitants and businesses, corporations and network providers, educational establishments, and societal organisations (NGO) would all become involved. This combined both a top-down approach via city-wide adaptation strategies and other programmes facilitated by the City of Rotterdam, and bottom-up approaches through local programmes to encourage participation via CoPs.

As reported in Rotterdam's climate change adaptation strategy, surprisingly, few of the inhabitants of Rotterdam were currently sufficiently aware of the risks of living in the low-lying polders or of the protection that the dykes provided when the project started (2013, p.26). To overcome that deficiency the strategy recommended that the regional authorities provide information about the risks of climate change via apps for smartphones and interactive communication via social media. This targeted information enabled citizens and business to become more aware of the effects, which they hoped

would result in measures being actively supported, and positive individual actions (RCCAS, 2013, p.26).

‘Small-scale adaptive measures throughout the ‘veins’ of the city provided opportunities for active participation and led to broad cooperation between regional authorities and other parties. In this way inhabitants, collectives, and corporations, organisations and businesses could all actively contribute to a climate-proof city, with climate change adaptation being both top-down and bottom-up’ (RCCAS, 2013, p.26).

The regional authorities needed to become facilitators and initiators as well as ‘guardians’.

Engagement and awareness were extended through Rotterdam’s resilience strategy, promoted by the 100 resilient cities programme,⁹⁵ which defined urban resilience as ‘the capacity of individuals, committees, institutions, businesses and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience’ (RCCAS,2013, p18). The resilience vision for Rotterdam saw climate adaptation penetrate mainstream city operations, with water adding value for the city and water management systems climate proofed. It also recommended self-organisation in the city, promoting a flexible local government, in which resilience is part of everyday thinking and acting. ‘It saw changes in society and democracy driven by a move away from top-down hierarchy to a more bottom-up approach. In this way it envisaged much greater levels of community and citizen involvement, changing urban governance’ (RCCAS,2013, p18). ‘We realized that it was more difficult to advise and engage people, if they did not have the means to make changes and action schemes’ (STIPO, 2016). The key certainly in Zoho was ‘making the community equal, the owner, the tenant, the people who lived there, all members of the club, not just a private club’ (STIPO, 2016).

⁹⁵ 100 Resilient Cities was pioneered by the Rockefeller Foundation in 2014 to help cities build resilience to the physical, social, and economic challenges of the 21st century, by providing necessary resources to develop a roadmap to resilience along four main pathways: financial and logistical guidance for establishing an innovative new position in city government; support for the development of a robust resilience strategy; access to solutions, service providers and partners from the private, public and NGO sectors; and membership of a global network of member cities. (<https://www.rockefellerfoundation.org/100-resilient-cities>). In 2020 this became Resilient Cities Catalyst (RCC) and the Global Resilient Cities Network (GRCN), with the RCC being a consultancy acting as a go between for cities and non-governmental bodies, while the GRCN sees itself as a bottom-up city-led endeavour, planning to drive urban resilience through memberships and partnerships. (<https://cities-today.com/100-resilient-cities-relaunches-as-an-independent-network>).

A ‘we-society’ was envisaged by the 100 Resilient Cities initiative, where residents, the public and private organisations, businesses, and knowledge institutions together determined the resilience of the city. (RRS, 2017, p.33). The programme aimed at supporting current connections between groups and facilitating further connections through dialogue. Under quality 4 of climate-proof Rotterdam, a programme was developed which advocated involving the community and supporting them in respect of understanding the urgency for acting on climate change. It envisaged a variety of measures but focused on many smaller projects that could be led by citizens and businesses under the motto ‘many small actions, make a big difference’. Existing stakeholders such as residents, businesses, public a private organisation, knowledge institutions, housing corporations and developers for outer dyke areas were all involved in the engagement. Private organisations and collectives were also formed as part of the process.

7.13 Process Outcomes – Rotterdam

In response to the challenges highlighted, the Rotterdam Climate Proof Climate Change Adaptation Programme proposed solutions for both the outer-dyke and the inner-dyke areas, with area-specific measures – the right approach at the right place at the right time.

‘Within the outer-dyke areas, the strategy focused on a combination of prevention and adaptation, via a system of protection interventions, including raising the elevations and closing the storm surge barriers during storm tides, augmented by adaptive measures that were mainly instigated from above, including the construction of floating buildings and the adaptive design of outdoor areas’ (RCCAS,2013, p18).

‘Within regional dykes, stretches of open water, green roofs, water squares and water storage were planned by the City of Rotterdam to limit the flow of water to outlets, and therefore increase the resilience of the water system’ (RCCAS, 2013, p.75). It was considered important to ‘link the planning of the safety measures to spatial development plans, and to regulate management and maintenance’ (RCCAS, 2013, p.75). Integration and multi-functional spatial use required cooperation with the province, housing corporations, developers, and property owners.

The initial priority, as set out within the climate change adaptation strategy and in accordance with the Rotterdam Water Plan 2, was to ‘work with water to create an attractive, economically strong and climate-proof city’ – a flood-proof city (RCCAS,

2013, p.81). ‘In all parts of the city, it was anticipated that rainwater should be captured and retained where it fell, and drainage delayed. The increase in short, sharp downpours meant that the urban water system had to become more resilient. The water storage capacity of the public areas needed to be increased. Waterproof public areas capable of temporarily storing water on streets without causing any damage’ (RCCAS, 2013, p.75), were advocated. The focus within the strategy was on LISUD measures to public areas. These included both small-scale measures such as removing paving and planting landscaping to the streets and in open areas known as rain gardens or bio-swales, facilitated by private organisations in collaboration with CoPs, to large measures such as water squares.

To create a waterproof city, all parties needed to be involved including the water boards, urban developers, the City of Rotterdam, spatial administrators and others like the housing corporations, project developers and individuals. The inhabitants were encouraged to play their part through already established and newly formed CoPs.

‘Adaptive measures enabled citizens, businesses, and other organisations to actively participate in the challenges’ (RCCAS, 2013, p.83). Consistent with this research, ‘Rotterdam aimed to involve the inhabitants in climate change adaptation and encourage them to replace paving in their own garden with plants and vegetation. Public awareness and involvement were to be stimulated by means of active and targeted communication. Everyone was to be encouraged to contribute to making the city waterproof’ (RCCAS, 2013, p.83).

Campaigns such as the Green Roof Information Days, the ‘Green Team’ and the campaign ‘Paving out, Plants in’ were test examples, directly involving the community (RCCAS, 2013, p.83).

Some measures targeted specific areas. To show how a top-down approach in one area could act as a catalyst for other changes, climate-proofing Zoho was implemented under Rotterdam’s Climate Adaption Strategy as a district scale measure. The aim was to make Zoho a resilient district, working alongside business owners, residents, DeUrbanisten, The Schieland and Krimpenerwaard Higher Water Board (HHSK), Havensteder housing association, and the City of Rotterdam. Zoho was a programme that envisaged both gradual urban regeneration and support for users of the area (residents, businesses, organisations, and visitors), by making them more aware of climate-proof measures. Climate adaptation was used as a driver for sustainable

development, one that strengthened social cohesion, so that Zoho could successfully integrate urban design, landscape, arts, and community projects.

A series of pilot projects were organised by the same cluster of organisations, alongside business owners and residents, starting with Benthemplein Waterscape, and aiming to extend the waterscape into a climate-proof area. STIPO, a private organisation that worked in the area, together with DeUrbanisten a design agency employed by the City of Rotterdam, facilitated workshops with Zoho inhabitants and professionals over a year, in a newly formed CoP. These sought to define specific strategies through deep analysis of the district climatic conditions, and agree a shared perspective, an approach promoted by this research under the wider title of EC communication and engagement. ‘There were lots of possibilities to get things going, even if not officially allowed. Implicit policy focused on specific groups that belong there. Nothing around was owned by the same people. Systems were formed around area cooperation to encourage development. Area cooperation instigated a willingness for people to take initiatives to get groups involved with placemaking. The partnership with the housing corporation gave the area stability’ (DeUrbanisten, 2016).

Following the successful implementation of the pilot project of Bethemplein Waterscape, several other pilot projects were developed in Zoho by STIPO, the business owners and the residents including:

- Polder Roofs: the transformation of Katshoek parking garage into an attractive green roof that stores and reuses rainwater from nearby buildings in a controlled way for urban agriculture, whilst offering everyday recreation and outdoor events.
- Katshoek Rain(a)way Garden: part of a new street at Bokelwog, where an abundance of hard surfaces was decreased by transforming the space into a colourful linear garden, with innovative rain(a)way tiles;
- Zoho Rainbarrel: participative water storage system designed by Studio Bas Sala, offering a smart solution for rainwater re-use and storage;
- Greening Hoboken: greening facades and sidewalks, restoring urban ecosystems, edible growth, and rainwater re-use, and
- Zoho Rain Garden: an abundance of hard surfaces and under-used parking spaces transformed into an attractive garden that collects rainwater from nearby buildings and public spaces and via de-paving Vijerhofstraat, makes a friendly and sustainable space.

The only perceived failures of the programmes were that due to the top-down nature of the programmes, projects initially focused upon rectifying deficiencies in below

ground water systems, and prioritisation on water management projects that require technical expertise, rather than wider measure that would benefit the communities. Cuts in Dutch funding also meant that limited money was available for initiatives. However, this has encouraged private organisations to work with communities to promote resilience, but there appeared to be a disconnect between city-wide climate adaptation strategy projects and bottom-up resilience projects.

7.14 Summary of Analysis and Key Findings

There now follows a summary of the key findings in relation to learning how factors inhibiting action amongst UK CoPs might be overcome through analysis of European cases, in particular the wider role that personal and collective responsibility plays via consensus planning in influencing behavioural, norm and practice changes, and how far structural changes might facilitate LISUD⁹⁶ adaptation by individuals and groups. under the main theme headings highlighted through the thematic analysis⁹⁷.

7.14.1 Awareness of Issues

The Climate Agenda highlighted the issues, providing money for improvements in the public realm. It reframed the approach away from ‘avoiding damage’ to promoting the efficient use of water, using solutions that were accessible.

The interviewees in all three cases recognised that their cities were witnessing issues, with existing below ground systems reaching capacity and changes in the climate predicted to put additional stresses on those systems, necessitating new approaches. The municipalities for all three cities are predicting more rain, and heavier rain, ranging from 20cm to 60cm per hour, overloading existing infrastructure, leading to more stormwater flowing over surfaces, and causing localised flooding. Up to 20% of the three cities are likely to suffer serious damage to their buildings with precipitation of more than 20cm. Each city is also predicting population growth, densification and increased impermeable surfacing, all of which exacerbate the issues.

Denmark is a unitary State organised on a decentralised basis. It has three levels of governance: central, regional, and municipal. The Netherlands also operates as a

⁹⁶ A typology developed specifically for this research, referring to low impact development and sustainable urban drainage.

⁹⁷ The main themes are represented in bold, with sub-themes and codes provided both a direct quotes from the interviewees with the interviewees name and date of interview in parenthesis, and as a narrative.

decentralised state like Denmark, where different levels share responsibilities for spatial planning and flood risk management. At a National level the National Adaption strategy and the Delta programme develop policies concerning adaptation to climate change. These acts provide municipalities and regional water authorities with the powers and policy instruments to enable them to deal with the effects of climate change, sharing responsibility between local government and residents. This research sought to determine that power share and the degrees to which residents were really involved with decision making.

De Urbanisten (2014) reflected on the ideal process associated with the climate agenda. 'The climate agenda provides ideas of how the system will work'. They went on to acknowledge that the 'climate agenda makes the climate stand out'. 'Rainfall was a wakeup call' as emphasised by Rainproof (2018) in Amsterdam, 'The catalyst event highlighted that events could occur, and the necessity to mitigate against them'. Both interviewees in Rotterdam (De Urbanisten (2014) and STIPO (2016)) understood that bottom-up initiatives that engage with the community around the climate agenda are beneficial, but slow because the process is complicated. All interviewees in all three cities described how the flood events in the cities acted as catalyst events, releasing money and inspiring action and prioritising measures.

STIPO (2016) reported that the climate agenda provided a joint language, ensuring money for public service improvements, and reframing the issues away from avoiding damage to promoting efficiency of water, so that solutions were accessible, a key tenet of this research. Pilot projects such as water squares were amongst the top-down measures to be implemented, which demonstrated how a sustainable approach could be developed at an area level. As expressed by De Urbanisten (2014) in Rotterdam, 'Funding dictated measures implemented, focusing upon delivering water squares', with 'The water squares provided the agenda for climate change adaptation' (STIPO, 2016), aligning wider top-down initiatives. Demonstration projects of a limited period were implemented in project areas and connected to the existing water system to relieve pressure on the system, prioritising 'wet spots' areas already at-risk requiring transformations'. 'The water squares demonstrated how physical projects could be developed above ground that also supplemented below ground measures' (STIPO, 2016). Climate initiatives were prioritised by the Municipality, so wider public realm improvements could be implemented alongside those measures. The area-based

measures were seen as both ‘an environmental catalyst and social catalyst’ (STIPO, 2016). These types of measure were seen as being beneficial in that they promoted experimentation. As highlighted (STIPO, 2016) ‘It works, a lot of things going on, but it is also sustainable’.

The messages associated with the changes in the climate and rainfall seemed to be difficult to get across as stated by SLA (2017) in Copenhagen, however despite that, they felt that those measures ‘needed prioritisation’. It appeared to the interviewees that there needed to be a shift to prioritise the issues. Dialogue and engagement needed to shift emphasis away from avoiding damage to promoting efficiency of water. Engagement and communication was felt to be needed to reframe the causes, issues and solutions making them accessible. One way of achieving that was as expressed by SLA (2017) in Copenhagen, where the ‘communication strategy reframed the causes, issues, and solutions, making them accessible’. Dialogue and facilitation devised ‘cloudburst’ definitions and solutions, which ‘involved getting the community involved’.

Adaptation plans that promoted solutions, promoted in all three cities were top-down, and funded and organised by Municipalities, water boards and utility companies, meaning that the focus initially was on below ground water management. Prioritisation was on ‘wet spots’, areas within the cities already considered at significant risk, that required transformation. The climate change adaptation programmes set the framework for action, (Cloudburst Copenhagen, Amsterdam Rainproof & Zoho in Rotterdam) and were facilitated via consensus planning involving all those living and working in each city. The programmes envisaged measures implemented at all scales and in all aspects of the city simultaneously, with different measures tailored to different areas. Pilot projects such as water squares were amongst the top-down measures to demonstrate how a sustainable approach could be developed at the area level.

Community acceptance offered opportunities to extend the initial programmes, promoting sustainable water management measures.

The interviewees acknowledged that many opportunities were developed once the community were bought into the process. By combining sustainable measures rather than being narrowly focused on only below-ground measures, a multitude of benefits become apparent. Demonstration projects of a limited period were implemented in a project area and connected to the existing water system to relieve pressure on the

system. The water squares demonstrated how physical projects could be developed above ground that also supplemented below ground measures.

7.14.2 Funding

Cutbacks to Dutch funding prompted private organisations to fill the gap in funding encouraging a bottom-up approach.

Cutbacks from the Dutch government funding had reduced the levels of urban renewal projects implemented. The climate agenda encouraged funding for specific measures aligned with the city's climate adaptation programmes, but other measures had been side-lined. The cutbacks brought a reprioritisation of measures in cities such as Rotterdam, with the focus on climate change adaptation measures rather than wider public realm. It also brought political change, with the promotion of private organisations to fill the gap in funding and encouraging a bottom-up approach. 'The government shifted from main investor to facilitator and finally partnership' (STIPO, 2016). They became facilitators for the community and entrepreneurs, raising awareness of the multiple solutions that were possible. An important aspect of this was that market pressure is significantly lower in Holland. There is also considerable difference geographically across the country. This political shift encouraged the development of more 'experimental schemes' as highlighted by STIPO (2016), solutions at a local level in certain areas. Interviewees noted in all three cities that professionals and private organisations employed by the Municipality became catalysts for solution development.

The Dutch planning system offering limited scope for participation in planning. Explicit planning policy inhibited actions by focusing on technical solutions, while implicit policy promoted actions in experimental areas, encouraging cooperation and development.

Interviewees in The Netherlands reflected upon the planning system, noting that limited opportunities existed for community planning except for top-down initiatives, despite the strong track record of participation in planning. STIPO (2016) 'realized that the whole of the planning system was slowly collapsing'. There was little scope for people to undertake planning. Explicit planning policy inhibited actions by focusing on technical solutions of which laypeople had little knowledge. Off the back of that, implicit policy developed in experimental areas, areas which needed regenerating, which challenged negativity and nurtured cooperation to encourage new development,

as was evident in the context of Rotterdam as a ‘smart city’. See latter discussion on consensus planning and engagement

7.14.3 Governance

Municipality-funded top-down processes promoting below-ground measures at all scales and with all aspects of the city simultaneously to relieve the existing system, encouraging participation with sustainable water management.

The solutions in each city to alleviate the climate change issues witnessed were to operate both as top-down initiatives via service level agreements and bottom-up initiatives promoting LISUD flood prevention measures, that could be implemented at smaller scales via CoPs. ‘Smaller bottom-up initiatives were not pushed at first but developed out of pilot projects such as the water squares, that focused on demonstrating how sustainable measures could be encouraged’.

The interviewees emphasised that the top-down initiatives funded by the Municipality promoted participation in sustainable water management, with different measures tailored to different areas. The role of engagement and awareness in stimulating motivation and action varied, depending upon the initiatives. Where the duty of care focused on assisting residents to take responsibility, rather than ensuring that the Municipality met service level agreements, then motivation and action were encouraged, and bottom-up solutions emerged from the top-down prototype projects. This enabled residents and businesses who were engaged in the process to see what was possible, including permeable paving, rain gardens, rain barrels, water barrels, swales, water boulevards, water squares, roof gardens, polder roofs, and back water valves.

7.14.4 Consensus Planning

There is a long track record of involving citizens in planning in Denmark and The Netherlands, commonly referred to as consensus planning. The process enables citizens to take an active part in planning in their cities. It favours planned rather than reactive adaptations. This largely takes the approach of city-wide engagement through top-down adaptation strategies. Each programme entailed extensive engagement with citizens.

Copenhagen’s Climate Adaptation Strategy and Cloudburst Management Plans promoted knowledge sharing, engagement at both national and international levels and fostered cooperation with the public. Copenhagen’s programme was facilitated by the municipality and operated as a top-down process. This meant that self-organising social learning was limited. By modelling the city and highlighting ‘wet-spots’, areas that

were at most risk and in need of assistance, business cases were developed by the municipality and in collaboration with various parties, who assisted in releasing funding for prioritised measures.

Amsterdam's Rainproof Programme came out of the Amsterdam 'Smart Cities' programme and was facilitated by the Municipality and the Waterboards. As highlighted by Rainproof (2016) 'Rainproof Amsterdam was a facilitator, a custodian, a guardian and a communicator with garden centres and environmental organisations, who were considered the main players', and residents and businesses. Consensus planning was extensive, with a 'communication strategy' (Rainproof, 2016) reaching out to all people affected in Amsterdam from flooding. The strategy developed 'themes - different scales of measures', undertook research into the causes and issues, and from that developed solutions specific to Amsterdam, drawing upon the Copenhagen model. The 'Smart Cities' initiative worked across multiple different disciplines. Dialogue between the municipalities and politicians acknowledged the seriousness of the issues and generated strategies covering the environment, water, health, safe neighbours, and green issues. Dialogue with the community, residents and businesses was via multiple small groups (CoPs) formed bottom-up to facilitate local-level changes (Rainproof, 2016).

Rainproof Amsterdam undertook community event development and awareness raising with municipalities, politicians, community, residents, and other organisations. The CoPs were largely formed as part of the process, with the help of private organisations employed under city-wide climate change adaptation strategies. The CoPs held citizen evenings, workshops, and reflection groups, where dialogue and listening between members were encouraged. Newsletters were used, publicising the communities, the services and maintenance operations linked to rain proofing. Engagement and social learning involved listening, publicising, advertising the process, social media and development of solutions at all scales, which were initiated both by professional organisations and the community.

Engagement brought groups together encouraging responsibility so that all became owners not just the developers, raising awareness, engendering a

willingness for people to take initiative, developing trust, and encouraging the community to become guardians and custodians.

Engagement was considered vital by the interviewees for bringing the various parties together and encouraging increased responsibility. In Copenhagen, responsibility for ‘the protection of individual properties at present rests with the owners of the building. If the property is privately owned, it is the individual owner who bears the economic burden and responsibility for any damage that occurs through inadequate drainage, defective sewer systems at the property or failure of the building structure’ (CPA, 2011, p.26). This encouraged many owners to engage with the ‘mainstreaming process’, raising awareness and engendering a willingness for people to take initiatives that developed trust. It extended the owners’ personal responsibility, the country’s public spirit, and collective responsibility for flood prevention and sustainable water management, so that the communities and businesses knew the risks, and were prepared.

‘Amsterdam stresses that its duty of care focuses on assisting residents in taking their own responsibility, instead of ensuring that the municipality meets the service level agreements’ (Waternet, 2016). Waternet’s role as a utility supplier became to communicate with everyone living in the city, that it was their shared responsibility to retain rainwater, particularly in spots prone to flooding.

Amsterdam Rainproof introduced smart coordinators, with operations planned by the city authorities, residents, and businesses – known as ‘mainstreaming’. Amsterdam Rainproof was set up ‘as a temporary platform to mainstream the issue in all municipalities’ (Dia, Worner and Van Rijswick, 2017). The programme was implemented using ‘soft’ policy instruments that encouraged, informed, and activated residents, business owners, government officials and knowledge markets. Amsterdam Rainproof served as a facilitator and a communicator. It reached out to citizens, developed infographics to illustrate the issues, and communicated a strategy to reframe the causes, issues, and solutions in an accessible form. It developed themes and different scales of measures. It was a guardian and a custodian, as noted in the interviews, with the organisers becoming entrepreneurs to celebrate solutions and raise awareness. It mounted social media campaigns and developed web-tools, which were used to promote Amsterdam-specific solutions.

To make Rotterdam a resilient and flexible city, it proposed ‘that climate change adaptation should be the responsibility of many parties, not just the local authorities. It was envisaged that the inhabitants and businesses, corporations and network providers, educational establishments, and societal organisations (NGOs) should all become involved in their own ways’ (RCCAS, 2013, p.83), combining both a top-down approach via city-wide adaptation strategies and other programmes facilitated by the municipality, and bottom-up approaches through local programmes that encouraged participation via CoPs.

Participation by citizens was via workshops, which generated ideas, discussion and connecting activities. The Cloudburst Programme involved extensive engagement aimed at awareness and attitude change to facilitate behavioural change and local and political dialogue. The aim was to explain the connections between large-scale and small-scale shifts away from engineer-led solutions to green solutions, whilst fighting against densification, which was disrupting the natural water cycle. At a site-specific level STIPO developed an overall strategy under the wider top-down climate change adaptation agenda, then formed CoPs to kick start the process so that they could focus on ‘co-makeship’ and area cooperation through ‘Rekreators’ and ‘Sole in the City’, as described by De Urbanisten and STIPO (2016). By developing area cooperation – an association of like-minded people, both individuals and groups, a sense of responsibility was fostered within the CoPs regarding the issues, aligning with EC principles, and encouraging groups to take initiative. Engagement facilitators were used, alongside the modelling and social-sub-cultural clustering.

The interviewees noted that community acceptance of the processes was considered vital, offering opportunities to extend the initial programmes, and spread sustainable water management measures. The interviewees acknowledged that many opportunities arose once the community bought into the process. By combining sustainable measures rather than being narrowly focused on below-ground measures, a multitude of benefits became apparent that were not observed initially.

In their accounts, the interviewees noted how engagement brought groups together to explore urbanism. The interviewees gave examples of how responsibility encouraged and motivated action, expressed mainly by STIPO (2016). ‘If people are encouraged to take responsibility, there becomes a willingness for people to take initiatives’.

Responsibility was thought to encourage the community to become more equal, with ‘Bottom-up self-organising enabling people to do things themselves’. The interviewees confirmed that the process involved rekindling trust between the professionals and the community. ‘It’s all about building trust, finding the ways to work together. Taking the time to feed into the process’. It’s about ‘being guardians and custodians’. SLA (2017) in Copenhagen gave examples of how the design process enhanced social behaviour in their areas, so that the community thought differently. The ‘Design process aimed at enhancing the social behaviour of the area, encouraging reconnection with the process of nature and the ongoing nature of the park. Reconnecting our future generations with nature in cities’. They went on to say, ‘We think people of Copenhagen have to think differently’.

It seemed to De Urbanisten (2014) in Rotterdam that it was about a long-term commitment to the area. It was about ‘Investment in the people, the neighbourhood, the building, and the public space’. Interviewees noted that professionals and private organisations employed by the municipality became catalysts for solution development. ‘The scheme had a 5-year horizon, but not a 5-year vision. Socially there is a vision, environmentally no vision’ (De Urbanisten, 2014). De Urbanisten were employed by the Municipality to develop the space between the buildings on behalf of the housing corporation. The water square became a catalyst for wider public realm improvements.

The shifts in behaviour witnessed in all three cities, alongside structural and institutional shifts in policy, encouraged and motivated bottom-up actions and self-organisation. People began to do things themselves, and in so doing enabled the community to be more equal. Those shifts rekindled trust between the professionals and the community, so that they found a way to work together, taking the time to feed into the process, ultimately becoming guardians and custodians. The long-term commitment to the areas ensured buy-in to the process, with investment in the people, neighbourhood, buildings, and public spaces.

All three cities facilitated process similarly, with the initial prioritisation on top-down approaches via the city’s adaption plans, however Rotterdam and Amsterdam went further as part of the process facilitating some bottom-up initiatives also. Copenhagen engaged from a top-down approach via the city-wide adaptation plan, relying upon professionals to develop and implement measures on behalf of the community.

Amsterdam mainstreamed the measures through a top-down approach with CoPs actively engaged in a participatory process. Meanwhile Rotterdam implemented area-based measures from a top-down perspective, but through implicit policy in certain areas of the city, organic, self-organising CoPs were also developed, promoting bottom-up small-scale measures devised and implemented by the CoPs themselves.

7.14.5 Ecological Citizenship (EC)

EC, as outlined in Chapter 5, is understood to be a civic approach to citizenship that encourages ‘people to associate the implications of their daily activities with the state of the wider environment’ (Seyfang, 2009). Denmark has a strong public spirit and a long track record of nurturing collective responsibility as described earlier in this chapter. These core values alongside the ‘notion that the greater communal good outweighs individual interests’ (King, 2020), provide the framework for motivating personal and collective responsibility to climate change issues, and incorporating both individual and group beliefs and attitudes. The Netherlands operates along similar lines.

In Denmark and the Netherlands, individuals have a responsibility for collecting, infiltrating and/or processing rainwater on private property up to the property boundary, preventing their property from flooding, and ensuring that excess water from their property does not endanger neighbours (Municipality of Utrecht, 2016). The municipality and water boards in the three cities are responsible for processing rainwater, managing the sewer systems and surface water. These responsibilities are based upon wider values of solidarity, flexibility, and sustainability, where cooperation in protection, conservation, justice, and care alongside prevention is seen as essential.

Pervasive problems persist in all three cities owing in part to the fact that systems are semi-centralised, fragmented, lack funding, and disempower community responsibility. These environmental effects inhibit people from coming together, by depriving them of the physical experiences that ground them in their communities. Modern civic environmentalism aims to promote both environmental protection and democratic renewal in the form of a participatory process. (Refer to Chapter 4). It encourages a bottom-up approaches to tackling problems, where communities are inspired to work with experts to solve the issues and encouraged to implement measures themselves, rather than relying upon others.

Modern civic environmentalism demands a greater understanding of environmental protection and stewardship alongside democratic justice. That wider responsibility is demonstrated in each city by the CoPs. What these three-city climate change adaptation programmes and associated pilot projects demonstrate are levels of EC. They explicitly highlight private consumer behaviour as political and a space for collective action for the common good (Seyfang, 2006, p.387). Through sustainable water management and urban renewal, CoPs are encouraged to come together to practise a shared personal commitment to sustainability, reflecting upon their own habitats and practices, and via ‘area cooperation’, developing collective solutions for their neighbourhoods that restrict localised flooding (STIPO, 2016).

7.14.6 Promotion of LISUD

In Copenhagen, although there was an overarching framework of measures, a plethora of different, LISUD measures ⁹⁸were promoted by the municipality. The focus for Copenhagen was ‘city nature’ (SLA, 2017), extending and re-linking areas of nature so that they became more resilient to withstand the challenges of climate change. Integrated planning and development of green spaces aimed to reduce heat and manage stormwater, whilst increasing recreational facilities, currently deficient within the city. A series of green LISUD solutions were proposed, complemented by improvements to the city’s sewer network, with the green areas capturing and storing rainwater as temporary collectors. The focus was on hydrological capacity as evident in the interview transcripts, as there was limited scope in the city for huge ‘hard’ infrastructure solutions. Instead, the ‘Copenhagen Model’ recommended assessing ‘ecosystem services’ (SLA, 2017). Parks were recontoured to form giant bio-swales, which could accommodate the water volumes. Biological, hydrological, and social circuits were mapped so that social behaviour could be encouraged, reconnecting people with nature. By sharing knowledge nationally and internationally, best practices could be established and implemented, fostering local cooperation with the public, and generating a climate-proof greener city.

In Amsterdam 57 LISUD measures were identified under Amsterdam Rainproof including property level measures such as permeable paving, rain barrels, rain barrel

⁹⁸ I refer to this as a typology developed specifically for this research, drawing upon low impact development and sustainable urban drainage.

fences, and backwater valves. Street-level and neighbourhood level measures included swales, water boulevards and roof gardens. The CoPs used the Rainproof website and via mapping and the toolkit of SuDS measures. They could contact Amsterdam Rainproof who facilitated the process, and the CoPs who had installed the measures for assistance and to learn about the features implemented. It was felt that the process was more important than the features, as described by Lotte of Amsterdam Rainproof (2016). In essence, this meant re-contouring the cities, reprogramming events, and prioritising the social side.

The Cloudburst programme of Rotterdam undertook detailed analysis of watersheds across the city looking at the topography, built structures, current water channels/routes, the problem areas, the volume of water combined with extreme rainfall and disconnecting measures that could be accommodated alongside LISUD. This analysis led to a series of measures being proposed. These measures were implemented, either as top-down via practices such as De Urbanisten alongside the municipality as part of the Climate Change adaptation programme, or bottom-up facilitated by STIPO as area-based measures. As described by De Urbanisten (2014), ‘we designed something that was wanted by the community. It was an open concept. A green solution. A prototype that could be replicated. Every space different’.

7.15 Chapter Summary

Returning to the core research questions, the following conclusions can be drawn from the case study analysis:

Climate change impacts were recognised in all three cities as an issue, following major catalyst events, which highlighted the necessity of mitigation and adaptation.

National adaption strategies and programmes implemented at a national level within decentralised countries, promoting climate change adaptation as top-down measure and shared responsibility between local government and residents. The programmes were implemented using ‘soft’ policy instruments.

The climate agenda provided a joint language, ensuring money for public service improvements that reframed the issues away from avoiding damage (previous policy) to promoting efficiency of water, so that solutions were accessible, and communities encouraged to take part.

The climate change adaptation programmes set the framework for action, (Cloudburst Copenhagen, Amsterdam Rainproof & Zoho in Rotterdam) and were facilitated via consensus planning involving all those living and working in each city. Those programmes envisaged measures implemented at all scales and in all aspects of the city simultaneously, with different measures tailored to different areas. Top-down measures implemented by the Municipality and water boards, such as pilot project water squares, demonstrated at an area-based level how a sustainable approach could be developed, seen as both an environmental and social catalyst.

Messages associated with the changes in the climate and rainfall were difficult to express to the various parties involved. Dialogue, engagement, and communication was seen as the way to shift the prioritise of the issue away from avoiding damage to promoting efficiency. It enabled the causes, issues, and solutions to be reframed, making them accessible. Opportunities were developed once the community were bought into the process. By combining sustainable measures rather than being narrowly focused on only below-ground measures, a multitude of benefits become apparent and were implemented.

Dutch government cutbacks in funding reduced the levels of urban renewal projects implemented, but prioritised the climate agenda, encouraged funding for specific measures aligned with the city's climate adaptation programmes. The funding gaps brought political change, with the promotion of private organisations to fill the gap in funding encouraging a greater bottom-up approach to climate change adaptation. The government shifted from main investor to facilitator and finally partnership. As facilitator they raised awareness of the multiple solutions that were possible.

Explicit planning policy inhibited actions by focusing on technical solutions of which laypeople had little knowledge. Off the back of that, implicit policy developed in some cities such as Rotterdam, developing experimental areas, areas which needed regenerating, which challenged negativity and nurtured cooperation to encourage new development.

Smaller bottom-up initiatives were not pushed at first by the Municipalities but developed out of pilot projects such as the water squares, focusing on demonstrating how sustainable measures could be encouraged.

Community event development and awareness raising with municipalities, politicians, community, residents, and other organisations, led to CoPs being formed, with the help of private organisations employed under city-wide climate change adaptation strategies.

The three cities analysed within the multi-case study demonstrate the process of facilitation and engagement in CoPs under wider top-down climate change adaptation programmes. These CoPs via separate programmes have shown how behaviours, norms, and practices change where individuals are motivated and collective responsibility for flood prevention and sustainable water management increased.

Currently residents bear risks and the economic burdens associated with responsibility for any damage that occurs through inadequate drainage, defective sewer systems at their property or failure of the building structure. This encouraged many owners to engage with the 'mainstreaming process', extending owners' personal responsibility, the country's public spirit, and collective responsibility for flood prevention and sustainable water management, facilitating implementation of LISUD at a property and street level, and promoting wider EC aspirations of environmental protection, stewardship alongside democratic justice, by encouraging affiliated virtue of care. The municipality and the Water boards have a duty of care to encourage residents to take their own responsibility, instead of ensuring the municipality meets service level agreements.

Responsibility encourages the community to become more equal, with bottom-up self-organisation enabling people to do things themselves.

Engagement with climate change adaptation was considered vital by the interviewees for bringing the various parties together and encouraging increased responsibility, encouraging the community to become guardians and custodians.

The design process enhanced social behaviour in the regeneration areas, so that the community thought differently, encouraging reconnection with the process of nature and eco system services.

A series of green LISUD solutions were proposed in all three cities, complemented by improvements to the city's sewer network, with the green areas capturing and storing rainwater as temporary collectors. LISUD was shown to be implemented at all scales

including city level, area level, street level and property level, with community initiatives focusing on the latter two.

Chapter 8. Summary of Findings and Key Conclusions

8.1 Introduction

This final chapter represents the core research questions for clarity. It summarises findings from each strand of the work and evaluates them in a set of reflective conclusions. It also includes a reflection on the aims pursued and methods adopted.

8.2 Research Questions, Overall Aims and Key Objectives.

8.2.1 Research Questions

Table 8-1. Research questions

Core research questions	Research methods
To what extent can people be motivated into adopting pro-environmental/social behaviour to facilitate personal and collective responses to sustainable water management and localised flood adaption?	surveys, and focus groups
To what extent are bottom-up organisations able to achieve this, or are top-down measures required?	surveys, focus groups and case studies
To what extent can EC / CoPs play a proactive role in supporting localised flood adaptation?	surveys
To what extents can we learn lessons from case studies in the UK and elsewhere?	case studies

8.2.2 Aims

The overall aim of the research was to develop a deep understanding of whether EC principles in CoPs undertaking social learning play a pro-active role in supporting implementation of LISUD. Its purpose was to optimise the potential for EC as a resource for learning about sustainability, and conditioning pro-environmental behavioural change; one that overthrew maladaptive behaviours and practices that promote value action gaps and misperceptions, which tend to prohibit LISUD adaptation to the super wicked problems of climate change. It was intended that this would not only lead to a greater understanding around the complex issues associated with flood prevention and sustainable water management in our cities but would also enhance understanding of citizens in CoPs.

The research was keen to assess whether top-down or bottom-up initiatives were more effective in encouraging pro-environmental behaviours, and to investigate a series of different programmes centred on sustainable water management. The intention was to examine whether programmes facilitated active participatory broad ecological social learning as a ‘learning curriculum’ to alter behaviours, norms, and practices, or whether wider structural measures were also needed.

It also sought to understand how changes in behaviours, norms and practices reflect the risks associated with climate change in our cities and reveal the loss of personal and collective responsibility for water management. The research enquired into what might override current patterns and motivate personal and collective responsibility for water management in our cities.

8.3 Theory

EC as defined for this research, was the 'idea that each of us is an integral part of a larger eco-system and that our future depends on each one of us embracing the challenge and acting responsibly and positively towards our environment. It's about making changes in our daily lives to be environmental citizens all day, every day' (Environment Canada, 2001). It is focused upon ecology, and the 'ecological footprint' (Wackernagel and Rees, 1996) and, the water footprint. An ecological citizen's duties, as defined by Dobson and others, is to 'minimise the size and unsustainable impacts of one's ecological footprint', promoted through 'many individual acts, at the local level', to 'bring about significant change' (Goodall, 1994, p.7).

In line with Tim Hayward's view, EC should be 'construed as a condition of practical virtue attainable by degrees, through processes of education and deliberative association, and by all, as citizens of the polity in which they find themselves' (2006, p.446). For this research, EC offers 'a personal commitment to learning more about the environment and to taking responsible action' (McGregor and Szerszynshi, 2003, p.8). It should be considered a new politics of obligation, which offers the potential for people to learn about water management and localised flood prevention and, through education and social learning, act.

Under Dobson's definition, the principal duty is to act with care and compassion towards each other, as today's acts will have implications for tomorrow's people (2003). The obligations of the ecological citizen are to defend the preservation of nature and should be both political and ethical resulting in ecological stewardship to future generations (Barry, 2002). Therefore, this research argues that EC offers the means for encouraging planned adaptation to climate change in CoPs.

It is surmised here that CoPs offer the structure for observation, social learning, group dynamics and social expectation, where 'learning is not a discrete activity, associated with formalised spaces of teaching or isolated contemplation, but more a matter of

practical activity, as people learn from each other by mutually engaging in tasks' (Lave, 1993).

Undertaking EC in CoPs provides the means for motivating people to think globally, and act locally, and therefore offers scope for encouraging people to undertake LISUD. It promotes a process aligned to their personal values for participating in change; one that involves many small acts making a difference. It emphasises 'the explicit link between environmental problem solving and community building' (Shutkin, 2000), through meaningful, informed participation in decision making. The model could be tested via a mixture of small-scale participatory and observational projects/engagements, and then further tested against international experience in countries that have a much longer history of 'living with water', such as the Netherlands.

This research suggests, in line with policy, that we need to learn how to live with floods and make space for water. This means 'developing culturally sensitive and sustainable ways of living and managing floods' (Ashley, et al., 2007) which 'empower the participation of all stakeholders through appropriate institutional frameworks and government mechanisms' (Tippet and Griffiths, 2006). It also means dispersing power away from central government to local public servants, communities, and individuals (DCLG, 2011), as promoted under FCERM. We need to improve public awareness and understanding of flood risks (Kelly and Garvin, 2007) so that there is a clear delineation and acceptance of the respective roles of the state, central and local government, other organisations and agencies and individuals (DGLG, 2011). Local areas should have greater freedom and renewed responsibilities, promoting local action through enhanced roles for communities.

If changes are enforced with a top-down approach, then assumptions are made that others will take responsibility for the decision. If, however, those decisions are instigated and undertaken from a bottom-up approach, via individuals or groups practising EC, then this research suggests that personal and collective responsibility would be encouraged, consequently motivating action.

8.4 Conclusions, Contributions to Research Knowledge and Future Research

From analysis and synthesis of the perception groups, focus groups, the flood action groups and the interviews with the case study facilitators, it has been possible to amass

a body of knowledge on innovative practices of social learning and consensus planning that promote flood prevention and sustainable water management within communities via CoPs undertaking climate change adaptation. It demonstrates the benefits of social learning alongside EC within CoPs, so that cooperation around justice, protection, conservation, and care is developed, and misperceptions around others' opinions on localised flood prevention and sustainable water management are overturned.

Semi-structured interviews produced detailed information on each of the three case studies, and two of the flood action groups cross-referencing findings from the perception surveys and focus group workshops. Together the mixed research methodologies provide a body of evidence that answers the main research question.

The narrow idea that democracy is confined to government, political institutions and electoral mandates has been challenged. Rather, in line with EC, it is now recognised that 'individuals and their interactions in society make majorities for change' (Beaumont, 2019). There is increasing awareness that we are more powerful than we think. 'Many small acts can lead to immeasurably larger outcomes' (Beaumont, 2019). In this regard, EC as a civic approach to citizenship adopted in CoPs, offers a way of increasing democracy and encouraging people to consider the implications of their daily activities for the wider environment. It helps in understanding the impacts of messy super wicked problems of localised flooding within the perception groups, flood action groups and case study groups. It is also a means of raising awareness regarding flooding and responsibility for flood prevention. Thus, it serves to encourage adaptation to climate change, through sustainable water management such as LISUD, and as such offers a theory of motivation.

However, despite these findings, EC alone was not found to produce a sustained change to behaviours, norms, or practices within a localised flood context. The reasons for this failure of sustained bottom-up change seemed to lie, at least in part, in the prevailing value action gaps and misperceptions that inhibit action and underpin our coping mechanisms. Current UK policy and legislative processes and structures that prioritise top-down measures within a centralised state tend to undermine individuals' sense of responsibility rather than facilitating bottom-up participatory planning to meet communities' needs and respect the environment.

When threatened, people adopt one of two broad coping strategies, either as ‘problem-focused or emotion-focused coping’ (Lazarus and Folkman, 1984). Problem-focused coping (as described in Chapter 4) involves taking direct action to alleviate the threat, whereas emotion-focused coping ignores the issue, changes the topic, and denies that there is anything that can or needs to be done. ‘Whether someone uses problem-focused coping or emotion-focused coping appears to be determined by their perception of how much control they might have. If we perceive that we have a significant amount of control, we are likely to adopt problem-focused coping. Conversely, if we perceive we have little control as in the case of localised flood prevention and sustainable water management, then we are likely to use emotion-focused coping’ (Lazarus and Folkman, 1984). This occurred in the CoPs more often than the problem-focused coping. Even though communities acknowledged climate change and the issues associated with it, they also ignored the wider issues and denied that anything could or needed to be altered, perpetuating the misperceptions and value action gaps that inhibit action. These findings are consistent with research pertaining to other behaviours and practices.

The issues related to climate change that led to localised flooding in our cities were acknowledged by all the groups surveyed in the UK, albeit with different levels of awareness. However, that awareness failed to translate into action, with significant reticence, reluctance, and apathy prevailing in all areas. Those surveyed maintained that the issues were someone else’s problem and they relied heavily on others actioning solutions on their behalf. The groups felt they had no collective responsibility for water, which removed personal responsibility and limited motivations to act. The drive for action could not (or at least in the groups surveyed) was not sustained.⁹⁹

The obligations of citizens committed to EC have been shown to foster changes in behaviour, norms, and practices in relation to sustainable consumption. However, within localised flooding contexts the impact has been limited. It is surmised here that the lack of a sense of responsibility in this regard is one of the main factors that inhibits action; it overrides the short-term benefits of changes effected through the CoPs undertaking EC, including a variety of everyday water conservation practices adopted.

⁹⁹ These findings are consistent with other areas of research, where initially changes in behaviours and practices were significant, but after the immediate threat was removed, lost again, when people resumed their previous behaviours and practices, as described by Henry Mance in *The Financial Times* discussing what we might have learnt about the Covid pandemic (2020, p1).

It was acknowledged by the communities that water management and localised flood prevention tend to be managed by professionals, who develop and implement proposals on behalf of the communities, removing personal responsibilities. The flood action groups illustrated partnership working, but this was variable, and still largely top-down, with little regard by the professional organisations of the community's expertise and knowledge of local matters, and therefore potential solutions. This research argues that structural changes to how water is managed that increase responsibility are necessary. This should run alongside encouraging EC within CoPs to promote problem-focused coping, and stimulating social learning and consensus planning, so that personal and collective responsibility is increased. If this increase in responsibilities occurs, this research surmises that it will lessen the value action gaps that inhibit action due to perceived lack of control, and motivate sustained changes in behaviours, norms, and practices. Once measures are installed, the benefits of actions will be evident, enhancing understanding of new practices and motivating changing existing practices.

The flood action groups in the UK offer a model of CoPs that enable communities to meet, discuss, and develop localised flood prevention and sustainable water management mechanisms together. However, the findings from this research indicate that even though these groups acknowledge the issues, at present there is limited evidence of installation of LISUD from a bottom-up perspective, a key concern of this research. This suggests that CoPs still rely heavily upon other organisations installing measures on their behalf. Structural measures promoting reactive adaptation responses, as opposed to planned adaptation, are witnessed in Denmark, where climate change adaptation measures have been implemented via top-down initiated climate proofing. However, in The Netherlands, living with water is much more deeply culturally embedded: planning is characterised by 'consociationalism', with many examples of successful LISUD implemented both via Amsterdam Rainproof and in Zoho, Rotterdam. The key conclusion from the multi-case study analysis highlights that due to cuts in Dutch funding, new governance models were able to develop in certain cities that promoted bottom-up measures in experimental areas, pointing towards the advantages of using governance models like those adopted, so that bottom-up initiatives and LISUD are promoted and actioned as planned climate change adaptation.

The review fills a gap in the literature around environmental governance, focusing on governance that promotes participatory planning within communities within the wider

context of FCERM and spatial planning. It assesses the role that CoPs undertaking EC can play in localised flood prevention and sustainable water management contexts. They can facilitate changes in behaviour, norms and practices, overturn misperceptions and value action gaps, and motivate people to adopt socially sustainable behaviours in the form of LISUD. The review also demonstrates the significant role that social learning plays within the CoPs, so that LISUD is encouraged as part of localised climate change adaptation.

CoPs, whether initiated from top-down processes or self-organised through bottom-up initiatives, facilitate this process by enabling communities to come together to discuss ideas and formulate solutions, undertaking participatory placemaking. They enable open dialogue between people on flooding matters and water management in their areas, aligning with wider obligations. They encourage communities to come together to explore new possibilities, solve challenges and create new mutually beneficial opportunities; whilst capturing and sharing existing knowledge to help improve their practices. In this way, feedback acts as a prompt to perpetuate changes in behaviours, norms, and practices, to decrease misperceptions (Berkowitz, 2004), and limit value action gaps that have been seen to inhibit pro-environmental behaviours.

It is apparent that EC as a new politics of obligation could encourage people to understand the issues surrounding flood prevention and water management and to appreciate how their actions affect others; it could lessen inequalities and injustices associated with localised flooding and promote planned climate change adaptation in the form of LISUD. As an engagement methodology and theory of motivation, EC promotes sustainability and encourages localised action. However, sustained long-term change has not been apparent, due to constraints imposed by the current planning framework in the UK as regards water management. This framework prioritises big infrastructure projects developed by professionals on behalf of the community; it limits consensus planning, and so facilitates and perpetuates a wider lack of responsibility regarding water management; it inhibits changes within communities, and consequently, EC has not become an embedded paradigm.

8.5 Important Limitations

As this research was undertaken individually, and through part-time study, the time frame of the research was significant. This has meant that literature that was up to date

at the start has been superseded and updated multiple times in the duration of this research. Others have researched many of the areas of literature reviewed including climate change, adaptation, policy, behaviour change, ecological citizenship, environmental governance, and communities of practice over the duration of this PhD, yielding additional findings. Therefore, the literature review has been extensive and ongoing to accommodate updates in research findings. However, so that the research findings could be assessed, no new literature has been reviewed post-2018.

As most of the empirical research was mainly undertaken six years ago, the findings reflect the attitudes expressed at that time. However, since then, appreciation of climate change and the small-scale actions that we can all take that will make a big difference has been more widely acknowledged, centred around Greta Thunberg and the youth movement. It would be interesting to see whether the research findings would be similar if conducted today, given the increased appreciation of the challenges we face and the efforts that we can all make to resolve those challenges.

There are benefits to the extended time frame in that this has enabled visits to the three case studies over a period and allowed assessment of how they have developed over time. This has facilitated increased findings.

Two organisations were considered for the online surveys and questionnaires: Kenley and the University of Salford. However, it became apparent that they would not be suitable for ongoing practical study, due partly to lack of interest from key participants and stakeholders, but also a lack of inclination to pursue implementation, as they relied on other organisations to act on their behalf. For these reasons, alternative organisations were consulted.

The results and subsequent analyses of the three case studies have highlighted several limitations in the research methodology. Most notably the introduction of GDPR, which caused additional measures to be put in place to protect the key participants' personal data, and limited access to key participants for the online questionnaires and face-to-face interviews. This resulted in a shift from the participants in the CoPs to the organisers of the programmes, which brought a different emphasis in the case studies as compared to the online surveys, questionnaires, and focus group workshops. Access to documentary and archival evidence has also been restricted, which limited the findings.

With qualitative research, especially using focus groups, there is always a risk that certain people's views or opinions might predominate and could skew the analyses. It was found that despite inviting all to participate in the semi-structured focus groups and the flood forum, the same people turned up to most of the events, as they were more proactive and participatory than others. It was therefore important to balance the views represented and assess holistically when analysing the data.

8.6 Further Research

There is a strong case for further research to examine the role that CoPs play undertaking EC engagement in implementing sustainable water management so that climate change issues are tackled at local levels as planned adaptation. This research could be scaled up from a few CoPs in one area of a city, to a whole city.

Further research should examine what structural changes are needed to increase responsibility around localised flood prevention and sustainable water management, so that the apathy and reticence currently evident in the value action gaps and misperceptions are challenged.

EC encourages individuals, communities, and organisations to think about the environmental rights and responsibilities we all have as residents of Earth and encourages personal commitments to taking responsible environmental action. It is about citizens voluntarily choosing to care for the environment and harnessing behaviour at the service of the environment. Further research should seek to assess how EC as an engagement methodology and theory of motivation can change behaviours, norms, and practices, even if those undertaking the process hold personal values that are not environmental, overturning the value action gaps that currently restrict long-term sustained action.

A good number of decisions are made in collective, organisational settings, and in such settings individual rationality is compromised by the need to consider the wishes and desires of others. Observation, social learning, group dynamics and group preferences heavily mediate individual preferences. Research has considered the role of social learning and CoPs in other fields of study. However, only limited research has been undertaken on participatory processes related to climate change adaptation. Further research should examine the role of CoPs, through social learning, in motivating LISUD as part of localised climate change adaptation. The evidence around sustainable

consumption needs to be extended, to assess how personal and collective responsibility might similarly be developed in this context, and LISUD promoted amongst individuals and groups undertaking planned adaptation.

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Appendices

Appendix A – Kenley Residents’ Association Questionnaire

Flooding

Awareness of issues surrounding flooding

1. There seems to be more rain falling in general, do you consider this a problem?

Yes its a problem

Not sure

No its not a problem

Other (please specify)

2. What problems might this increase in rain cause to the area in which you live?

3. How much of a problem is flooding in your area?

Its a problem

Not sure

Its not a problem

Other (please specify)

4. How often has your area been flooded in the last 5 years?

Once

Twice

Five times

More than five times

5. When was the last time the area flooded?

Last year

This year

Other (please specify)

6. Have you ever been flooded at home or work?

Home

Work

Neither

Flooding

7. Which sources do you think cause flooding?

- Groundwater
- River (fluvial) flooding
- Surface water (pluvial) flooding
- Estural flooding
- Coastal flooding
- Inter-urban flooding

Other (please specify)

8. If at home which of the following apply:

- I own my own home
- I rent
- I am a Landlord

9. If at work, describe the circumstances

- Office
- Pub
- Hotel

Other (please specify)

10. Who do you think is responsible for flood prevention in your area?

- Central government
- Environment Agency
- Local Authority (Croydon)
- Local organisations (Residents Associations / Business Improvement Districts etc)
- You
- Multiple people
- Other (please specify)

Awareness of issues surrounding flooding

Flooding

11. The government predicts that over 250,000 houses need to be built every year to accommodate our increasing population. Do you perceive a flood issue with this increase in housing?

- Yes I perceive a flood issue
- Not sure
- No I perceive no issue
- Other (please specify)

12. What actions / measures are needed with new development to prevent flooding in your area?

- All developments to be designed not to alter existing conditions
- All developments to be designed to exceed existing conditions
- Other (please specify)

13. In your opinion, is flooding a single or a multiple cause issue?

- Single cause from one source
- Not sure
- Multiple cause from a series of sources
- Other (please specify)

14. What type of property do you live in?

- Flat
- Mobile Home
- Terraced House
- Semi-detached
- Bungalow
- Detached

Other (please specify)

Flooding

15. Which of the following apply to your property?

- Courtyard
- Front garden
- Back garden
- Shared garden
- Balcony

Other (please specify)

16. Does your property have any open drains?

- Yes
- No

17. Do you currently collect water from your roof into a water butt?

- Yes
- No

18. What water collection measures have you installed?

- Water butt
- Water barrel
- Rain garden

Other (please specify)

19. If you have a front garden how is it surfaced?

- Grass
- Hardstanding
- Both

Other (please specify)

20. If you have a front garden have you changed the surface since you lived in the property?

- Yes
- No

Awareness of issues surrounding flooding

Flooding

21. Which of the following apply:

- Removed grass and shrubs then hard surfaced
- Removed loose fill and replaced with fixed material (e.g. tarmac / concrete / gravel)
- Removed loose fill, now used for parking

Other (please specify)

22. Have you increased the amount of hardstanding on your property?

- Yes
- No

23. Have you decreased the amount of hardstanding on your property?

- Yes
- No

24. Do you think any of the below have caused a change in the frequency of flooding?

- Climate change
- Increased precipitation
- Widened river courses
- Changes to maintenance
- Increased populations
- More housing
- Old sewers and drains
- Changes to regulations and policy

Other (please specify)

Values

25. If you had to describe yourself which of the following would you choose?

- Biospheric (motivated to protect the environment)
- Altruistic (Motivated to help others)
- Egoistic (Motivated by personal gain)
- Not sure
- Other (please specify)

Flooding

26. In making decisions are you individually motivated or do you rely upon other peoples opinions?

- Individually motivated
- Not sure
- Rely upon others opinions
- Other (please specify)

27. If other people's opinions matter, who do you listen to?

- Family members
- Work colleagues
- Professionals
- Strangers
- Newspapers / TV / Internet
- Other (please specify)

28. When walking along the street you notice that the gully at the side of the road is full of leaves and debris, would you clear it or expect others to clear it?

- I would clear it
- Not sure
- I would expect others to clear it

29. Have you ever made a decision and then changed your mind because of other people's opinions?

- Yes
- Not sure
- No

30. Would you do something if it was not done by the majority? For instance, would you install flood protection measures to your property to prevent flooding if others did not?

- Yes
- Not sure
- No

Flooding

31. Are you inclined to do something if you see others doing it? For instance, would you consider installing flood prevention measures to your property if it would prevent your property from flooding, if others had decided not to install it?

- Yes
 Not sure
 No

32. Are you motivated by environmental concerns?

- Yes
 Not sure
 No

33. Would you consider installing water conservation / flood prevention measures to your property if you did not like the look of them, despite knowing they were effective?

- Yes
 Not sure
 No

34. Which of the below would you consider installing?

- Rain barrel / water butt
 Rain garden
 Green roof
 Tree gully (ditch with trees planted in it)
 Infiltration basin (ditch that allows water to flow into the ground)
 Temporary flood board (board that prevents water entering properties)

Other (please specify)

35. Of the measures listed above, which do you think is the most effective?

36. If you have a water butt is this for flood prevention or water conservation?

37. Why aren't more flood measures in place generally?

Values

Flooding

38. Are any of those listed below barriers to implementation?

- Money
- Technology
- Knowledge
- Space
- Ownership
- Incentives
- Perception

Other (please specify)

39. Would you install measures on your property that prevent your neighbour from flooding?

40. Alternatively, would you consider installing a measure that you do not like the look of, if it prevented your neighbour from flooding?

41. Do you consider it important that flood prevention measures help many people, or do flood prevention measures predominantly only help you?

42. Please rate the following flood prevention actions relative to normal when normal is everyday actions?

	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree	N/A
Water butt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flood boards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sand bags	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rain garden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Swale (depression in the garden to collect water)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Permeable surfaces to front / back garden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

Flooding

46. Which of the below would persuade you to adopt a flood prevention mea

- Science
- Perceived effectiveness
- Media
- Advertising
- Success

Other (please specify)

47. Would you be willing for us to contact you again in the future regarding your answers?

- Yes
- No

48. If yes, please provide your details so that we can contact you again?

Name	<input type="text"/>
Company	<input type="text"/>
Address	<input type="text"/>
Address 2	<input type="text"/>
City/Town	<input type="text"/>
County	<input type="text"/>
Postal Code	<input type="text"/>
Email Address	<input type="text"/>
Phone Number	<input type="text"/>

Appendix B - Provocations, Dialogues and Discussions

Ice-breaker Questions:

- What was your reaction to what you just watched?
- What issues and /or solutions in the documentary were you already aware of?
- What issues and /or solutions surprised you?
- What issues are similar to the issues in the community?
- What additional information do you feel you need / want?

Community Problem Solving:

- What do you believe is the mostly pressing water issue in our community?
- What “misperceptions” are there to sustainable flood prevention solutions?
- What barriers exist to implementing localised flood prevention solutions?
- In what ways, can the community implement green solutions to localised flood prevention?
- To promote big changes in the community, the majority of the public need to fundamentally think it is the right thing to do, what practices could be adopted in the community, and how should they be communicated?
- Who are the key players, groups and or individuals making changes in the community?
- What is the first step in bringing these groups together?
- What can you individually be doing to your homes?
- How would your community pay for green infrastructure sustainable solution to localised flood prevention improvement?

Appendix C – Community Resilience Questionnaire

Grey Street



(Image Source: www.thames21.org.uk)

About You

Qu.1: What is your age group?

0-15 yrs 16-24yrs 25-40yrs 41-60yrs
61-80yrs 80+yrs

Qu.2: What ethnic group do you associate yourself?

White Mixed or multiple ethnic Asian
Black / African / Caribbean / Black British Other Ethnic Group

Qu.3: Where do you live?

Qu.4: Which of the below best describes you?

Young person Student Professional person
Family person Retired

Qu.5: What type of property do you live in?

Flat Terraced House Semi-detached
Bungalow Detached

Qu.6: Do you own your own house?

Own Rent

Qu.7: Which of the following apply to your property? You can circle more than one.

Courtyard Front Garden Back Garden Shared Garden
Balcony No Garden

Environmental Concern

Qu. 8: If you had to describe yourself, which of the following would apply?

Interested in caring for and protecting the environment.

Interested in helping others.

Motivated by personal gain.

Qu. 9: Are you motivated by environmental concerns such as an obligation to care for and protect the environment and live within ones means, or a responsibility not to endanger others promoting social justice?

Yes Not Sure No

Qu. 10: How much of a concern is climate change?

Qu. 11: There is more rainfall in general; do you consider this a problem?

Yes No

Qu.12: Do you think flooding in general is increasing?

Yes No

Qu.13: Do you think any of the below have caused an increase in flooding?

More rain	Climate Change	Population increases
Increases in impermeable surfaces		Changes to maintenance
Population migrations		Adding a drive to a house
Under capacity in sewers and drains		More housing
Changes to regulations and policy		

Qu. 14: Have you ever been flooded?

Yes No

Qu.15: Do you recognise that water conservation might prevent localised flooding?

Yes No

Qu. 16: Do you acknowledge that this way of living is unacceptable and that an alternative way might benefit you, your neighbours and the planet?

Yes No

Green Street:



(Image Source: www.thames21.org.uk)

Flood Issues / Solutions

Qu. 17: Which sources do you think cause flooding?

Groundwater (water that rises up from below the surface)

River Flooding

Surface Water Flooding (from heavy rain)

Coastal Flooding

Qu. 18: Do you or your household currently collect water from your roof into a water butt?

Yes

No

Qu.19: Which of the below would you consider installing?

Rain barrel / water butt

Rain Garden (planted garden receiving water form downpipe)

Green Roof

Tree gully

Infiltration basin (A ditch or shallow depression that allows water to collect and gradually flow away)

Retention basin (Ditch / shallow depression that allows water to collect and directs flow away)

Temporary flood board (outside doors)

Backflow valve (on incoming clean and waste water pipes)

Permeable paving with attenuation crates in the ground to collect water (paving laid with gaps to allow water to fall into plastic crates below ground for collection)

Qu.20: Of the measures listed in Qu.19, which do you think would be the most effective ay flood prevention?

Qu.21: If you have a water butt is this for flood prevention or water conservation?

Flood prevention

Water conservation

Qu.22: Do you consider it important to collect, conserve and reuse water on your property preventing flooding to others and increasing social justice?

Yes

No

Qu.23: Would you be more inclined to install measures that prevent your property from flooding, or measures that prevent you and your neighbour from flooding?

Your property

You and your neighbours

Qu. 24: Of the measures below, which are you more likely to install?

Property level measures

Street level measures

Neighbourhood level measures

Qu.25: Who do you think is responsible for flood prevention?

Central Government Environment Agency Local Authority
Local organisations You
Multiple people (combinations of people and organisations)

Qu. 26: Which of the below do you consider barriers to installing flood prevention? Circle more than one if you wish).

Money Time knowledge Habits
Space Ownership Ease of installation
Perception of effectiveness Incentives Aesthetics
Technology

Qu.27: Why aren't more flood measures in place generally?

Qu.28: What is stopping you installing measures to your property?

Qu.29: If local organisations were to offer assistance and education, would this improve the likelihood of you installing any measures?

Yes No

Qu.30: Would greater availability of the solutions improve the likelihood of you installing the measures?

Yes No

Qu. 31: Do you think water collection measures lessen or prevent flooding?

Yes No

Qu.32: Which of the following everyday practices do you consider normal, when normal is defined as commonplace?

Collecting water Watering the garden with stored water

Installing a water butt / rain garden from downspout to collect water

Re-using already stored water rather than using water from the mains

Re-circulating grey water for irrigation (i.e. bath water or water to peel vegetables for example)

Qu.33: Which of the following flood preventative actions would you consider normal, when normal is defined as commonplace?

Water butt

Flood boards

Backwater valves

Sandbags

Rain garden

Swale

Permeable surfaces

Qu.34: Which of the below would persuade you to adopt a flood prevention measure?

Science

Perceived effectiveness

Media

Advertising

Success

Ease of buying

Everyday normal

Practices highlighted as environmental

Social justice

Qu. 35: Would you change your practices such as watering the garden, collecting water or conserving water on your property, if the measures in Qu. 33 were installed?

Yes

No

Qu.36: Would you be inclined to re-circulate water if the measures in Qu. 33 were provided, or would you still tend to connect your hosepipe to the mains water?

Yes

No

Qu. 37: If you are not environmentally motivated, can you see the benefits of these measures?

Yes

No

Qu. 38: If water providers or developers supply these measures would this encourage you to collect, conserve and re-circulate water?

Yes

No

Appendix D- Flood Action Group Questionnaire

Community Resilience ...

The following questions have been assembled to scope the community flood action group's awareness of flood risk, to highlight ways in which the group's understanding of the issues can develop and implement solutions to eliminate the risks. The data will be used solely for a PhD undertaken at Kingston University to understand how community groups operate, and ways in which those groups could function better increasing resilience, and ultimately lessening flood risk.

Once complete, please submit the questionnaire by 31 August 2018.

COMMUNITY FLOOD ACTION GROUP NAME: _____

- 1 When was your community flood action group formed?
- 2 How many members are there in the group?
- 3 Does your community group have any flood risk that you are aware of:

NO

DON'T KNOW

YES

Please specify:

- 4 Have there been any incidents of flooding in the community in the last 20 years?

NO

DON'T KNOW

YES

Please specify:

5 How was your community flood action group formed?

6 Which members of the community are represented by the community flood action group?

7 What are the issues faced by the community?

8 How are the issues in the group discussed?

From a flood-specific point of view

From a broad point of view e.g. participation planning placemaking

9 How are the issues communicated in the group?

site-specific level

catchment level

information campaigns

modelling info graphics

conversation

10 How are the solutions developed in the group?

information campaigns

learning from others (social learning) through discussion

learning by doing (social learning through projects)

changes to social practices

preservation and conservation measure. e.g. Ecological Citizenship

11 How are flood prevention measures promoted within the community group?

10 What restricts flood prevention action by the group?

funding

knowledge

expertise

time

ownership/access

inclination

13 How are flood prevention measures inaugurated?

by the group through small-scale initiatives

by the group through multiple interconnected measures

by professionals on behalf of the group

by interest groups on behalf of the group

by government bodies

14 Who is the best person to contact regarding matters arising from this questionnaire?

Name:

Position:

Email:

Telephone:

15 Please provide any additional comments you wish to add.

Many thanks for completing this questionnaire. Your comments are highly valued.

Appendix E – Flood Action Group Semi-Structured Interview Questions

Interview Questions - focusing specifically on the principles of EC, CoPs and social learning as pathways for mobilising local action.

(Items in *italics* are sub-question prompts for me – not sent in advance. They are there to help with direct further questions following the general questions).

1. Management and operations of the group

- How is collaboration facilitated within the flood action group? - *who takes the lead? How do people join?*
- Does the flood action group facilitate group learning around water management and localised flood prevention? *What are the practical outcomes? How to people learn from one another?*
- Does your flood action group promote open dialogue around flooding matters? *How is open dialogue facilitated within the group?*

2. What drives your agenda?

- How important are justice issues such as environmental protection and conservation a concern of the flood action group? *Are the group interested beyond their own local area? How well informed are they on the ‘wider’ picture? How does this fit into their agenda?*
- Does the flood action group acknowledge a sense of responsibility towards flood prevention both as individuals within a group and collectively? How is responsibility for flood prevention fostered?

3. Your chief objectives – what are you seeking to achieve?

- Please could you tell me what your key objective(s) are in your flood action group? *Are these concerned with both flooding as a local concern, or national or global? If not just local how can/do you acknowledge this your group and act upon it?*
- What range of environmental practices does your group promote?

4. Motivations your members to act

- Turning ideas into actions can be difficult – as an ‘action group, can you tell me how you achieve this? *How do you motivate your members to act? What encouragement means do you use?*
- Actions can be representative of communal responsibility – or personal: how does your group view this matter of responsibility? *To what extent is it personal – or rely on group sharing of common responsibilities ?*

5. Sustaining your efforts and existence.

- Does the flood action group promote learning and if so how and why? *Is it through providing a shared environment for communication or/and dialogue, sharing existing knowledge, and introducing collaboration? If so, please define what this entails?*
- How is learning promoted? Is this an individual activity or a group action? Please explain how this is undertaken in the flood action group?
- Does the flood action group encourage private consumer behaviour around flood prevention? Please explain.
- Every volunteers group suffers 'down times' and many groups. To what do you attribute your success in keeping going?

Appendix F – Multi-Case Study Questions

The process of sustainable communication and engagement:

- How did communities of practice in each city understand super wicked problems?
- How was the scale of the issues translated?
- How were local water management processes discussed and understood?
- How were sustainable design solutions developed and communicated within the cases?

Attitudes and Behaviours:

- How were collective attitudes and behaviours acknowledged within the cases?
- How were misperceptions to sustainable water management and flood prevention highlighted in the process?
- How were ecological values altered?
- How was broad Ecological Citizenship (EC) attitudes and behaviours fostered within the cases?
- How permanent were those changes?

Fostering collective motivations and actions:

- How did social learning based Ecological Citizenship (EC) develop collaborative common language and vision within each case?
- How did collaborative active participatory planning undertaken as a social learning process within communities of practice within each case, foster sustainable water management?
- How did context alter the process for each case?
- How did social learning motivate individual responsibility to promote sustainable water management and flood prevention?
- How did social learning shift individual responsibility and promote collective actions within the communities of practice?
- How did social learning processes within each case increase collective action responsibilities and motivations?

Culture changes in Governance promoting both individual responsibility and

Collective Action Responses:

- How did the city-based adaptation plans facilitate LISUD?
- How did consensus planning facilitate the process?

- How was local policy change around water management and urban design with the cases fostered?
- How was governance of water management facilitated?
- How were the citywide climate change adaptation approaches facilitated, top-down, bottom-up or via a combination of the two?

Appendix G – Research Methods Summary

Research Method	Location	Participant Numbers	Responses	Dates	Relevant Details	Data Location
Questionnaires:						
Questionnaire - Pilot	Kenley Residents Association (KENDRA) Core Members	8	8	May 2014	Initial pilot questionnaire to test questionnaire	
Online Questionnaire	Kenley Residents Association (KENDRA) Members	50 - Total membership 1,500	22	May – September 2014	Following initial pilot questionnaire	Chapter 6
Questionnaire	Transition Cambridge	20 – Out of 2000 followers, approximately 1,900 newsletter subscribers	18	2015		Chapter 6
Questionnaire	Salford University	22	22	2017		Chapter 6
Online Questionnaire	Flood Reaction Group Aberaeron	1 – out of 20+ members	1*	2018		Chapter 6
Online Questionnaire	Flood Action Group Crosby on Eden	1 – out of 100+ members	1*	2018		Chapter 6
Online Questionnaire	FLAG – Flooding on the Levels Action Group in Somerset	1 – out of 1000+ members	1*	2018		Chapter 6
Online Questionnaire	Flood Action Group Keswick	1 – out of 20+ members	1*	2018		Chapter 6
Interviews:						
Semi-structured Interview	De Urbanisten	1	1	May 2014	Thematic Analysis undertaken from semi-structured interview transcripts	Chapter 7
Semi-structured Interview	STIPO	1	1	May 2016	Thematic Analysis undertaken from semi-	Chapter 7

					structured interview transcripts	
Semi-structured Interview	Rainproof Amsterdam	1	1	September 2016	Thematic Analysis undertaken from semi-structured interview transcripts	Chapter 7
Semi-structured Interview	SLA Copenhagen	1	1	17 November 2017	Thematic Analysis undertaken from semi-structured interview transcripts	Chapter 7
Semi-structured Interview	Flood Reaction Group Aberaeron	1	1	7 December 2021	Following Online Questionnaire 2018 Thematic Analysis undertaken from semi-structured interview transcripts	
Semi-Structured Interview	Flood Action Group Keswick	2	2	13 December 2021	Following Online Questionnaire 2018 Thematic Analysis undertaken from semi-structured interview transcripts	
Flood Forum Dutch Dialogue:						
Questionnaire	Transition Cambridge & Local Businesses and Residents	30 – From 2000 followers, approximately 1,900 newsletter subscribers from Transition Cambridge	30	July 2016	Following Learning to Stay Dry and Misperceptions, Barriers and Opportunities Focus Groups	Chapter 6
Focus Groups						
Learning to Stay Dry						

Focus Group	Transition Cambridge (comprising professionals, council employees, transition group members and community participants)	2 facilitators and 30 attendees	30	February 2016	Initial focus group	Chapter 6
Misperceptions, Barriers, and Opportunities						
Focus Group	Transition Cambridge (comprising professionals, council employees, transition group members and community participants)	2 facilitators and 6 attendees	6	March 2016	Follow up focus group with select core group for more detailed participation following earlier Learning to Stay Dry Focus Groups	Chapter 6
Case Study Analysis						
Thematic Analysis	Copenhagen	1	1	2017		Chapter 7
Thematic Analysis	Amsterdam	1	1	2016		Chapter 7
Thematic Analysis	Rotterdam	2	2	2014 / 2016		Chapter 7

Note:

*Collective response from Flood Action Groups received as one survey.

Appendix H – Code Book

Code	Description	Example
Awareness of the Issues	Broad code to centralise content related to how participants recognise and acknowledge the issues	‘In the future flood risk will increase’
Management of the issues	Focused on the identification and resolution of issues	‘There appears to be no connection with the management of water’
Typologies of Measure		
Typologies of Measure	A variety of different measures suitable for preventing flooding and promoting sustainable water management	‘Green solution prototypes demonstrate what could be replicated. Every space different, so if replicated, water management systems would need to adapt’
Funding		
Funding	Financial support raised for various measures	‘City deal funds available for the groups to receive funding to assist projects’
Planned action	Participants’ understanding of how a programme of measures undertaken to achieve the goal reduced costs	‘Action before catastrophe saves money’
Funding priorities	Funding priorities determined by needs	‘Areas in need have great potential but limited financial incentive’. ‘Limited money available due to cuts in finance, political change needed to facilitate private organisations, encouraging them to fill gap in funding, promoting bottom-up initiatives’

Private Initiatives	Private firms contracted to complete and manage public initiatives	'Limited money available for sustainable measures from Municipality, focus on private organisations and community groups'
Financial penalties	Obligation to pay a sum imposed by a decision	'Professional organisations receive financial penalties if decisions lead to further other consequences inhibiting action and solution development'
Cutbacks in funding facilitating private organisations	Financial constraints motivating participants' actions	'Politically facilitated change'
Concern		
Concern with the protection of the natural environment	Anxiety around the scale of risks	'It was not only 300 properties that were at risk from flooding, but also around 11,000 from surface water flooding alone. Realisation shocked some people '
Uncertainty	Lack of certainty limiting confidence for participants	'Felt unsure about how the council promoted sustainable measures, how policy assisted those measures being implemented'
Values		
The regard in which something is held	Individual or group beliefs that motivate people to behave one way or another, serving as a guide	'Common values need to be understood to motivate and inspire communities'
Barriers		
Circumstance or obstacle that prevents progress	Aligned to other codes that inhibits action	'Barriers impede ordinary people acting and tackling issues'

Confusion inhibiting understanding	Uncertainty due to a lack of clarity or definition inhibiting participants' understanding	'Many people did not understand the terminologies'
Power denuding responsibility	Top-down system prioritisation of power to select organisations, restricting personal responsibility	'Too much emphasis is currently placed on public agencies and other organisations tackling water issues on behalf of residents and businesses'
Accountability	The process of being accountable for one's own decisions being lost for participants	'Too much emphasis is currently placed on public agencies and other organisations tackling water issues on behalf of residents and businesses at the detriment of people who needed to become responsible for their own space'
Powerlessness	An inability of participants to divert an event that might cause great or sudden damage or suffering	'People feel powerless to action anything that might divert catastrophe'
Reluctance to act	An unwillingness or disinclination to do something	'Ordinary people reluctant to act'
Uncertainty	Participants' limited knowledge where it is impossible to describe exactly the existing state, a future outcome, or more than one possibility	'There appeared to be large gaps in the knowledge by ordinary people which led to uncertainty'
Apathy	A lack of interest or concern by the participants	'If you catastrophise something – climate change as a term, people get angry about the government not doing enough and people justify why they are not doing something about it'
Blame	Responsibility for a fault or wrong misplaced by participants	'People tend to blame incompetence of the government, or their neighbours when facing

		something so large, so big that they cannot understand’
Inflexible structures	Non-flexible structures highlighted by the participants restricting actions	‘Today we have structures and systems that are too inflexible, that we cannot flex. We are needing to become more flexible, to learn to adopt smaller systems, working with communities to become more resilient’
Top-down approaches	The decision-making process for prioritizing measures starting at the highest level and then communicated down	‘All the projects within the Rotterdam adaption plan were top-down – funded and organized by the Municipality and or the Water boards to alleviate the issue. That meant that the focus initially was on water management, which historically had been focused below ground’
Limited accountability	Others not taking responsibility for their choices, or lack of action by participants on things that are critical to the success	‘Environmental regulators are not exercising regulatory or supervisory authority over environmental endeavours including flood prevention measures, instead they act more like partnerships with limited power to act or develop solutions’
Issues tackled differently in different areas	Lack of consistency	‘Environmental issues in different areas tackled differently leading to some areas facing considerably higher environmental risks than others’
Being done good to	False actions inspired by wrong aims that lead to false praise	‘You need to have physical proof that you're not spinning a line and they keep saying that they're working with the community, whereas we're just mostly being done good too’.

Failing to listen	Failure to listen to a warning or a request, or an attempt to change an attitude	'I've almost got to the point where I hope it will happen because I don't think they will listen to us unless there is another one, and that is the absolute tragedy'
Prioritisation of the environment over social reasons.	The action or process of deciding the relative importance of one aspect over another	'The drive is always towards biodiversity. I think the environment can often recover an awful lot faster than a community can, and nobody really takes that into account, do they?'
Motivation		
Self-interest	Personal gain incentivising participants	'Yeah, so that was the start, that was the motivation to do something. Obviously, self-interest played a part as well'
Informing people	Some organisations failure to keep people informed, limiting involvement by the participants	'So, you know you've got the officialdom which doesn't really keep people informed. I suppose the key objective is informing people and keeping people informed and letting them know of things and obviously on the back of that they can then get involved in the bigger fight'
Group Dynamics	Social processes within participants' groups	'I suppose it's group dynamics. I suppose we're all heading there in the same direction'
Flooding	The covering or submerging of normally dry land with a large amount of water that participant's fear	'I think you know the great motivation is going to be the next flood, isn't it? That will be what will motivate them next time'

Reasons for acting or behaving in a certain way	Motivations and behaviours within the participants leading to actions	'Reasons for acting now needed to be better understood to overturn reluctance and apathy'
Consideration of issues	Participants looking attentively at the issues	'Need to consider both flood and drought issues'
Information distribution	How participants share data and information among themselves	'How information was distributed was considered important to prevent alienation and misunderstanding'
Perception	How participants regard, understand or interpret the issues	'Water is now perceived as an enemy, but water is why towns and villages were built where they were built'
Togetherness	Advantages of working alongside and with other people encouraging responsibility	'In essence people take responsibility, not because they like everybody, but because they are looking after the area together'
Cooperation	Advantages of working together to the same end	'We formed and developed systems around cooperation in the area to encourage development'. 'There becomes a willingness for people to take initiatives'
Cutbacks to funding promoted political change	The process for change due to reduction in measures promoting action	'In the Netherlands, cutbacks of the funding process really speed up the process for a bottom-up approach. Government has less money, so a change from main finance to facilitator'
Catalyst for action	Precipitation of events to inspire action within participants	'The flood of the 28th July was the catalyst to inspire action and to release money to research solutions within the Delta programme'

Responsibility enables the community to become equal	The quality or state of being responsible morally, legally or mentally accountability	'Making the community equal, the owner, the tenant, the people who like it here, all members of this club, not just a private club'
Building trust	Developing trust between the participants so that they can work more effectively together	'It is about building trust. Need to find the way to work together, important to take time to feed into the process'
Framing	The act, manner or process of constructing information so that the participants could better understand the causes and issues.	'Communication strategy reframed the causes, issues, and solutions, making them accessible'
Disparity in action over different measures.	The dissimilarity of measures focusing upon one over the other, even though both are a similar risk to the participants.	'You know we're in a no-win situation. You would have thought that people would be more interested in it. And I cannot for the life of me understand why when they're talking about climate change, people get very exercised about drought measures. And nobody is really concentrating on the other side of the climate change coin which is flooding'
Incentivisation	The process of the current risk faced by the community providing incentives to facilitate actions	'We are the communities at risk of flooding, we want to have the water moved somewhere else so that it will be stored, or it just threatens us'
Pooling resources facilitates change	The process of combining more than one person's supply of something	'I'm here because we're in this, we're in a community where there are other people who are community minded with the kind of skills that I've been able to use'
Injustice	An unjust act or occurrence associated with flooding that inspires the participants.	'And we were united by the injustice of it all. I think that's what binds us. it's the need to

		protect this community that we love and the injustice that we suffer from doing it'
Responsibility		
Moral obligation towards or in respect of something	Broad code related to motivations that emphasises the participants' duties in dealing with the issues and or having control of the issues	'People need to become responsible for their own space'
Governance		
Action or manor of governing	Regulation, management, and oversight of issues by participants	'Flood risk is multifactorial. Appointing one person to oversee all the various elements is vital if flooding is to be tackled'
Communities of Practice (CoPs)	Groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly	'We invested in the people, the neighbourhood, the building and public space. We organised a lot of events and associations. In essence people take responsibility, not because they like everybody, but because it helps if you have nice neighbours'
Empowerment	Promoting authority or power within the participants	'We need to empower people to think about water'
Learning		
Learning Strategy	Acquisition of knowledge or skills through study, experience, or being taught	'We need to change the world into a better place through collaboration, showing people what to do'
Discussion	Participants' need for discussion to enable greater understanding	'A discussion would be useful on what more information was needed in order that people could understand the issues and propose

		sustainable solutions, so that they could implement themselves'
Participation	Inclusive process encouraging engagement of participants in moral obligation	'How to engage people, before catastrophe occurs'
Joined-up thinking	Participants' ways of thinking about complicated problems in an intelligent way that includes all the important facts	'More joined-up thinking needed to aid understanding'
Ecological Citizenship		
Ecological Justice	Participants' comprehension that their choices may harm other people so they should strive to compensate for it by acting and living in a more sustainable way	'I can't think what the expression is there. There's some legal term for it, but it's all about, you know, the responsibility that you have to your neighbours as well'
Ecological Care	Enacting justice within the participants - related to ecological matters	'And we were united by the injustice of it all. I think that's what binds us. it's the need to protect this community that we love and the injustice that we suffer from doing it. God knows why it works, but it does'
Consensus planning	Agreement on multiple decisions as part of wider spatial planning amongst participants	'So, it's getting those kinds of people to make a difference and when that chief executive was involved in it, we actually did get to the point in January 2010 where they were agreeing to do a much better release so that they've given us storm space'

Inauguration	Establishment of a system, policy, or period	'Today we have structures and systems that are too inflexible, that we cannot flex. We are needing to become more flexible, to learn to adopt smaller systems, working with communities to become more resilient'
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