



Decentralized Implementation of Flood Resilience Measures – A Blessing or a Curse? Lessons from the Thames Estuary 2100 Plan and the Royal Docks Regeneration

Britta Restemeyer, Margo Van Den Brink & Johan Woltjer

To cite this article: Britta Restemeyer, Margo Van Den Brink & Johan Woltjer (2018): Decentralized Implementation of Flood Resilience Measures – A Blessing or a Curse? Lessons from the Thames Estuary 2100 Plan and the Royal Docks Regeneration, Planning Practice & Research, DOI: [10.1080/02697459.2018.1546918](https://doi.org/10.1080/02697459.2018.1546918)

To link to this article: <https://doi.org/10.1080/02697459.2018.1546918>



© 2018 Informa UK Limited, trading as Taylor & Francis Group



Published online: 26 Nov 2018.



Submit your article to this journal [↗](#)



View Crossmark data [↗](#)

Decentralized Implementation of Flood Resilience Measures – A Blessing or a Curse? Lessons from the Thames Estuary 2100 Plan and the Royal Docks Regeneration

Britta Restemeyer^a, Margo Van Den Brink^a and Johan Woltjer ^b

^aDepartment of Spatial Planning and Environment, University of Groningen, Groningen, The Netherlands;

^bDepartment of Planning and Transport, University of Westminster, London, UK

ABSTRACT

This article presents a case study on the implementation of the Thames Estuary 2100 Plan in the Royal Docks, a regeneration project in the East of London. On paper, the Thames Estuary 2100 Plan advances the shift from traditional flood control to flood resilience, because of its long-term horizon, estuary-wide approach, and emphasis on floodplain management. In practice, however, we identify three frictions between vision and reality: a lack of local ownership of the plan, a lack of clear guidance for floodplain management, and limited capacities with local authority. These frictions suggest an ongoing ‘public-public divide’ in decentralized governance.

KEYWORDS

Flood risk management; spatial planning; decentralization; UK; Thames Estuary 2100 Plan

1. Introduction

The Thames Estuary 2100 Plan (TE2100 Plan) is a novelty in English flood risk management, with its attempt to manage tidal flood risk in the Greater London Region until 2100. In the literature, the plan is praised for its innovative methodological approach, creating an ‘adaptable plan’, using advanced economic analysis methods to evaluate different management options, and pushing forward resilience-building floodplain measures instead of rushing to new engineering works (Jeuken & Reeder, 2011; Ranger and Reeder, n/a; Penning-Rowsell *et al.*, 2013; Lavery and Donovan, 2005). The TE2100 Plan proposes proactive spatial planning to keep flood risk in London low, as the city is expanding into its floodplains (Lavery & Donovan, 2005). While the plan gained much attention from academics and policy-makers during its development phase (from 2002 to 2012), there has not yet been a public or academic evaluation of its actual implementation and usage in practice. Such a ‘reality check’ is important, as there can be a difference between ‘policy-on-paper’ and ‘policy-in-practice’ (Pressman & Wildavsky, 1973; Hupe & Hill, 2016; Nielsen *et al.*, 2013), in particular when an ambiguous term like resilience is involved (White & O’Hare, 2014; Hutter & Kuhlicke, 2013).

The TE2100 Plan is one of the first strategic plans that explicitly aims at fostering flood resilience. As it was developed from 2002 onwards and enacted in 2012, there are potentially many lessons to be learned from its implementation process up to now. The

CONTACT Britta Restemeyer  britta.restemeyer@uol.de

Present affiliation for Britta Restemeyer is Department COAST and the Department of Applied Geography and Environmental Planning, University of Oldenburg, Oldenburg, Germany

© 2018 Informa UK Limited, trading as Taylor & Francis Group

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

importance of a governance perspective on how to successfully implement flood resilience measures has been highlighted before (Driessen *et al.*, 2016), but so far most academic articles specifically deal with the ‘public-private divide’ (Meijerink & Dicke, 2008; Handmer, 2008; Loucks *et al.*, 2008; Mees *et al.*, 2012, 2016). Yet, there is also a recognizable ‘shift within the state’ (Meijerink & Dicke, 2008), from a more centralized organization of flood risk management towards a decentralized organization. So far, this ‘public-public divide’ has received little attention in the flood resilience debate.

The TE2100 Plan is an ideal case study, as there is a general shift in England of devolving responsibilities to the local level with the Localism Act of 2011 (Clarke & Cochrane, 2013; Begg *et al.*, 2015; Eagle *et al.*, 2017). The English context potentially enables the implementation of flood resilience measures, as England has a long-standing tradition of dividing flood risk management responsibilities among a variety of stakeholders, in addition to a discretionary planning system that allows for more flexible and tailor-made approaches (Johnson & Priest, 2008; Wiering *et al.*, 2015; van Den Hurk *et al.*, 2014). By studying the implementation of the TE2100 policies to the case of the London Borough of Newham (LBN) and the Royal Docks, we analyse how, and under what conditions, this strategic plan is implemented at the local level. We will study specifically how devolving governmental responsibilities impact the implementation of flood resilience measures.

For this purpose, the article starts with explaining the flood resilience concept and related implementation challenges. Subsequently, the TE2100 Plan is placed into the context of English flood risk management, discretionary planning and the turn towards localism, discussing to what extent it might enable the implementation of flood resilience measures. After explaining our methodological approach, we present our results regarding the implementation process of flood resilience measures in the Royal Docks. Finally, we draw several lessons from the translation process of the TE2100 Plan, in particular with respect to the difficulties of devolving responsibilities for implementing resilience measures at the local level.

2. Flood Resilience – An Implementation Challenge

Flood risk management is currently undergoing a ‘paradigm shift’ from traditional flood control towards flood resilience. Flood resilience represents a more holistic and risk-based approach in which the integration of spatial planning and water management stands central (White, 2010; Meijerink & Dicke, 2008; Tempels & Hartmann, 2014). The key difference between a traditional flood control and a resilience approach is that there is not merely one single line of protection given by dikes, storm surge barriers, and other flood defence infrastructure but also the hinterland is adapted in such a way that damage is kept to a minimum in case of flooding (Restemeyer *et al.*, 2015). Flood defence measures (such as dikes, dams, and sluices) are complemented with *flood risk prevention* (e.g. keeping vulnerable land-uses out of flood-prone areas, make more space for water), *flood risk mitigation* (adaptations to the built environment, e.g. flood-proofing houses), *flood preparation and response* (e.g. flood warning systems and evacuation plans), and *flood recovery* measures (e.g. flood insurance, reconstruction and rebuilding) (Hegger *et al.*, 2016; Driessen *et al.*, 2016).

The reasons for focusing on resilience are manifold. A traditional flood defence approach is generally considered to have increased vulnerabilities in cities and regions by creating a ‘false sense of security’ and ecological losses (Plate, 2001; Wesselink *et al.*, 2007; Giosan *et al.*, 2014). A resilience approach, on the contrary, promises more safety (as the hinterland is adapted to flooding), better environmental effects (because of more natural estuarine dynamics, river restoration, and an increase in wetlands), and improved spatial quality (because water is integrated into urban/landscape design) (White, 2010; Vis *et al.*, 2003, Hooijer *et al.*, 2004; Liao, 2014). Intrinsic to a flood resilience approach is the ability to deal with the dynamics of society and nature by learning ‘to live with water’ instead of ‘fighting against the water’ (Restemeyer *et al.*, 2015).

In practice, however, flood resilience faces several implementation challenges. For the implementation of the TE2100 Plan, ‘multi-level’ and ‘multi-actor’ governance challenges are most relevant, or, in other words, the need for bridging the ‘public-private divide’ as well as the ‘public-public divide’. This is because the plan was mainly developed by a small group of people working at a more strategic level of the Environment Agency (EA), while its implementation depends on multiple actors on multiple levels (TE2100 Plan, EA, 2014 (see Appendix A)).

The ‘public-private divide’ refers to the multitude of public and private actors that need to be involved in implementing flood resilience measures (Begg *et al.*, 2011; Kuhlicke & Steinführer, 2010; Nye *et al.*, 2011; Restemeyer *et al.*, 2015). The diversification of flood risk management measures does not only ask for a broadening of disciplines involved in flood risk management (e.g. water management, spatial planning, ecology, disaster management) but also the need to involve private stakeholders. Some flood resilience measures (e.g. flood-proofing individual houses) can only be implemented, or be effective, when citizens, developers and house-owners are aware of flood risk, and are also capable and willing to take precautionary measures. Flood-proofing individual houses, for example, can only be done together with developers and home-owners due to property rights. Flood warnings and evacuation plans, on the other hand, only work when citizens in flood-prone areas know what to do and where to go in case of an emergency.

The ‘public-public divide’ refers to the several departments as well as multiple levels of government and governance that are involved in implementing flood resilience measures (Pahl-Wostl, 2009; Armitage, 2008). While the traditional flood control approach was mainly organized at a central level, flood resilience asks for a balance of large-scale flood defence infrastructure (usually organized centrally) and more tailor-made flood risk management measures (e.g. risk communication, adaptations to individual houses and buildings, evacuation plans) organized at a regional and local level. Consequently, there is a trend in flood risk management towards decentralization, i.e. a devolution of responsibilities to the local level (Meijerink & Dicke, 2008; Begg *et al.*, 2015; Davoudi & Madanipour, 2015). On the one hand, decentralization is necessary for more locally tailor-made approaches (Begg *et al.*, 2015; Wachinger *et al.*, 2013; Walker *et al.*, 2010). On the other hand, this trend also bears the risk that responsibilities are devolved to the local level without providing sufficient central support and guidance (Eagle *et al.*, 2017; Begg *et al.*, 2015; Clarke & Cochrane, 2013). Davoudi (2016) and Davoudi and Madanipour (2015) have also criticized this decentralization trend in the

UK, stating that resilience is often used to mask hidden neoliberal agendas, which lead to budget cuts and an overburdening of the local level.

The growing multiplicity in actors and levels in flood risk management makes decision-making less straightforward and increasingly complex. Different actors often have diverging interests, and it might not necessarily be evident for these actors why a resilience strategy is actually beneficial for them. For many actors, the move towards flood resilience might actually imply more responsibilities and more costs than before. That bears the risk that there is a gap between policy rhetorics and the reality of flood risk management and urban design practice (Clarke, 2015; White & O'Hare, 2014; Meijerink & Dicke, 2008). In the policy implementation literature, this gap has been framed as the discrepancy between 'policy-on-paper' and 'policy-in-practice' (Hupe & Hill, 2016), leading to the goal to 'understand, explain and address problems associated with translating explicit and implicit intentions into desired changes' (Nilsen *et al.*, 2013, p. 4).

In this article, we attempt to understand the conditions and contextual circumstances associated with the decentralization of flood resilience measures. According to Begg *et al.* (2015) and Zuidema (2017), decentralization can only work under two conditions. First, there needs to be sufficient central guidance and support, for example, in form of guidelines, regulations, funding, and expertise. Second, there needs to be local ability (knowledge, resources, and staff) as well as local willingness to implement flood resilience measures. Moreover, the division of responsibilities needs to be clear. These conditions are highly dependent on contextual circumstances, which can vary significantly per country (Meijerink & Dicke, 2008). The next section will, therefore, elaborate on the circumstances in England, in particular how spatial planning and flood risk management is organized, and how these relate to the recent 'localist turn'.

3. The English Context – Enabling the Implementation of Flood Resilience Measures?

The English context of flood risk management, spatial planning and, more recently, the turn towards localism can be seen as advantageous for flood resilience for several reasons. It 1) has adopted a diverse set of flood risk management measures, with land use planning as a key tool, 2) holds long-standing experience with a plurality of actors, in which responsibilities are divided among the state, market and individuals, and 3) offers the possibility for locally tailor-made solutions. We will explain these points below.

The diversity of English flood risk management measures can be explained with the development of three phases over the last century from 'land drainage' (until the 1970s) to 'urban flood defence' (until the 1990s) to 'integrated flood risk management' (from mid-1990s onwards) (Tunstall *et al.*, 2004; Johnson & Priest, 2008; Haughton *et al.*, 2015; Wiering *et al.*, 2015). The main emphasis on structural flood defences during the first phase has been gradually complemented with other, non-structural measures (Tunstall *et al.*, 2004; Johnson & Priest, 2008). During the second phase, flood warning systems and flood alleviation schemes (insurance) as well as 'softer engineering approaches' like floodplain rehabilitation and flood storage areas came up (Tunstall *et al.*, 2004; Wiering *et al.*, 2015). During the third phase then, land use planning and

development control for flood risk areas became a key tool to reduce flood impacts (Tunstall *et al.*, 2004). Today, the British are particularly known for their advanced systematic approach of taking flood risk into account in spatial development processes, first articulated in 2001 as Planning Policy Guidance. In 2006, it was further developed into Planning Policy Statement 25, which is nowadays part of the National Planning and Policy Framework (NPPF) (Wiering *et al.*, 2015; van den Hurk *et al.*, 2014). It is a detailed policy instrument to restrict development in floodplains. It also introduces the ‘sequential test’ as well as ‘exceptions test’. The sequential test prohibits certain land uses in flood-prone areas. Development may only be allowed (under the exceptions test) when no alternative sites are available and certain conditions are met (e.g. flood-proofing of buildings).

The reality of a plurality of actors has emerged from the diversity of measures as well as the fact that in England flood protection is not a statutory duty (Wiering *et al.*, 2015). Flood risk management responsibilities are spread among state actors, market parties, and individuals. State actors include central government (i.e. Department for the Environment, Food and Rural Affairs (DEFRA), Department for Communities and Local Governments (DCLG), the Treasury) and the operating authorities (e.g. EA, Regional Flood and Coastal Committees (RFCCs),¹ local authorities), with the central government making policies and providing funding, but for the rest taking an ‘hands-off approach’ and making operating authorities responsible for delivering government policy (Johnson & Priest, 2008). Market parties involved include insurance companies, developers, and architects. Individuals are involved through ‘riparian landownership’ (riverside-based landowners have certain rights and duties, e.g. responsibility for flood protection), ‘property-level protection’ (individuals can apply for DEFRA funding to install flood protection to their homes), and the widespread uptake of insurances (Johnson & Priest, 2008).

The room for locally tailor-made approaches is intrinsic to the English system, as there are no standardized minimum flood protection levels. Flood defence standards and state funding for flood defences depend on cost-benefit-analyses and are, therefore, always context- and case-specific (Wiering *et al.*, 2015; Begg *et al.*, 2015). Additional room for local approaches is created with the recent ‘localist turn’ (Eagle *et al.*, 2017, p. 59). The Flood and Water Management Act (2010) makes Lead Local Flood Authorities (LLFA) – like the London Borough of Newham – responsible for managing local flood risk from surface water, groundwater, and ordinary watercourses, asking them to develop Local Flood Risk Management Strategies. Local authorities and private local actors have recently been given even more responsibilities (Begg *et al.*, 2015; Eagle *et al.*, 2017; Clarke & Cochrane, 2013). Examples include the National Flood and Coastal Erosion Risk Management Strategy (EA & DEFRA, 2011), which pushed for a partnership approach in flood management funding, and the Localism Act (2011), which abolished the regional tier in spatial planning. Ideally, these responsibilities enable local authorities to address local problems and create more democratic and fit-for-purpose solutions (Begg *et al.*, 2015).

However, the English system also has certain characteristics that might make the implementation of flood resilience measures rather difficult. England’s political system can be characterized as one of national guidance and local discretion. Decisions are based on negotiation instead of legally binding land-use plans (Cullingworth *et al.*, 2014; Campbell *et al.*, 2000; Janssen-Jansen & Woltjer, 2010). Flood risk management is

politicized at the local level with the possibility that local matters might be higher on the agenda than high-cost, long-term flood risk measures. Moreover, the plurality of actors has led to a highly complex policy arena, coined 'the most disconnected water management system in the world' with an unclear division of responsibilities (House of Commons, 2015, p. 6).

The 'localist turn' can also be considered a saving measure instead of a turn towards more accountability and democracy (Clarke & Cochrane, 2013; Begg *et al.*, 2015; Eagle *et al.*, 2017). The workability of the partnership approach to flooding can be questioned (House of Commons, 2015), in particular in light of recent austerity policies in local authorities in the aftermath of the financial crisis (Davoudi & Madanipour, 2015). Overall, much responsibility lies with the local level, where the two conditions mentioned in section 2 – resources and motivation – do not always exist. A case-specific evaluation is necessary, which we will now do by turning to the implementation of the TE2100 policies in the Royal Docks case.

4. Analysing the Implementation of the TE2100 Plan in Newham and the Royal Docks

4.1. The Case

The goal of the TE2100 Plan is to manage tidal floods in a holistic way, integrating flood risk management, spatial planning, public awareness-raising, and disaster management (Lavery & Donovan, 2005). The plan is not statutory, but a long-term flood risk management strategy. Its approach of managing tidal floods in the Thames Estuary until 2100 was officially approved by the government in 2012. Investments in flood defence infrastructure are secured for 10 years. Most of the plan's strategic intentions, however, depend on voluntary implementation, which makes coalition-building with mostly local authorities crucial. The TE2100 Plan is, therefore, a typical example of a strategic plan in the UK (Janssen-Jansen & Woltjer, 2010).

One of the triggers for the TE2100 Plan was the prospect of the Thames Gateway, a regeneration initiative aimed at providing 110,000 new houses and 225,000 new jobs within the Thames floodplain (Lavery & Donovan, 2005; Thames Gateway Delivery Plan, 2009 (see Appendix A)). Part of this regeneration initiative is taking place in the London Borough of Newham, especially in the Royal Docks situated at the river Thames. Redevelopment has started, but most of the regeneration work is scheduled until 2027. Taking flood risk into account is a necessity, as the area is prone to tidal as well as pluvial flooding (see Figure 1). The Royal Docks form a 'bath tub', with much of the area lying low and the Thames river frontage as well as the docks on higher grounds. In case of a breach of the flood defences, the area would be flooded quickly (and severely). Flood defences are in place, currently providing a protection standard of 1:1000.

The Royal Docks are one of 38 opportunity areas in the London Plan (2015 (see Appendix A)). The London Plan (2015) sets out the goal to develop at least 6,000 new jobs and 11,000 new homes in the Royal Docks. As the area is of strategic importance to London, the Mayor of London and the GLA (Greater London Authority) are directly involved in the regeneration process, making it a multi-level governance case. For the Mayor of London and the GLA, the Royal Docks is an opportunity area to improve employment capacity and build new residential houses. The latter is needed, because London suffers from an enormous housing shortage.

According to a housing supply analysis, 50,000–60,000 new homes per year need to be built to meet London's housing demand (Quod and Shelter, 2016). For Newham specifically, it is also a chance to improve its reputation, as it is one of the most deprived Inner London boroughs (Aldridge *et al.*, 2015).

4.2. Methodology

We used three methods to study the implementation of the TE2100 Plan in Newham and the Royal Docks regeneration, namely policy document analysis, expert interviews and participatory observation. The purpose of the policy document analysis was to identify the official intentions of the TE2100 Plan concerning flood risk management and new spatial developments, the communication of the plan to the boroughs, and the interpretation of the plan in Newham and the Royal Docks redevelopment. We analysed three types of policy documents (see Table, [Appendix A](#)). First, strategic documents concerning future spatial developments and tidal flood risk management on a strategic level, including, for example, the TE2100 Plan and the London Plan. Second, implementation and guidance documents, such as the 'TE2100 Local Council Briefing Documents' published by the Environment Agency (EA) in 2015, in which the Environment Agency explains the implications of the TE2100 Plan for each London borough. Third, local documents concerning Newham, such as Newham's core strategy and Newham's Strategic Flood Risk Assessment (SFRA), as well as the Royal Docks redevelopment. For the latter, we also made use of Newham's public access website to search for specific planning applications and the flood risk advice given by the EA.

Supplementary to the document analysis, the expert interviews helped us to understand the perceptions of people directly involved in the process of making and translating the plan. For this purpose, we interviewed 13 key policy agents, stakeholders, and experts. They were involved in either the development or the implementation of the TE2100 Plan at a strategic or local level (see [Table 1](#)). We spoke to individuals from state authorities (EA, GLA, LBN) as well as private stakeholders (the main consultant involved in TE2100 Plan development, a developer and an architect involved in Royal Docks regeneration). Participatory observation gave us direct insights in the communication process between the EA and the London boroughs, as we attended a workshop organized by the EA in July 2015, observing how the EA explained the implications of the TE2100 Plan to the local boroughs of London and how the boroughs reacted to the plan's implications.

We analysed the data in two steps. First, we coded the 'policy-on-paper' and the 'central guidance and support' for implementation. We were looking for the TE2100 intentions for the Royal Docks redevelopment as well as the regulations, funding, advice and expertise offered by DEFRA, GLA, and EA. Second, we coded 'policy-in-practice' with a particular focus on the 'local ability' (staff, resources, knowledge) and 'local willingness' (motivation, incentives) among LBN, developers and architects to implement flood resilience measures. Additionally, we paid attention to the division of responsibilities and if it was clear to the involved stakeholders.

Table 1. Overview of interviewees.

Interviewee	Interviewee's background	Date
Initiator of TE2100 Plan (EA)	Initiator of TE2100 Plan, key person during development of TE2100 Plan	2014-03-05
Main advisor (consultancy firm)	Main consultant of TE2100 Plan, key person during development of TE2100 Plan	2015-05-22
Principal Programme Manager (GLA)	Regularly consulted during development of TE2100 Plan	2014-03-10
Director of the Thames Estuary Asset Management Programme (EA)	Responsible for asset management of the TE2100 Plan	2015-05-19
TE2100 Senior Advisor for Floodplain Management (EA)	Responsible for floodplain management of the TE2100 Plan	2015-05-19
Development Manager in the Housing & Land Directorate (GLA)	GLA representative working on the Royal Docks project, regulator of social housing providers in London	2014-05-29
Strategy Manager for climate change adaptation and water (GLA)	Responsible for increasing London's resilience to extreme weather and climate change	2014-05-29
Planning Advisor (EA)	Working at EA, advising the London Boroughs on planning implications of the TE2100 Plan	2015-05-19
Architect (Associate Director at architectural firm)	Lead architect on proposed residential redevelopment scheme of the Royal Docks	2014-05-27
Senior Project Manager (housing corporation)	Responsible for taking the proposed residential development scheme through the planning process	2014-05-23
Planning Officer (London Borough of Newham)	Responsible for spatial planning in London Borough of Newham	2014-05-29
Environmental Control Officer (London Borough of Newham)	Working on Newham's responsibilities as a Local Lead Flood Authority (LLFA)	2015-05-27
Policy Officer (London Borough of Newham)	Working on Newham's policies	2015-07-15

5. The TE2100 Plan and Newham's Royal Docks Development

This section presents our results regarding the TE2100 implementation in Newham's Royal Docks redevelopment. [Section 5.1](#) introduces the 'policy-on-paper', i.e. the intentions and guidance in the TE2100 Plan. [Sections 5.2–5.4](#) describe the 'policy-in-practice', with a focus on the perceived central guidance and support as well as the local ability and willingness.

5.1. The TE2100 Vision for the Royal Docks and Implementation Guidance

The TE2100 Plan considers the extensive regeneration plan of the Royal Docks policy unit as an opportunity 'to improve flood risk management arrangements, including floodplain management, to achieve safer floodplains, and defences that enhance the riverfront environment' (p. 124). The main intentions of the TE2100 Plan and the implementation guidance offered in the Local Council Briefing for Newham are summarized in [Table 2](#). In general, the vision for the Royal Docks comprises 'three pillars' of flood risk management measures (TE2100 Plan):

- Maintain and improve flood defences, and integrate them into future development wherever possible
- Ensure that new developments in the tidal flood plain are safe to reduce the consequences of flooding
- Raise public awareness to facilitate emergency planning and response.

Table 2. TE2100 intentions and guidance for implementation as presented in the TE2100 plan and local council briefing for Newham.

TE2100 Plan intentions	Implications and guidance presented in Local Council Briefing	Assigned 'implementation partners'
1) Maintain, enhance or replace existing flood defences, and integrate them into new developments wherever possible	<ul style="list-style-type: none"> ● Implement maintenance works (ongoing) and major improvements to flood risk management system (between 2050 and 2070)^a (funding guaranteed) ● Safeguard land for improvement works (a width of about 10m along the Thames) ● Incorporate the concept of 'riverside strategies' into local plans, strategies and guidance documents (guidance provided during EA workshop) 	<ul style="list-style-type: none"> ● RFCCs ● Local authority planning teams ● Landowners ● Developers
2) Ensure that new developments in the tidal flood plain are safe	<ul style="list-style-type: none"> ● Agree on partnership arrangements and principles ● Apply NPPF where possible to reduce consequences of flooding ● Take TE2100 information to revise SFRA and flood plans 	<ul style="list-style-type: none"> ● GLA ● Local authorities' spatial and emergency planners ● Developers ● Architects
3) Raise public awareness to facilitate emergency planning and response	<ul style="list-style-type: none"> ● Agree on partnership arrangements and a programme for floodplain management 	<p><i>For floodplain management programme:</i></p> <ul style="list-style-type: none"> ● RFCCs ● LB Greenwich, LB Tower Hamlets and LB Newham ● Local Resilience Fora ● Transport for London ● Canary Wharf Group ● EDF Energy ● Managers/owners of vulnerable sites

^aRaise downriver defences in about 2070 by 1.1m if Thames Barrier is improved and no new barrier is built; raise upstream defences by up to 0.5m in 2065, and an additional 0.5m by 2100.

For all actions, the EA stresses that they 'cannot implement the TE2100 Plan alone', but that 'it will require a multi-agency approach', in which local authorities 'play a key part in delivering our recommendations for spatial and emergency planning procedures' (TE2100 Plan, p. 41). Accordingly, the TE2100 Plan lists 'implementation partners' for each recommended action, comprising public (e.g. GLA, local authorities) as well as private actors (landowners, developers, architects) (see Table 2).

Strikingly, there is a gradient in terms of the provided implementation guidance; with much guidance provided for the first pillar and little guidance provided for the last pillar. The first two pillars are explicitly included in the Local Borough Briefing handed out by the EA in July 2015. For the first pillar, there are concrete estimates for raising the flood defences (0.5m until 2065 and 1m until 2100) and safeguarding land to enable these maintenance works (about 10 m width of land close to the riverside). Moreover, the EA proposed so-called 'riverside strategies' – a proposal to better embed flood defences into the spatial surrounding by realigning the flood defences and thereby improving public amenity. The concept of riverside strategies has been visualized in the

Local Council Briefings, suggesting riverside walks and terraces, which can be used during low tide, but are flooded during high tide.

For the second pillar, the TE2100 Plan refers to the existing regulatory framework NPPF, with the request to apply it wherever possible, and existing plans like the SFRA, in which TE2100 data shall be incorporated to have a better knowledge base. The third pillar – raising public awareness – is largely missing or only implicitly incorporated in ‘a programme for floodplain management’. Implementation partners are only named for the floodplain management programme, not explicitly for public awareness-raising. Although ‘community engagement programmes’ are advised ‘to ensure the public, businesses and other groups understand, are involved in and supportive of flood plans’ (TE2100 Plan, p. 125).

The only explicit funding programme linked to the implementation of the TE2100 plan is the Thames Estuary Asset Management 2100 programme (TEAM2100), which was established to deliver the proposed flood defence works of the TE2100 Plan. TEAM2100 is the EA’s ‘single largest flood risk management programme’ and ‘one of the government’s top 40 infrastructure projects’, securing 300 million pounds for tidal flood defence works in the Thames Estuary for the next 10 years (source: TEAM2100 brochure by EA). In line with recent austerity policies (see [section 3](#)), efficiency is a key goal of the programme. The programme aims at ‘delivering greater value for public money through innovation, greater collaboration with the supply chain, optimised asset and programme management’, and thereby wants to achieve a 25% saving over 10 years compared to previous capital programmes for the Thames Estuary (source: TEAM2100 brochure by EA). Other implementation measures are largely dependent on existing funding arrangements from DEFRA. The Local Council Briefings explicitly stress the partnership approach to flood defences: local authorities and ‘riparian landowners’ are expected to take costs for flood embankment works into account.

The following section presents for each ‘pillar’ how the TE2100 Plan intentions are put into practice. We particularly focus on the perceived roles and responsibilities of the stakeholders, and the conditions and contextual circumstances under which the implementation is taking place.

5.2. Flood Defences and Riverside Strategies: Fragmented Responsibilities and a Funding Issue

Although there are some successful examples of integrating flood defences into spatial developments at the riverside in central London (e.g. Millenium Dome, City Hall and Tate Modern on the south bank of the Thames), the implementation of riverside strategies faces several difficulties in practice. One of the main reasons is funding; the TEAM2100 funding is only reserved for tidal defences, not for improving the appearance of the river frontage. Riverside strategies were supposed to be realized with partnership funding from the local authorities and developers. However, local authorities often lack financial resources. As the consultant explained:

‘the plans were made when Britain was very buoyant, when local authorities were very buoyant (...), but when the crash came in 2009 [Europe’s financial crisis], local authorities had no money, they haven’t got the money to do riverside strategies’.

Newham has also suffered from significant budget cuts over the years. Since 2011, annual funding has been cut by 39% (£97m in absolute terms), and from 2016 to 2020 they are facing further reductions of 22.5% per year (London Borough of Newham Efficiency Plan, 2016–2020). That makes Newham one of the three boroughs with the highest budget cuts in London for both funding periods (London’s Poverty Profile, 2014; The Guardian, 2015).

During the EA workshop, one borough representative also wondered who would be paying for the extra maintenance efforts of riverside terraces compared to usual flood walls, thereby making clear that local authorities are less inclined to realize riverside strategies, if that increases their costs.

An additional issue is that the EA depends on local planning authorities to safeguard the land close to the riverside, which makes the riverside strategies subject to the discretionary planning system of the UK. In the local council briefings, the EA asked the local councils to incorporate the idea of riverside strategies into their strategic plans such as local plans, strategies, and guidance documents. For local authorities, however, flood risk is just one concern among many others. Particularly in a growing city like London (see Section 4), where space is scarce, keeping ‘the most attractive parcels’ close to the river free of any development is difficult (borough representative during EA workshop).

During the workshop, local authorities named ‘lacking political buy-in’ as the prime reason for not yet having incorporated the concept of riverside strategies into their local plans. The EA Planning Advisor confirmed this: ‘From a planning point of view, my personal experiences with local authorities are completely fine (...), but I think targeting higher up politically is difficult.’ At the workshop, a borough representative elaborated that flood risk as a long-term concern does not match with the politicians’ short election period of four years, as flood risk would not be a ‘sexy’ enough topic to win the next election.

For Newham and the Royal Docks, the TE2100 Plan (p. 124) suggested that ‘the extent of expected future development (...) provides opportunities to modify the layout of the flood defences and integrate them into new developments wherever possible’, thereby enriching the river frontage in its appearance, environmental diversity, and public amenity opportunities. In most cases, however, the flood defences are perceived to suffice for the moment, so that the EA only asked for keeping space free for future maintenance and improvement of the defences. As the Planning Advisor from the EA said, ‘we didn’t feel it was necessary to insist that any of the major developments raise our flood defences, apart from Minoco Wharf’. The Minoco Wharf development is the only case identified where the developer was asked to conduct flood wall replacement works, and where the riverside strategy concept was applied.

In general, however, there is a lack of clear guidance on the usage of the riverside strategy concept. Newham, for example, has not yet incorporated it into their local plan. Besides, it sounds like a missed opportunity not to raise the defences and incorporate them into a riverside strategy concept at the moment, when new developments take place. Once the development has taken place, it will be difficult to adapt the landscape in future. According to the main consultant the limited uptake of riverside strategies also has to do with a loss of leadership and vision: ‘I think the biggest disaster for the whole thing was when the project manager left, because she had the vision and she had the capability.’

Overall, maintaining and improving flood defences is secured with the TEAM2100 programme for the next 10 years, but the incorporation of riverside strategies is

hampered due to fragmented responsibilities, diverging stakeholder interests, and the question who would eventually pay for the implementation as well as the maintenance of riverside walks and terraces.

5.3. Flood-Proofing New Developments: 'Watering Down' Regulations

The second pillar is mainly about the usage of land use planning and the regulatory framework NPPF for integrating flood risk into development and building decisions (see 5.1).

Overall, our interviewees' perception is that the integration of spatial planning and flood risk management has improved considerably over the last years, and that nowadays the regulations from the NPPF are well-followed. The NPPF regulations are also broadly accepted among private developers. The consultant stated that 'developers are recognizing that flooding is a design criterion for buildings', also recognized by the developer from the housing corporation in the Royal Docks: 'We are building next to the Thames so I think it is only fair that any responsible developer building in areas that are prone to flooding, or potentially prone to flooding, have to take measures to allow for that'.

In the case of the Royal Docks, where most of the new developments lie in flood risk zone 3, development can only be allowed when the sequential and exceptions test have been passed. When it is not possible to find another location for the development (sequential test), development can only be allowed under the exceptions test. Newham's SFRA gives a first assessment for some of the development sites in the Royal Docks (e.g. Silvertown quays and Royal Albert Basin). According to the SFRA, the compliance of these developments with the exceptions test is 'subject to appropriate design and agreeing emergency arrangements'. One of the criteria for appropriate design is to have 'less vulnerable uses' (e.g. parking) on ground floor level and 'more vulnerable uses' (e.g. residential) above the 1 in 200 year breach levels.

However, these general regulations changed throughout the redevelopment process of the Royal Docks. Architects involved in the development of the Great Eastern Quays (located in the Royal Albert Basin, see [Figure 1](#)) explained that during the first phase of the development, the EA prohibited habitable space on the ground floor level. Later on, in a second phase, the EA dismissed this regulation and only required that every residential unit has a 'safe egress route' above flood levels and preferably no sleeping accommodation on the ground floor level. Similar evidence can be found for Minoco Wharf (located in West Silvertown, see [Figure 1](#)). In a letter to the London Borough of Newham (EA, 2014), the EA officer wrote: 'we now do not consider the finished floor levels of the development to be critical as long as an appropriate emergency plan is in place to ensure that residents and site users will remain safe during a flood event'. Thus, common regulations for building in flood-prone areas were 'watered down'. Several reasons for this change were mentioned by our interviewees.

The architect considered the improved maintenance works of the tidal flood defences as the main reason: 'they're now maintaining them more often, and they've now put site risk as residual, which means it's a much better condition for being able to build things.' The Planning Advisor from the EA mentioned the urge for development as a reason: 'we don't insist on threshold levels being set above that depth because realistically that would just prohibit any development in that area by asking them to raise all buildings by seven meters'.

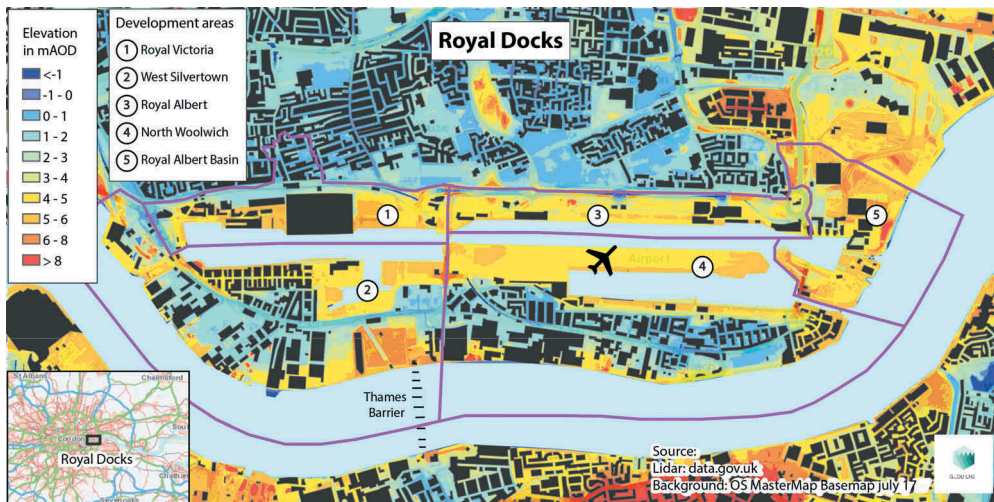


Figure 1. The Royal Docks – development areas and potential flood depths.

Moreover, he stated that they insist upon an evacuation or refuge strategy, but that ‘anything extra in terms of building resilience is a bonus really’.

Another reason is that there are already existing residential houses in the Royal Docks, terrace houses, which do have habitable ground floor space. In fact, most of the existing residential houses lie in the deepest areas of the Royal Docks (North Woolwich), which makes them extremely vulnerable in case of a flood breach (see Figures 1 and 2). The Development Manager from the GLA raised the point of equity: ‘So it seems a miss to start placing developments, you know, a story or half a story higher than the ground treatment of any other neighbouring premises. Cause it sort of creates the situation of them and us.’ In response to this, the strategic flood risk manager from the GLA said:

‘I do not think if we are building new developments in, you should put in any more residential on the ground floor, even if you are contrasting the new and the existing development, you are just putting more people at risk.’

For now, existing residential houses are not yet targeted. Confronted with this, the EA Planning Advisor stated that they do not have any mechanism in place to also flood-proof the existing houses.

Overall, the abovementioned quotes show a strong reliance on the existing flood defences, whereas flood-proofing new developments is only partly realized. With this strategy, spatial planning is not fully used to lower the potential impact of flooding. Actually, relying on evacuation and egress routes makes risk communication and awareness-raising among the residents even more important, so that they know what to do in case of an emergency and that they should not use the downstairs room as sleeping accommodation. To what extent residents are targeted with specific awareness raising programmes is addressed in the following section.



Figure 2. Existing houses in North Woolwich.

5.4. Raising Public Awareness: Unclear Responsibilities and No Issue for a Deprived Borough

The responsibility for raising public awareness is not clarified in the TE2100 Plan (see [section 5.1](#)). In practice, this leads to a situation in which no one considers it to be their responsibility.

The GLA emphasized that they carried out two pilot studies on community engagement programmes in London (in Purley and in Redbridge), and shared their experiences with the boroughs. In the case of the Royal Docks, however, the strategic flood risk manager from the GLA pointed to the responsibilities of the local borough for surface water and the EA's responsibility for tidal and river flooding, stating that 'it is about these two working together'. The Planning Advisor of the EA, however, did not see an own responsibility. Instead, he considered it the responsibility of the local borough (as the responsible authority for emergency planning) together with the developer. He explained that the developer, as they are fully aware of the flood risk, would be responsible 'for putting up notices to inform future residents'. Also in the opinion of Newham's planning officer risk communication 'is up to the developer and the estate agents at the end of the day'. Confronted with this, the representative of a housing corporation, as a developer in the area, explained that every new resident receives 'quite a lot of information about the scheme [...] and I imagine an element of

that will contain some information about the flood risk. But at the same time it's... we don't want to scare people away.'

This shows that ambiguous responsibilities lead to finger-pointing. Eventually, risk communication is supposed to be carried out by a private stakeholder whose own interests contradict with communicating flood risks. Therefore, it is questionable how thorough developers will fulfil this role, in particular because there is no one controlling their risk communication actions.

The Local Flood Risk Management Strategy from Newham (draft version from Sep 2015) makes risk communication and emergency response an issue, but mainly points to existing documents and institutions. For example, the SFRA, which should inform communities and businesses, the general EA and MET Office flood warnings, and the multi-agency flood plan developed by Newham's Resilience and Emergency team in partnership with external agencies such as the Metropolitan Police, the Fire Brigade and the EA. The Local Flood Risk Management Strategy (p. 46) does not give the impression that immediate action is going to be taken; it only states: 'Where specific communities are at a significant residual risk of flooding, the development of Community Flood Plans should be promoted, as well as the development and exercising of business continuity and emergency plans'. Again, it is not made explicit who should do this where and when.

The policy officer from Newham also made clear that it is difficult to engage with citizens in the borough due to Newham's deprived standing and a lack of a participation culture. When she tried to engage with people about Newham's local plan (not specifically about flood risk), she received 'hardly any feedback'. Moreover, the policy officer explained that 'flooding has not yet come up as a topic among councillors'. Among politicians, "green stuff" like recycling and flood risk are more considered a topic for white, upper middle-class boroughs', not for a deprived borough like Newham. For flood risk, a particular challenge is that Newham has barely any house ownership and much fluctuation.

6. Reflection and Conclusions

This article started out with problematizing the implementation challenge of flood resilience, in particular the 'public-private' and 'public-public divide' in decentralized governance. Although there are many reasons for adopting a flood resilience approach, finding a balance between large-scale infrastructure and locally tailor-made is difficult. Especially because it involves multiple levels and raises questions about the degree of centralization and decentralization and the best responsibility division. The TE2100 Plan, as an early adopter of the flood resilience concept, is a prime example of such a governance challenge.

6.1. In Sum: The TE2100 Implementation in the Royal Docks – Friction between Vision and Reality

The case of the TE2100 Plan and its implementation in the Royal Docks redevelopment represents a friction between vision and reality. This friction can be explained by considering three underlying reasons.

First, there is a *lack of commitment and ownership* on both levels, strategic as well as local. On the strategic level, EA and GLA are the main actors. However, within the EA ownership of the plan faded since the team that developed the TE2100 Plan left and a new implementation team was installed. Losing the project leader also meant a loss of vision and leadership, which could have been beneficial to make the plan more visible. Also the nature of the plan as a long-term strategic vision does not seem to help; a plan that spans over 100 years seems to be less pressing in the short term. The local level does not have a sense of ownership, as the boroughs were hardly involved in the development of the plan, although they are a crucial implementation partner.

Second, the *provision of central guidance and support varied significantly* between tidal flood defences and the 'floodplain management side' (i.e. land use and emergency planning measures). While there is clear guidance and a specific funding programme for tidal flood defences (i.e. TEAM2100), floodplain management (i.e. land use and emergency planning measures) has less clear and binding instructions as well as funding schemes. The adoption of riverside strategies is voluntarily, which makes it part of discretionary planning practice. This position is particularly problematic in a context of urban growth, where the profits of development in the short term easily outweigh the long-term profits of flood protection. Because of this context and the residual nature of flood risk in the Royal Docks, the regulations of the NPPF were watered down, as shown for the development conditions in the Royal Docks. Strikingly, the watering down began on the central level, while developers and architects were actually expecting stricter rules. Public awareness-raising was not clearly defined as a responsibility in the TE2100 Plan. In practice, this led to a situation of finger-pointing, with the developers being at the end of the line, although they are an actor with diverging interests.

Third, *local ability and local willingness are limited*. The Borough of Newham has undergone many restructurings over the last years due to changes in legislation and austerity policies. Although there is funding from DEFRA for the responsibilities as LLFA, restructuring in this sector also implies new routines and expertise. This is difficult in the current situation of the borough, in which budget cuts lead to a reduction of staff as well as resources for training. Willingness seems to be influenced from two sides, though. On the one hand, flood risk is not yet a topic in local politics which makes it difficult to put flood risk on the agenda. On the other hand, Newham's deprived standing and constantly changing demography has resulted in a problematic participation culture, which generally makes it difficult to engage with citizens.

Another point of concern is that the problems in existing neighbourhoods are not yet addressed at all. This creates new inequalities between existing neighbourhoods and new developments, which are usually built slightly higher and with evacuation routes. The inequalities stemming from this are in line with more general findings on decentralization and localism (see for example Begg *et al.*, 2015), and require further research.

6.2. Broader Implications: Conditions for Decentralizing Flood Resilience Measures

The case study suggests broader conditions for decentralized flood resilience measures. In the case of an overarching strategic plan, there is a need for a *sense of ownership* on

both the central and the local level, for which *central guidance and support* as well as *local ability and willingness* are required (see also Begg *et al.*, 2015; Zuidema, 2017).

For creating a sense of ownership at the central level, a more parallel policy process of plan development and plan implementation could prevent friction between vision and reality. Preferably, this process entails the involvement of individuals from the development team in the implementation team in order to safeguard the transfer of the plan. While this issue has been part of the academic debate for several decades now (e.g. Pressman & Wildavsky, 1973), it is still not always put into practice. To stimulate ownership at the local level, it is essential that local actors are involved earlier on. Involving local actors in the strategic plan-making phase may positively influence local ability (by building up expertise) and local willingness (by agreeing on certain tasks and measures).

In the case of the TE2100 plan, local ability and willingness was further influenced by a lack of 'political buy-in'. Creating local political support and attention is not easy in a case where there has not been a major flood event for decades. Local ability and willingness, and particularly 'political buy-in', depend on a variety of factors which are hard to influence. Nevertheless, our study shows that leaving floodplain management to local discretion and negotiation is a risk. This risk can be mitigated through stricter guidelines and rules provided at the central level, most notably including well-defined funding schemes for floodplain management.

A clear institutional framework for central guidance and support is particularly important in a context of austerity and neoliberalism. Without such a framework, flood resilience and climate change adaptation can be easily pushed aside as a long-term task which does not require action on a very short term. Being dependent on leadership (as in the case of the TE2100 Plan) proved to be very vulnerable, because it is sensitive to changing conditions (e.g. economic crisis). Central guidance and support should imply a clear division of tasks and responsibilities between the central and the local level. Furthermore, it should imply sufficient resources for carrying out these tasks. Central guidance should also provide clear guidelines and funding schemes for floodplain management, similar to current schemes for tidal flood defences. Further research is needed to establish how capacity problems in existing neighbourhoods can be addressed in these schemes.

Overall, the implementation of flood resilience measures proved to be a multi-level governance challenge. Decentralization is a common approach to achieve more locally tailor-made measures, yet it is strongly dependent on local input and ownership. This article points towards an ongoing 'public-public divide' in decentralized governance for flood resilience. It also suggests a need to acknowledge central guidance and support as a precondition for successful implementation.

Note

1. Established by EA under the Flood and Water Management Act 2010, with members from the EA and representatives of the LLFAs to ensure regional coherence and consistency, has an advisory role to EA.

Acknowledgements

The authors would like to say thanks to Mena Kamstra and Myrthe Leijstra for contributing to the data collection for this paper.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This research was supported by NWO (the Netherlands Organisation for Scientific Research) under Grant number 406-11-207; Nederlandse Organisatie voor Wetenschappelijk Onderzoek [406-11-207].

ORCID

Johan Woltjer  <http://orcid.org/0000-0003-3179-6294>

References

- Aldridge, H., Born, T. B., Tinson, A., & MacInnes, T. (2015) *London's Poverty Profile 2015*, Report (100 pages), London, Trust for London and New Policy Institute. Available at http://www.npi.org.uk/files/5714/4533/2889/LPP_2015_report.pdf (accessed 15 August 2017).
- Armitage, D. (2008) Governance and the commons in a multi-level world, *International Journal of the Commons*, 2(1), pp. 7–32. doi:10.18352/ijc.28
- Begg, C., Luther, J., Kuhlicke, C., & Steinführer, A. (2011) *Participation in Central European Flood Risk Management: Social Capacity Building in Practice*. CapHaz-Net WP9 Report, Helmholtz Centre for Environmental Research – UFZ, Leipzig, Germany. Available at: http://caphaznet.org/outcomesresults/CapHaz-Net_WP9_RHW-River-Floods.pdf.
- Begg, C., Walker, G., & Kuhlicke, C. (2015) Localism and flood risk management in England: The creation of new inequalities? *Environment and Planning C: Government and Policy*, 33(4), pp. 685–702. doi:10.1068/c12216
- Campbell, H., Ellis, H., Henneberry, J., & Gladwell, C. (2000) Planning obligations, planning practice, and land-use outcomes, *Environment and Planning B: Urban Analytics and City Science*, 27(5), pp. 759–775. doi:10.1068/b2683
- Clarke, J. R. L. (2015) *Learning from practice - enhancing the resilience of cities through urban design and planning*, Doctoral dissertation, University of Warwick, 2015.
- Clarke, N., & Cochrane, A. (2013) Geographies and politics of localism: The localism of the United Kingdom's coalition government, *Political Geography*, 34, pp. 10–23. doi:10.1016/j.polgeo.2013.03.003
- Cullingworth, B., Nadin, V., Hart, T., Davoudi, S., Pendlebury, J., Vigar, G., ... Townshend, T. (2014) *Town and Country Planning in the UK*, (London: Taylor & Francis).
- Davoudi, S. (2016) Resilience and governmentality of unknowns, in: M. Bevir (Ed) *Governmentality after Neoliberalism*, pp. 152–171 (New York: Routledge).
- Davoudi, S., & Madanipour, A. (2015) *Reconsidering Localism*, (London: Taylor & Francis).
- Driessen, P. P. J., Hegger, D. L. T., Bakker, M. H. N., van Rijswijk, H. F. M. W., & Kundzewicz, Z. W. (2016) Toward more resilient flood risk governance, *Ecology and Society*, 21, pp. 4. doi:10.5751/ES-08921-210453
- EA. (2014) *Letter from EA to London Borough of Newham, Concerning Finished Floor Levels in Minoco Wharf Development (Dated 3 September 2014)*, Approval of details pursuant condition

- C35 (details of proposed finished floor levels) attached to planning permission 11/00856/OUT dated 30th March 2012 (London: Environment Agency).
- EA & DEFRA. (2011) Understanding the risks, empowering communities, building resilience: The national flood and coastal erosion risk management strategy for England. London. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/228898/9780108510366.pdf.
- Eagle, R., Jones, A., & Greig, A. (2017) Localism and the environment: A critical review of UK Government localism strategy 2010–2015, *Local Economy*, 32(1), pp. 55–72. doi:10.1177/0269094216687710
- Giosan, L., Syvitski, J., Constantinescu, S., & Day, J. (2014) Protect the world's deltas, *Nature*, 516 (7529), pp. 31–33. doi:10.1038/516031a
- Handmer, J. (2008) Risk creation, bearing and sharing on Australian floodplains, *International Journal of Water Resources Development*, 24(4), pp. 527–540. doi:10.1080/07900620801921439
- Haughton, G., Bankoff, G., & Coulthard, T. J. (2015) In search of “lost” knowledge and out-sourced expertise in flood risk management, *Transactions of the Institute of British Geographers*, 40, pp. 375–386. doi:10.1111/tran.12082
- Hegger, D. L. T., Driessen, P. P. J., Wiering, M., Van Rijswijk, H. F. M. W., Kundzewicz, Z. W., Matczak, P., ... Ek, K. (2016) Toward more flood resilience: Is a diversification of flood risk management strategies the way forward? *Ecology and Society*, 21, pp. 4. doi:10.5751/ES-08854-210452
- Hooijer, A., Klijn, F., Pedroli, G. B. M., & Van Os, A. G. (2004) Towards sustainable flood risk management in the Rhine and Meuse river basins: Synopsis of the findings of IRMA-SPONGE, *River Research and Applications*, 20(3), pp. 343–357. doi:10.1002/rra.781
- House of Commons. (2015) *Living with water – Report from the commission of inquiry into flood resilience of the future* Report by the All Party Group for Excellence in the Built Environment (40 pages), Available at <http://cic.org.uk/admin/resources/appg-report.-1.pdf> (accessed 15 August 2017).
- Hupe, P. L., & Hill, M. J. (2016) “And the rest is implementation.” Comparing approaches to what happens in policy processes beyond great expectations, *Public Policy and Administration*, 31(2), pp. 103–121. doi:10.1177/0952076715598828
- Hutter, G., & Kuhlicke, C. (2013) Resilience, talk and action: Exploring the meanings of resilience in the context of planning and institutions, *Planning Practice & Research*, 28(3), pp. 294–306. doi:10.1080/02697459.2013.787706
- Janssen-Jansen, L. B., & Woltjer, J. (2010) British discretion in Dutch planning: Establishing a comparative perspective for regional planning and local development in the Netherlands and the United Kingdom, *Land Use Policy*, 27(3), pp. 906–916. doi:10.1016/j.landusepol.2009.12.004
- Jeuken, A., & Reeder, T. (2011) Short-term decision making and long-term strategies : How to adapt to uncertain climate change - examples from the Thames Estuary and the Dutch Rhine-Meuse Delta, *Water Governance*, 1, pp. 29–35.
- Johnson, C. L., & Priest, S. J. (2008) Flood risk management in England: A changing landscape of risk responsibility? *International Journal of Water Resources Development*, 24(4), pp. 513–525. doi:10.1080/07900620801923146
- Kuhlicke, C., & Steinführer, A. (2010) *Social capacity building for natural hazards: A conceptual frame*, CapHaz-net WP 1 report, Leipzig, Helmholtz Centre for Environmental Research – UFZ. Available at <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.476.7009&rep=rep1&type=pdf> (accessed 15 August 2017).
- Lavery, S., & Donovan, B. (2005) Flood risk management in the Thames Estuary looking ahead 100 years, *Philosophical Transactions, Series A, Mathematical, Physical, and Engineering Sciences*, 363(1831), pp. 1455–1474. doi:10.1098/rsta.2005.1579
- Liao, K. H. (2014) From flood control to flood adaptation: A case study on the Lower Green River Valley and the city of Kent in King County, Washington, *Natural Hazards*, 71, pp. 723–750. doi:10.1007/s11069-013-0923-4
- London's Poverty Profile. (2014) Reduction in borough budgets (dated 28 March 2014). Available at <http://www.londonpovertyprofile.org.uk/indicators/topics/11-services/reduction-in-borough-budgets/> (accessed 15 August 2017).

- Loucks, D. P., Stedinger, J. R., Davis, D. W., & Stakhiv, E. Z. (2008) Private and public responses to flood risks, *International Journal of Water Resources Development*, 24(4), pp. 541–553. doi:10.1080/07900620801923286
- Mees, H., Tempels, B., Crabbé, A., & Boelens, L. (2016) Shifting public-private responsibilities in Flemish flood risk management - Towards a co-evolutionary approach, *Land Use Policy*, 57, pp. 23–33. doi:10.1016/j.landusepol.2016.05.012
- Mees, H. L. P., Driessen, P. P. J., & Runhaar, H. A. C. (2012) Exploring the scope of public and private responsibilities for climate adaptation, *Journal of Environmental Policy & Planning*, 14(3), pp. 305–330. doi:10.1080/1523908X.2012.707407
- Meijerink, S., & Dicke, W. (2008) Shifts in the public–private divide in flood management, *International Journal of Water Resources Development*, 24(4), pp. 499–512. doi:10.1080/07900620801921363
- Nilsen, P., Stahl, C., Roback, K., Cairney, P., & Ståhl, C. (2013) Never the twain shall meet? - A comparison of implementation science and policy implementation research, *Implementation Science*, 8(63), pp. 1–12. doi:10.1186/1748-5908-8-1
- Nye, M., Tapsell, S., & Twigger-Ross, C. (2011) New social directions in UK flood risk management: Moving towards flood risk citizenship? *Journal of Flood Risk Management*, 4(4), pp. 288–297. doi:10.1111/j.1753-318X.2011.01114.x
- Pahl-Wostl, C. (2009) A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes, *Global Environmental Change*, 19(3), pp. 354–365. doi:10.1016/j.gloenvcha.2009.06.001
- Penning-Rowsell, E. C., Haigh, N., Lavery, S., & McFadden, L. (2013) A threatened world city: The benefits of protecting London from the sea, *Natural Hazards*, 66, pp. 1383–1404. doi:10.1007/s11069-011-0075-3
- Plate, E. J. (Ed.) (2001) *Naturkatastrophen: Ursachen, Auswirkungen, Vorsorge*, (Stuttgart: Schweizerbart).
- Pressman, J. L., & Wildavsky, A. B. (1973) *Implementation: How Great Expectations in Washington are Dashed in Oakland: Or, Why It's Amazing that Federal Programs Work at All, This Being a Saga of the Economic Development Administration as Told by Two Sympathetic Observers Who Seek to Build Morals*, (Berkeley: University of California Press).
- Quod and Shelter. (2016) When Brownfield isn't enough - strategic options for London's growth. Available at <http://www.quod.com/wp-content/uploads/2016/02/When-brownfield-isnt-enough.pdf> (accessed 15 August 2017).
- Restemeyer, B., Woltjer, J., & van den Brink, M. (2015) A strategy-based framework for assessing the flood resilience of cities - A Hamburg case study, *Planning Theory and Practice*, 16(1), pp. 45–62. doi:10.1080/14649357.2014.1000950
- Tempels, B., & Hartmann, T. (2014) A co-evolving frontier between land and water: Dilemmas of flexibility versus robustness in flood risk management, *Water International*, 39(6), pp. 872–883. doi:10.1080/02508060.2014.958797
- The Guardian. (2015) London's poorest boroughs once again prepare to make the biggest cuts (dated 23 February 2015). Available at <https://www.theguardian.com/uk-news/davehillblog/2015/feb/23/londons-poorest-boroughs-once-again-prepare-to-make-the-biggest-cuts> (accessed 15 August 2017).
- Tunstall, S. M., Johnson, C. L., & Penning-Rowsell, E. C. (2004) Flood hazard management in England and Wales: From land drainage to flood risk management, in: *Proceedings World Congress on Natural Disaster Mitigation*, February 19–21, New Delhi, Vol. 2, pp. 447–454.
- van den Hurk, M., Mastenbroek, E., & Meijerink, S. (2014) Water safety and spatial development: An institutional comparison between the United Kingdom and the Netherlands, *Land Use Policy*, 36, pp. 416–426. doi:10.1016/j.landusepol.2013.09.017
- Vis, M., Klijn, F., de Bruijn, K. M., & van Buuren, M. (2003) Resilience strategies for flood risk management in the Netherlands, *International Journal River Basin Management*, 1(1), pp. 33–40. doi:10.1080/15715124.2003.9635190

- Wachinger, G., Renn, O., Begg, C., & Kuhlicke, C. (2013) The risk perception paradox - implications for governance and communication of natural hazards, *Risk Analysis*, 33(6), pp. 1049–1065. doi:10.1111/risa.2013.33.issue-6
- Walker, G., Whittle, R., Medd, W., & Watson, N. (2010) *Risk Governance and Natural Hazards*, CapHaz-Net WP2 Report, Lancaster, Lancaster Environment Centre, Lancaster University. Available at https://www.researchgate.net/profile/Gordon_Walker/publication/228680238_Risk_governance_and_natural_hazards/links/00b7d525d4e53efa7d000000/Risk-governance-and-natural-hazards.pdf (accessed 15 August 2017).
- Wesselink, A. J., Bijker, W. E., de Vriend, H. J., & Krol, M. S. (2007) Dutch dealings with the Delta, *Nature and Culture*, 2(2), pp. 188–209. doi:10.3167/nc.2007.020206
- White, I. (2010) *Water and the City: Risk, Resilience and Planning for a Sustainable Future*, (London: Taylor & Francis).
- White, I., & O'Hare, P. (2014) From rhetoric to reality: Which resilience, why resilience, and whose resilience in spatial planning? *Environment and Planning C: Government and Policy*, 32 (5), pp. 934–950. doi:10.1068/c12117
- Wiering, M., Green, C., Rijswick, H. F. M. W., Van, Priest, S. J., & Keessen, A. (2015) The rationales of resilience in English and Dutch flood risk policies, *Journal of Water and Climate*, 6(1), pp. 38–54. doi:10.2166/wcc.2014.017
- Zuidema, C. (2017) *Decentralization in Environmental Governance: A Post-Contingency Approach*, (Abingdon: Routledge).

Appendix A. Overview policy documents

	Document name	Published by	Date	Pages
Strategic documents	TE2100 Plan, Managing flood risk through London and the Thames Estuary	EA	Nov 2012	230
	TE2100 Plan, Technical Report	EA, 2009	Apr 2009	384
	Thames Gateway Delivery Plan	DCLG	2007	42
	London Plan	Mayor of London	Mar 2015	408
	Thames Strategy East	Thames Estuary Partnership	2008	181
Implementation and Guidance documents	TE2100 Local Council Briefing Documents	EA	Jul 2015	each 9
	– Barking and Dagenham			
	– Bexley			
	– City of London			
	– City of Westminster			
	– Havering			
	– Hounslow			
	– Lambeth			
	– Lewisham			
	– Newham			
	– Richmond			
	– Southwark			
	– Tower Hamlets			
	– Wandsworth			
	– Hammersmith and Fulham			
– Greenwich				
– Kensington and Chelsea				
Local documents	TEAM2100	EA	July 2015	3
	Flood and Coastal Resilience Partnership Funding	DEFRA	May 2011	11
	Planning Consultation Toolkit	EA	2015	16
	Newham 2027 – Newham’s Local Plan, the Core Strategy	Newham	Jan 2012	291
	PPS25 Sequential Test – Proposed Submission Core Strategy	Newham	2012	37
	Strategic Flood Risk Assessment Newham	Capita Symonds	2010	285
	Local Flood Risk Management Strategy (Draft, Version 5)	Newham	Sep 2015	68
	London Borough of Newham Efficiency Plan (2016–2020)	Newham	n/a	12
	Royal Docks, A Vision for the Royal Docks prepared by the Mayor of London and the Mayor of Newham	Mayor of London and Mayor of Newham	2011	52
	Royal Docks, Parameters for Development	Mayor of London and Mayor of Newham	2011	164
	Royal Docks, Spatial Principles	Mayor of London and Mayor of Newham	2011	100

When we needed more detailed information on specific planning applications, we made use of Newham’s public access website: <https://pa.newham.gov.uk/online-applications/search.do>. This provided a greater level of detail on original plans, recommendations from the EA and potential alterations. We checked the archive for the following mixed use sites: Silvertown, Minoco Wharf, Great Eastern Quays, Gallions Reach Quarter, Royal Albert Basin, Royal Victoria