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Journal of Environmental Planning and Management

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/cjep20>

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Published online: 10 Apr 2014.

To cite this article: Liz Root, Erwin van der Krabben & Tejo Spit (2014): Bridging the financial gap in climate adaptation: Dutch planning and land development through a new institutional lens, *Journal of Environmental Planning and Management*, DOI: [10.1080/09640568.2014.885412](https://doi.org/10.1080/09640568.2014.885412)

To link to this article: <http://dx.doi.org/10.1080/09640568.2014.885412>

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Bridging the financial gap in climate adaptation: Dutch planning and land development through a new institutional lens

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(Received 6 June 2013; final version received 14 January 2014)

Based on a case study of the Stadshaven port redevelopment in Rotterdam, this paper explores whether existing spatial planning mechanisms and processes can be used to facilitate local-level investment in climate-resilient public infrastructure and/or whether new processes and mechanisms are required to encourage investment in climate adaptation. The study reveals several key findings. First, a lack of conventional funding sources or formalised regulatory framework allowed room for experimentation with existing mechanisms and flexible strategies. Second, project planners are currently ambivalent towards introducing new mechanisms as a means to overcome implementation challenges. The case provides evidence about the role of the governance process, not simply as a means of system coordination that exists in isolation from institutional norms and values, but rather as a space for innovation, which can contribute towards reducing the financial gap associated with climate adaptation.

Keywords: climate adaptation; area redevelopment; financial barrier; institutional change; spatial investment

1. Introduction

Despite efforts to reduce greenhouse gas emissions, the scientific community agrees that adaptation to climate change is necessary (Adger, Arnella, and Tompkins 2005; Swart *et al.* 2009; International Panel on Climate Change 2013). Additional stresses related to climate change present an emerging challenge for public urban infrastructure. The effects of climate change will include multi-hazard simultaneous phenomena and ‘creeping’ changes (Birkman *et al.* 2010) that will become more frequent and intense, including rises in sea level, river flooding, and urban heat island effects (de Bruin *et al.* 2009). Local governments are required to facilitate investment in, and oversee, conventional public urban infrastructure, e.g. water distribution and sewers. Within the context of climate change, research about resilient¹ city building also suggests that municipalities will benefit from new public infrastructure strategies such as permeable pavements, separation of stormwater and sewage, strategic application of greenspace and trees, water storage and retention, and improved drainage and grading plans to mitigate possible flooding or deluge incidents (Makropoulos and Butler 2010; Bobylev *et al.* 2013). However, in times of fiscal stress, any new infrastructural investments, or even retrofitting existing systems, poses a substantial financial challenge for municipalities.

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This paper addresses these issues in the context of the Dutch planning system, focusing on two main issues. First, can innovative² practices and uses of existing spatial planning mechanisms and processes facilitate local-level investment in climate-resilient public infrastructure? And/or, second, are new processes and mechanisms required to encourage investment in climate adaptation? This paper will also explore institutional changes such as modifications to existing rules, norms and practices by local-level Dutch spatial planners. The assumption of this paper is that institutions are complex and dynamic facets of the adaptation implementation process, rather than as inert and inflexible.

Mahoney and Thelen (2010) argued that institutional change often occurs "... precisely when problems of rule interpretation and enforcement open up space for actors to implement rules in new ways" (4). This paper considers the interplay between local governance processes and the institutions in which the actions are embedded. Section 2 introduces an institutionalist conceptual framework, which will be applied to analyse the empirical findings. The approach builds on institutionally-oriented research about climate adaptation (Termeer 2009; Dovers and Hezri 2010; Glaas *et al.* 2010; Gupta *et al.* 2008; Matthews and Sydneysmith 2010; Biesbroek *et al.* 2011; Burch 2011; Inderberg 2011; Oberlack and Neumarker 2011; Storbjork and Hedren 2011). Specifically, it explores the degree to which institutions constitute the ground on which modes of practice are played out and values and ideas evolve or are reinforced (Schmit 2008).

Section 3 outlines the methodology and Section 4 provides a brief background about the Dutch national climate adaptation programme and key characteristics of Dutch planning and land development practice. By connecting programme with practice, Section 4 also problematises the anticipated institutional delivery platform of local climate adaptation investments, which will probably occur through planning and redevelopment processes. Sections 5 and 6 present a case study: the large-scale, long-term Stadshaven port redevelopment project in Rotterdam. This case considers the degree to which practitioners are modifying modes of practice and reinterpreting rules as a means to facilitate investment in climate resilient public urban infrastructure. The paper concludes with critical reflections and identifies the fundamental tensions that are highlighted by the findings of the Rotterdam case study.

2. Theoretical approach

2.1. Situating the role of institutions

Adaptation to climate change is a relatively new research field (Aakre and Rübhelke 2010) and scholars have used a variety of philosophical and theoretical approaches to explore the issue. Institutions in the climate adaptation literature are described in a variety of ways from representing a constraint (Corfee-Morlot *et al.* 2009; Funfgeld 2010) to being a 'double edged sword' as both a facilitator and limiter (Anguelovski and Carmin 2011) and, as inherently conservative, institutions are considered as both a strength and a weakness in relation to embedding adaptation into practice (Gupta *et al.* 2008). Scholars also tend to identify institutions as barriers, rather than facilitators, of adaptation to climate change (Runhaar *et al.* 2012). From this perspective, implementation of climate adaptation will require changes in planning and funding processes, e.g. through mainstreaming, cross-sectoral policy integration or the application of a multi-level governance framework (Uittenbroek, Janssen-Jansen, and Runhaar 2013). The purpose of the research described in this paper is to explore the interplay

between the governance process and the institutional context in which the actions are embedded. Biesbroek *et al.* (2013) called this a 'realists' perspective' because the focus is "... geared towards the dynamics of the process in an attempt to understand the value positions, interests, and institutions that could reveal 'why' impasses have emerged" (35).

The current study builds on this realist perspective description, and also focuses on the spaces that evolve during this process and how they offer opportunities for action to the actors and organisations that operate within an institutional platform. The analysis draws from previous research suggesting that institutional change is often a gradual process (Lowndes 2005; Hall and Thelen 2009; Mahoney and Thelen 2010). From this perspective, actors are seen as embedded within institutions; to evoke change, actors use existing tools to deal with new problems. That is, there is a broader interconnectivity between the often evoked idea that there are both barriers and stimuli to implementing climate adaptation. Biesbroek *et al.* (2011) defined barriers to adaptation as "... those conditions and factors that actors experience as impeding, diverting, or blocking the process of developing and implementing climate adaptation strategies" (182). Barriers may include uncertainty, lack of knowledge about climate change, and a lack of effective policy, governance, institutions, and financial resources (Moser and Ekstrom 2010). Oberlack and Neumarker (2011), defined stimuli in terms of dynamics that support the "drivers of adaptation" (8). However, while descriptive metaphors, the concepts do not provide an analytical lens to consider the way in which barriers and stimuli play out in different ways and in different contexts (Keskitalo, Juhola, and Westerhoff 2012; Westerhoff *et al.* 2011). The next section will present an institutional framework to consider how institutions play a critical role, and how an institutional platform can shape the context in which planning and implementation processes play out.

2.1.1. *Dimensions and dynamics: a new institutional conceptual framework*

Concepts arising from 'new institutionalism' can help to clarify the degree to which Dutch spatial planning actors are starting to shape an implementation pathway. These concepts illuminate the role of institutions in structuring access to resources for climate adaptation investments (Agrawal 2010), the agency actors use in applying rules, and the degree to which there is scope available to bend or modify rules.

New institutional theories provide a range of explanations about how institutions behave in relation to uncertainty, how rules are applied, the types of actors that operate within institutional contexts, and the factors that inform institutional change. Although the theories differ in how they describe institutional change and inertia, they tend to agree that institutions do change. Buitelaar, Lagendijk, and Jacobs (2007) argued that although practices and policies become strongly embedded once institutionalised, "... institutional change takes place as a result of an ongoing process of social-political manipulation and tireless tinkering, a process which can be appropriately labeled as 'institutional bricolage'"³ (905). Some scholars working in the field of climate adaptation governance have suggested that new institutions and better coordination between stakeholders is required to implement adaptation. However, institutional change might not necessarily require overt abolishment of institutions or the creation of new ones, but may occur via reinterpretation and different applications of existing rules and practices (Hall and Thelen 2009). Lowndes (2009) argued that when institutional actors face new problems, the ambiguity creates "... critical openings for creativity and agency to establish new precedents for action" (12). Changes occur within what Mahoney and Thelen (2010) referred to as the 'soft spots' (14; see Figure 1) between rules, interpretation of rules and

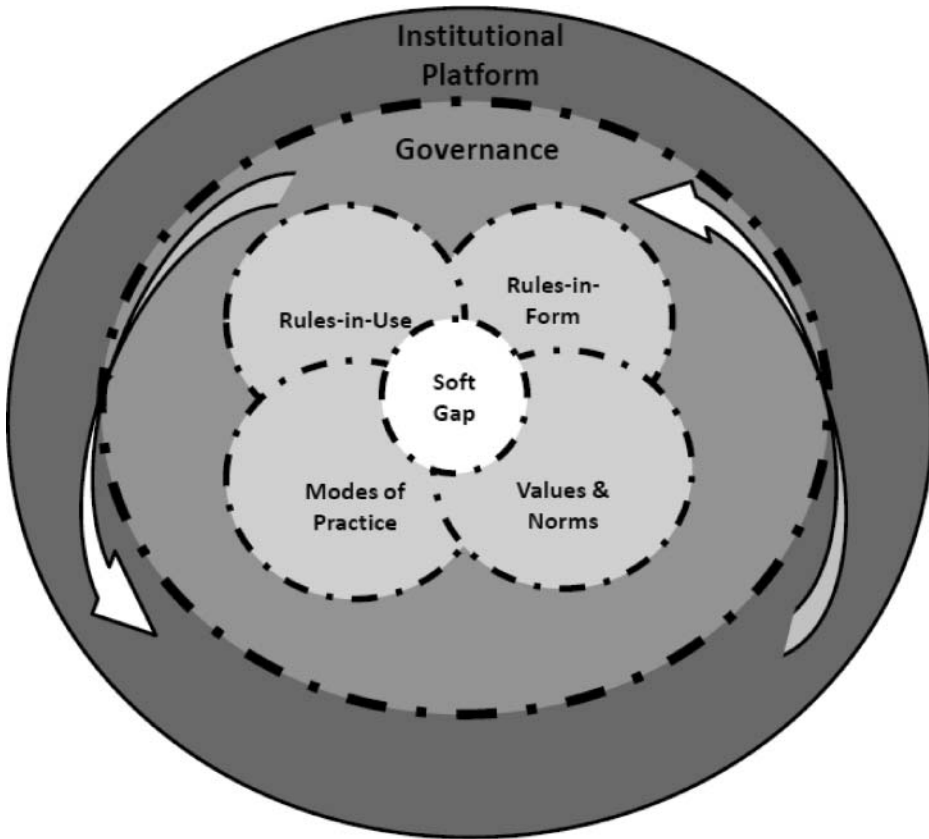


Figure 1. Dimensions and dynamics between the institutional platform and governance. Source: Author's interpretation based on Mahoney and Thelen (2010), Hall and Thelen (2009), and Lowndes (2009).

enforcement of rules. Therefore, in contrast to the general perception that institutions are inflexible and lack human agency which has been described (Lowndes 2001) as "... vulgar institutionalism [that] treat institutions as facts of life" (1956), this paper will apply a framework in which institutions change and evolve over time. This gradual evolution is largely reflective of contemporary socio-political norms, in what Dembski and Salet (2010) referred to as "patterns of social rules" (617).

Figure 1 draws from Mahoney and Thelen (2010), Hall and Thelen (2009) and Lowndes (2009) to illustrate the dimensions and dynamics of gradual institutional change. This analytical lens can help clarify the interdependency between institutions and governance. Rather than being inert, the governance process is seen as involving fluidity and agency in terms of the actors, organisations and between the institutional platform in which the formal and informal 'rules of the game' are embedded (North 1990).

2.1.2. Institutional platform: rules of the game

Institutionalist approaches⁴ conceptualise institutions in different ways, in terms of their relative economic, political and sociological perspectives, but as Dembski and Salet

(2010) noted, "... what most institutional approaches have in common is that they aim to explain how social rules enable collective action in a world of individual choices" (614). This type of analysis emphasises the relative importance of the social context that shapes the actions of individuals and organisations. Social practices are informed and shaped by norms, values, habits and routines, formal and informal rules. Lowndes (2005) referred to the range of ideas, values and influences, including the role of media in framing social issues, as 'institutional templates' within which actors and organisations function, and are influenced by. Formal and informal institutions differ: formal institutions are generally seen as government rules that are enforced by the legal system, e.g. laws, constitutions, ordinances, and local land-use plans. Informal institutions have less explicit rules and emerge via repetition and solidification of behaviour through perceptions, values, beliefs, and norms (Buitelaar *et al.* 2011). Formal and informal rules interact and shape actions and behaviours at organisational and individual levels. Thus, institutions create the conditions (constraints and opportunities) that organisations and actors must negotiate to achieve their objectives (Lowndes 2005). Metaphorically, organisations and individual actors are players within a larger game with implicit and explicit rules that evolve over time (Lowndes 2009; van Hal and van Bueren 2012).

2.1.3. Governance: (re)interpretation and enforcement

In the conceptual model (Figure 1), governance is both a binder and an embodiment of the complex interactions between formal and informal rules. Governance is not reduced to a technical problem of 'system coordination' (Lowndes 2009, 95) as a means to improve implementation processes. Rather, governance is complex and involves building consensus and engaging in processes to obtain consent to carry out objectives in arenas involving diverse and conflicting interests (de Alcantara 1998). Birkman *et al.* (2010) described governance as the way in which actors and organisations interface and use mechanisms to articulate their interests, exercise their legal rights, and mediate their differences. This involves constant interpretation of rules, norms and practices: written and unwritten, formal and informal, explicit and tacit (van Hal and van Bueren 2012). Thus, institutions may constrain or enable actors in the governance process to manage conflicting agendas and to set priorities (Storbjork and Hedren 2011).

Mahoney and Thelen distinguished between 'rules-in-use' and 'rules-in-form' and referred to the 'soft spot' (2010, 14) of (re)interpretation or ignoring rules until the rules gain broader legitimacy and become part of a shared understanding. Actors may seek to adapt the 'rules of the game' to meet the demands of uncertain and changing environments and to protect (or further) their own interests. This conceptual perspective helps clarify the dynamic interplay between institutions and governance in the context of climate adaptation policy making and implementation, by offering a degree of agency to practitioners to effect change while simultaneously acknowledging that they operate within an institutional context in which they must navigate a complex set of informal and formal 'rules of the game' (North 1990). Application of this perspective to the Stadshaven project can help clarify the interactions between the broader factors influencing actions and the subtle ways that project actors are (slowly) finding solutions in the 'soft spots' of the governance process.

3. Methodology

This paper explores how municipal-level actors use planning and land development processes to facilitate local-level investment in climate adaptation, whether innovative strategies are emerging, and the degree to which new mechanisms are required. The epistemological assumption behind this research is that local context matters and local actors construct meanings that underpin the views that they express (Creswell 2009). These views are the result of ongoing interactions within their professional sphere and through (professional) cultural norms. By focusing on a single detailed case study of the Stadshaven redevelopment plan, we explore the local planning context and the broader dynamics that affect responses to climate adaptation.

Rotterdam has garnered international attention for its climate adaptation strategy (Stead and Taşan-Kok 2013). This paper goes deeper, describing how the Stadshaven project, and the Rotterdam Adaptation Strategy, is a work-in-progress that can provide insights as project planners grapple with complex issues related to major changes in Dutch planning and land development practice. The Stadshaven project is not necessarily unlike other municipalities that are less engaged with climate adaptation, or are attempting to develop a strategy. Although the ambitious scale of this project might be beyond the capacity of many municipalities, the implementation challenges may be similar. Gerring (2007, 108) referred to this as an ‘influential case’ with respect to case selection. The objective here is not to focus on extraordinary pilot projects within the Stadshaven portfolio, but rather to focus on the ‘case that proves the rule’ (Gerring 2007, 108) with regard to the interplay between local institutions, governance, and the potential for actors to exert agency.

This paper combines document analysis (national climate adaptation policy and programmes; municipal and project policy and programmes; local planning and land development regulatory frameworks) and semi-structured interviews (see Table 1). From September 2011–January 2013, 18 interviews were conducted with senior managers, policy makers, spatial planners and development managers from the key public sector organisations involved in the project (the City of Rotterdam, the Port of Rotterdam, the Stadshaven Project Management Bureau, and a non-profit social housing corporation). Interviews were also conducted with national senior policy advisors from the Ministry of Infrastructure and the Environment, who are involved in the national adaptation programme development. Key individuals were identified from the policy documents, and subsequent interviewees were identified using snowball sampling (Farquharson 2005). Interviewees were asked about the degree to which investment in climate adaptation is part of the planning and land development programme; more specifically, they were asked about the mechanisms and processes that are being used, or will be used, to facilitate investments in climate-adaptation related public infrastructure. They were also asked whether new mechanisms are required. Interviews were transcribed and coded using qualitative data-analysis software (NVivo). Key themes were identified and the themes were further narrowed using the conceptual framework described in Section 2.

The findings clarified the complexities faced by practitioners, reaching beyond the information available in public documents (Qu and Dumay 2011). The data were sufficient to enable us to contrast and compare differences and similarities in viewpoints between organisational actors and to obtain a robust understanding of the institutional context and the evolving norms and principles that local actors are developing during policy making and implementation.

Table 1. List of Interviewees

Interviewee Numerical Reference	Role	Interview date(s)
City of Rotterdam & Project Management Bureau		
7	Urban Planner	August 10/12
15	Climate Adviser	August 23/11
16	Climate Adviser	July 12/11
8	Climate Adviser	August 27/12
4	Water Engineer	August 23/12
2	Urban Planner	September 27/12
9	Engineer	November 5/12
6	Urban Planner	August 10/12
10	Project Manager	June 4/12 and August 23/12
5	Project Manager	November 19/12
Port of Rotterdam		
3	Project Manager	November 19/12
Stadshaven Project Management Bureau		
1	Project Manager	August 27/12
14	Adviser	August 23/12
Ministry Infrastructure & Environment		
11	Project Manager	September 15/11 and September 3/12
12	Project Manager	September 15/11
Woonbron		
13	Project Manager	January 13/13
18 interview sessions		

4. Plugging into an institutional platform: Dutch planning and land development practice

4.1. Adaptation to climate change: implications for planning and land development

In the Netherlands, the national government has accepted evidence that climate change will occur and launched a national adaptation programme in 2007 (VROM 2007a, 2007b). The Delta Programme is responsible for the ongoing development of the programme (Termeer, Biesbroek, and van den Brink 2011; Vink *et al.* 2012), the urban component of which is called the New Housing Development and Restructuring Programme (Deltaprogramma 2010). Policy research about precise implementation mechanisms is ongoing, with the objective of developing a clear national policy framework in 2014. Based on research conducted to date, local-level climate adaptation will be delivered using existing frameworks on spatial investments. The focus will be on improved coordination and using existing cost recovery and cross-subsidisation mechanisms, which are conventionally used in Dutch planning and land development practices (Ministry of Infrastructure and Environment 2011) (Interviewees 11, 12). Thus, climate adaptation investments are handled in similar ways as other public infrastructure investments and must be financed with income from the usual cost recovery and value-capturing mechanisms that are applied in Dutch planning. However, the economic downturn of 2008 is a fundamental exogenous intervening factor beyond the control of

municipal actors. One Delta Programme document indicated that while existing planning and land development approaches and instruments available to municipalities could be applied to facilitate local-level adaptation investments, in the short term current practices hold less promise as development projects are less financially able to contribute to climate adaptation measures (Deltaprogramma 2011). The next section provides a brief overview of Dutch planning and land development, identifies the key characteristics that define modes of practice, and introduces the tensions between control and flexibility within the institutional platform and played out in the governance process.

4.1.2. Planning and land development: planning culture and mode of practice

A defining and unique feature of Dutch planning and land development practice is the active role played by municipalities over the past 40 years (Needham 2007; van der Krabben and Jacobs 2013). Using a public land development model, municipalities (and arms-length development organisations) have played a major role in directing the land development process by assembling land, undertaking the servicing and ultimately selling the lots to developers for commercial, industrial and residential purposes (Buitelaar 2010; van der Krabben and van Dinteren 2010). This strategy has enabled municipalities to use the market to invest in their communities and deliver a range of public goods with a high degree of spatial quality. This public land development model is now facing scrutiny because many municipalities are currently burdened with substantial land holdings and financial exposure (van der Krabben and Jacobs 2013).

As a mode of practice that is enabled by formal and informal institutions, the public land development model may have produced a planning culture that assumes local municipal government has a dual role: to control the planning and land development process and to steer the process to achieve planning objectives (Buitelaar and Sorel 2010). Planning culture can be defined as “. . . the collective ethos and dominant attitudes of planners regarding the appropriate role of the state, market forces, and civil society in influencing social outcomes” (Buitelaar and Sorel 2010, 985). Buitelaar and Sorel argued that this results in an ambiguous overlap: a plan-led approach wherein development applicants must conform to legally binding land use plans; and a mode of practice that has more in common with the development-led approach usually found in the UK (Janssen-Jansen and Woltjier 2010). In practice, Dutch planners tend to implement a pragmatic rule application and achieve planning objectives using a goal-justifies-the-means approach (Needham 2007).

The next section focuses on the Stadshaven project, which serves as a case study to illustrate the dilemmas faced by practitioners, who must simultaneously grapple with shifting modes of practice as a result of the reduced financial capacity of land development, and emerging public policy related to climate adaptation. It shows how informal institutions shape responses to climate adaptation that reflect local norms and values, and how practitioners may experiment with available formal planning instruments to find solutions that facilitate investment.

5. Existing mechanisms and evolving practice: introduction to the case study

5.1. Stadshaven, Rotterdam

The Stadshaven precinct is located at Rotterdam’s inner harbour and is the second largest inner-city redevelopment in Europe (Daamen and Vries 2012). Rotterdam has one of the largest ports in the world, making this area of considerable economic importance to the

Netherlands and the European market. The redevelopment plan encompasses 1600 ha of land and harbour basins. The 'Creating on the Edge' document (Stadshaven 2008a) describes a planning vision that includes relocating the deep sea cargo services out of this inner port area and closer to the North Sea, thereby increasing inter-Europe shipping container activity in the Waalhaven area. The redevelopment vision involves adding 5000 new residential units and introduces a variety of commercial uses, innovative start-up businesses and educational facilities into the area (Stadshaven 2008a, 2011). The long-term vision to the year 2040 explicitly refers to the area as a testing ground to support experiments and foster innovative thinking. Based on the idea of sustainable transition, the planning vision includes developing energy-neutral climate-proof buildings that do not rely on carbon-based energy and are designed in anticipation of temperature and sea level rise and extreme events. Water is framed as an opportunity, with the possibility for floating communities and climate-adaptive mobility (Stadshaven 2011).

The following analysis of this case study applies the concepts shown in Figure 1. It begins by describing how stakeholders are positioning adaptation to climate change and shifting their perspectives on the role of planning and land development in the redevelopment process. Next, it focuses on one area of Stadshaven, called Heijlplaat, to illustrate how they are experimenting with existing rules.

5.1.2. *Influences from the Institutional platform: shifting role of planning*

Implementation of the Stadshaven project is planned in phases. The 2007–2015 phase (Stadshaven 2008b) involved a €710 million public investment development programme, based on the public land development model and assumptions about a strong housing market that would stimulate and financially support the redevelopment. Specifically, public sector actors were to use land to lever investment and steer the development process. After the downturn of the national economy in 2008, and the reduced demand for housing and commercial properties, the public land development model lost its effectiveness. Stadshaven project actors consistently referred to this as the 'old model' (Interviews 1, 2, 6, 7, 9, 10, 11, 12, 14). One area planner commented:

Stadshaven is really thinking about how new developments will happen and not based on the traditional way where government made everything happen. And that is the challenge today, especially in this economic climate where we are in the economic crisis that we are facing right now. (Interviewee 2)

They contrasted this with the concept of a 'new model,' in which the public sector assumes a facilitating role and leaves most of the investment to the private sector. This shift from government as the driver of the development agenda to facilitator is pivotal and represents what some actors described as a fundamental 'paradigm shift' (Interviewees 14, 7). This shift also refers to moving from large-scale comprehensive development planning to incremental development based on a small-scale format (Interviewees 7, 10).

In 2008, changes to the Spatial Planning Act gave municipalities new legal powers to recover the costs of public works. Despite these new formal rules, which provide alternatives to a risk-oriented planning model, most municipalities continued to use the public land development model (van der Krabben and Jacobs 2013). The perception that few options were available to facilitate investment in Stadshaven illustrates the organisational logic (Keskitalo *et al.* 2012) behind the original planning approach insofar

as the expectation was that the public sector would drive development. Without the apparent means to deliver this planning vision, one actor noted, the development programme would become more commercial:

... the one who pays decides ... [so] if your role is shifting from the necessity of not having the financial resources, you are not in the driver's seat ... you have to loosen up a little, more than a little bit, in terms of what you can demand from market parties, in terms of quality, the specific requirements of what you would prefer to see happen in a certain area. (Interviewee 1)

According to this interviewee, despite the existence of a regulatory framework compelling market players to finance the costs of public goods (including climate adaptation measures) using cost-recovery mechanisms, Stadshaven planners do not have the degree of influence they once had. The implication is that investments would be required to demonstrate added value as recognised by the market, and such benefits would be extracted according to their market value. Thus, investment would be based on the objectives of market players, and might or might not align with the broader public policy objectives. Van der Krabben and Jacobs (2013) referred to this problem as the 'two hats dilemma' that Dutch municipalities often face, i.e. the dilemma between achieving spatial planning goals or favouring economic considerations.

This shift in practice represents a change in the governance process: away from a "command and control" model (Interviewee 9) toward a new model in which the government must achieve public policy goals without providing financial resources (Interviewees 9, 11, 12); in other words, from a supply-oriented model to a demand-driven model. This shift is exemplified by how planning actors are now approaching the overall timing of the development process. Rather than a stepwise systematic implementation process, the strategy is now to facilitate a slow transformation by working with existing businesses and strategically attracting new businesses in an incremental process (Interviewees 2, 3). Project actors were anxious about applying a new model, but rewriting the institutional rules for planning and land development offered an appealing opportunity (Interviewees 6, 9) for organisational and individual ingenuity (Interviewee 6). Lowndes (2009, 12) referred to this as "... a critical opening for creativity and agency to establish new precedents for action".

5.1.3. *Climate adaptation as a market opportunity: ideas, values, influences*

Its adaptation to climate change marks Stadshaven, and Rotterdam more generally, as a leader in innovation. The overall vision is to reposition Rotterdam's negative image as a working-class port city. According to one senior policy adviser, local politicians exploited this reputation to attract subsidies from the national government. This tactic made the city dependent on funds from the national government and was a strategy that was counter-productive to attracting investors (Interviewee 6). Conversely, other interviewees (Interviewees 1, 4, 6, 7, 8, 9, 14) commented that the new focus on climate adaptation, including high-profile pilot projects such as floating communities, the Rotterdam Climate Campus, and the RDM Campus, will help Rotterdam develop a more positive image. One senior policy maker said:

Rotterdam is really reframing it as a chance and if we can find the technical solutions then we are going to export them all over the world ... everybody is coming to Rotterdam to see how we do it. (Interviewee 8)

The Stadshaven project is based on the assumption that climate adaptation is vital to sustainable development and a prosperous economic future (Interviewee 1). By signalling its commitment to climate adaptation, the objective is to attract long-term investors for various commercial opportunities. Rather than generating fears related to water safety issues, which could cause global and national investors to invest in other major ports such as Hamburg and Antwerp, the focus is on technological innovation and planning foresight (Interviewees 1, 6). Therefore, adaptation to climate change is linked to broader values associated with a strong economy, local employment and the city's international reputation as a pioneer in technological innovation.

Development of the Rotterdam climate adaptation policy framework is ongoing. A number of showcase projects are currently underway, but it is still unclear how climate adaptation fits into spatial planning processes and what concrete actions are needed to address specific issues, such as urban heat island effects (Interviewees 7, 8). According to one development manager, the focus on creative and innovative strategies has generated "... all sorts of measures, but they have not yet made a plan on how we do it" (Interviewee 3). Rather than providing details for implementation, the policy vision is a broad strategic document that has played an important function in building intra-organisational support (Interviewee 8). It is a formal way to collect inter-departmental information about how the policy could be operationalised, based on input from various city departments and stakeholders, and connected to other processes. This strategy was developed based on the general consensus among policy makers that climate adaptation does not have enough substance or urgency as a standalone issue (Interviewees 8, 11). It has evolved into a process-oriented activity based on consultation and building relationships and support for the strategy (Interviewees 7, 8). Policy makers now recognise that this process has been fundamental to building legitimacy and clarifying how the strategy could be embedded into a large complex organisation. In other words, the policy-making process began as a lineal exercise to determine the costs and benefits of adapting to climate change, and has evolved into an organisational learning process, showing how governance can help build consensus and address differences between organisational actors. This intra-organisational incremental strategy runs parallel to the high-profile pilot projects (e.g. floating communities) and external international communication and networking efforts. Thus, external and internal organisational dynamics are functioning simultaneously, which informs the institutional platform and, in turn, the governance process.

5.1.4. *Playing with the rules*

The Stadshaven Structure Vision was jointly prepared by the City of Rotterdam and the Port of Rotterdam and was approved in 2011. The Structure Vision (*structuurvisie*) defines the strategic planning vision and sets out the general policy underpinnings; this is joined by a legally binding land use plan (*bestemmingsplan*). The Structure Vision and the land use plan for each area of the precinct (not all of the land plans are finalised) do not yet contain revised local safety standards or specific benchmarks related to climate change (Interviewees 4, 7, 8). This is not surprising, because the target for finalising the Rotterdam Adaptation Strategy was due sometime in 2013, but it is interesting that in contrast to most climate adaptation studies, which identify the need for new tools to bridge the implementation gap, a consistent theme is emerging among project actors: the idea that new regulations are not required to implement adaptation. Instead, the focus is on mainstreaming climate adaptation objectives into existing sectoral practices, such as

water and spatial planning (Interviewee 8). Interviewees argued that the existing spatial planning framework, including the structure vision, zoning and environmental impact assessment, is sufficient, and all that is really required is broadening the scope of the existing mechanisms (Interviewees 3, 8, 4). Interviews revealed three main themes. First, existing mechanisms are not being maximised and more creativity is required to use the available legal means (Interviewees 4, 8). Second, too many inflexible regulations are already in place, making it difficult to advance spatial planning goals, and adding more regulations would widen the implementation gap (Interviewees 3, 5, 8, 10). Third, incentives to encourage developers, such as fast-tracking approvals and allowing more building density, would be more effective than new regulations (Interviewees 1, 6). One senior policy advisor stated that “positive sanctions” and “voluntary compliance” through negotiation would be more effective than “command and control” approaches (Interviewee 6). A lack of support for conformance-oriented solutions was also evidenced by the interest in developing performance-based criteria, wherein development projects would be required by regulations to attain a certain level of performance, e.g. in relation to on-site water management or heat comfort, but without the local authority specifying the types of interventions. The practical challenge at present is that no accepted performance indicators in relation to climate change are available (Interviewees 6, 8).

The next section will move from a meso-level analysis to a micro-level analysis by focusing on the small residential village of Heijplaat, in the Waalhaven area of Stadhaven.

5.2. Heijplaat: planning a climate-resilient neighbourhood

Most of the houses in the village of Heijplaat are owned by a social housing corporation, Woonbron. When Woonbron indicated their intention to demolish 200 dwellings and redevelop the southern half of the village, the City of Rotterdam set the following condition of approval: the applicant must increase the height of the development site by 1 metre, which would also require replacing all underground infrastructures. The rationale behind this requirement was that the area is located in a flood-prone zone. City staff took into consideration future climate risks associated with rising sea levels, more intense rainfall, and increased discharge of water from rivers (Arcadis 2012), but lacking local benchmarks, adopted provincial standards based on water risk standards that are applied to areas that are located inside of dike protected areas.

The cost of increasing the height of the land was estimated at €5.6 million; Woonbron dismissed the approach as financially unfeasible and argued that increasing the height of the land was an unjustified strategy that was disproportionate to the estimated damage that might be caused by nuisance flooding events (Interviewee 13). Woonbron also argued that the height difference between the redeveloped area (intended for ownership housing) and the abutting lower-income rental housing could emphasise differences in the community and drive a social wedge between residents (Interviewee 13). The next section focuses on the governance process and how traditional planning instruments were used, which included the use of market contracts.

5.2.1. Experimenting within institutional parameters

In March 2011, the village of Heijplaat was designated as a pilot project for a climate-adaptive building strategy. The strategy was based on a multi-dimensional approach to flood risk management, to limit flooding events, reduce damage and promote recovery

(Arcadis 2012). Flooding in the area is not considered to be life-threatening; it is expected to cause modest physical damage and neighbourhood inconvenience. Reconceptualising the main issue from safety to nuisance/inconvenience opened up space to experiment with other solutions based on tolerance and acceptance of living with water (Interviewees 8, 13). The revised plan will improve the projected flood risk of 1:10 years to 1:250 and 1:4000 years by using a resilient building-design approach: the average height of the land will remain at 3.0 NAP⁵ but the flood risk impact will be reduced by introducing measures to limit damage. For example, building facades must be water-proofed to a height of 3.60 NAP, and utility connections within the houses must be located at 3.90 NAP. Regulations also specify a climate-resilient public space and flood-proof roads and sidewalks, ensuring the neighbourhood is resilient to water infiltration, rather than fortified against it (Interviewee 13). The physical plan will be supported by a communication strategy to improve awareness about flood risks and develop evacuation and recovery plans. The revised plan for the village is currently in its final stage of approval. It includes various points of departure from conventional practice, while still remaining within the realm of traditional planning. For example, the plan must ensure adherence to water safety standards from the EU, national and provincial governments, and the City of Rotterdam. It is part of the Stadhaven Structure Vision, providing a localised solution within a broader framework.

The Heijplaat case illustrates how local governance and institutional actors can affect how formal rules are applied, and help devise responses that are based on local values and ideas. This type of solution is linked with an evolution in thinking about the climate-adaptation policy-making process. One interviewee said:

... first we said 'no wet feet' and then we thought, well maybe in some locations, wet feet are not that bad and maybe measures to avoid wet feet are so extremely expensive that maybe we should change our way of thinking [and] change our way of looking at water, water annoyance, and accept some water on the street once in awhile. [It is] a kind of calculated risk ... and it was kind of a paradigm shift. Dealing with wet feet isn't the ultimate goal anymore. (Interviewee 8)

While this type of resilience-based approach requires more tolerance about potential water intrusion, it is an alternative to the original idea, which would have led to a difference in elevation between higher- and lower-income residents. This example also demonstrates the critical need to incorporate formal regulatory requirements along with less-structured negotiation processes. The City of Rotterdam used provincial flood height benchmarks (Interviewee 13), and simultaneously demonstrated willingness to experiment by reconsidering the initial requirements. This enabled a mutually beneficial process: the social housing organisation was able to proceed with the development application, and the City of Rotterdam was able to improve the flood plan and reduce the vulnerability of the village.

Heijplaat is a small-scale example of how evolving perspectives about tolerance to water intrusion could be implemented in practice (Interviewee 8). Unlike other stalled development projects, it provided an opportunity to create a balance between spatial planning goals, climate adaptation objectives and the interests of different stakeholders (Interviewee 3) – whether it is successful remains to be seen. In the short term, the market risk rests with the housing corporation, in relation to the market value of the land, and the degree to which the explicit climate risk claims in planning documents and sales contracts negatively affect the project. In the long term, the climate risk rests with

residents, in relation to the performance of the design specifications and whether occasional inconvenience due to nuisance flooding is acceptable.

6. Conclusions

This research explored how innovative practices can develop from existing mechanisms, and the degree to which new processes and mechanisms need to be included in the planning and land development process to facilitate investment in climate adaptation at the local level. The findings revealed the innovative potential of legal rules (van Rijswijk and Salet 2012), and also that innovative practice is enabled by the dynamics and interplay between the institutional platform and governance process. For example, the Heijplaat case involved typical stimuli (political support, internal champions, problem awareness) as well as a number of barriers that can act as major impediments to climate adaptation implementation (lack of financing, a weak formal policy framework). Stakeholders overcame these barriers using existing mechanisms and processes – they found solutions in the soft spot created by shifting modes of practice, a broad agreement about the value of climate adaptation to Rotterdam, and emerging norms about tolerance to water. This soft spot, along with the application of ‘rules-in-use’ and ‘rules-in-form,’ indicates that existing mechanisms have a degree of adaptive capacity. One senior policy said, “. . . I think it is more the way we use the rules and tools and the cultural change than that we have to dramatically change the rules and tools” (Interviewee 6). Thus, cultural changes can enable or constrain organisational actors. From an institutional perspective, this finding illustrates the tension between informal and formal rules that inform practice, and are, in turn, informed by actions in practice. The policy making and implementation process is iterative, and innovation occurs through building consensus, addressing conflicts, and utilising mechanisms to (slowly) achieve collectively agreed-upon objectives in relation to climate change.

The findings also revealed that stakeholders do not support new formal mechanisms, such as regulations and additional requirements. The general reluctance about new regulations reflects a dynamic within Dutch planning: on the one hand, there is the desire to open spaces to establish new forms of action (Mahoney and Thelen 2010), and on the other hand, conventional Dutch planning culture tends to straddle between a plan-led and a development-led approach. The latter has provided Dutch planners with a degree of steering capacity (Buitelaar and Sorel 2010) to achieve spatial planning objectives. In the context of adapting to climate change, project actors are unsure of what types of concrete measures are required and how much investment is needed (Interviewees 3, 4, 7, 8). The desire to steer the process is illustrated by the general perception that adaptation implementation will be encouraged by allowing room for reinterpretation of the existing framework – as opposed to additional regulations. This finding also suggests that project actors are unclear about what additional rules are needed to propel concrete actions. Instead, they are developing a shared understanding and a set of normative rules as a precursor to introducing formal regulatory actions.

The focus on Rotterdam’s high-profile climate adaptation initiatives and as a technical innovator draws attention away from the governance-related insights that can be gained. Although the Stadshaven project is benefiting from freedom to experiment, Rotterdam’s planning actors are constrained by the same factors that other Dutch planners face: reduced financial resources and a shifting role of the public sector in spatial planning. Moreover, for other municipalities that are developing an adaptation strategy and wondering how to implement policy ambitions, we learn that Rotterdam is also

continuing to define the implementation pathway. The Stadshaven case provides informative evidence about the role of the governance process: it is not simply a means of system coordination and does not exist in isolation from institutional norms and values; it also provides a space for innovation, which can contribute towards reducing the financial gap associated with climate adaptation.

Acknowledgements

This research was supported by funding from the Dutch research programme, Knowledge for Climate/Climate Proof Cities. The findings were presented at the European Climate Change Adaptation Conference in Hamburg, Germany in March 2013. The authors would like to thank the referees for their helpful comments.

Notes

1. Resilience in this context refers to an engineering conceptualisation wherein adaptation measures are designed to return the impacted area to a steady state after the disturbance (Funfgeld and McEvoy 2012).
2. Innovation refers to the application of existing mechanisms to create novel solutions to meet new requirements.
3. Buitelaar, Lagendijk, and Jacobs (2007) referred to the Smith *et al.* (2001, 42) definition of 'institutional bricolage': as "the patching together of institutional arrangements from the cultural resources available to people in response to changing conditions. A key feature of institutional bricolage is the coming together of different (mainstream and alternative) logics and perspectives" (895).
4. Four schools of thought, representing variants of new institutionalism, are referred to as historical institutionalism, rational choice institutionalism, sociological institutionalism, and discursive institutionalism (Thynne 2008). Thynne identified the logics associated with each institutionalism as 'path-dependence', 'interest' 'appropriateness' and 'communication', accordingly (329).
5. A NAP [Normaal Amsterdams Peil] of '0' is the average sea level of the North Sea, which is a topographical reference point used in the Netherlands.

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