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Beyond maintenance: Emerging discourses on waterway renewal in the Netherlands

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ABSTRACT

Across the western world, ageing waterworks have to be renewed, but interpretations on transport policies for renewal differ and are indistinct. Our aim is to grasp the competing discourses on the public management of Dutch waterway renewal in order to understand the different interpretations and how these influence waterway planning. The analysis demonstrates that a technical discourse, in which renewal is framed as sustaining the waterway network, currently prevails in the Netherlands. However, this discourse is increasingly complemented by a financial and functional discourse. These new discourses emphasise co-financing arrangements between public governments and the incorporation of new functionalities and trends into the outmoded waterways. As recent practices are altered by the new discourses, the established technical discourse decreases in importance, as does the central role for infrastructure operators. Instead, renewal becomes a strategic, political matter for transport policymakers, in which new waterway configurations are discussed. For producing legitimate future renewal practices, this article recommends that the connection between strategic policymakers and apolitical operators could be improved.

1. Introduction

Across the western world, inland waterways, one of the oldest means of transportation, have advanced into mature infrastructure networks, in which multiple ageing assets can be found. Sometimes already built in the early stages of the 20th century, assets, such as weirs, bridges, and navigation locks, have to be maintained well and, eventually, have to be renewed. Recent research has stressed the importance of strategic, functional considerations once infrastructure reaches its end-of-lifecycle (Frantzeskaki and Loorbach, 2010; Bolton and Foxon, 2015), but renewing infrastructure networks is typically the responsibility of waterway authorities responsible for the day-to-day operation (Willems et al., 2018). Operators responsible for a well-functioning waterway system will consider the renovation or replacement of waterworks if infrastructure is technically written off. In contrast, new strategic notions also consider the incorporation of new functionalities, both in terms of quantity (expansion or reduction of waterworks) and quality (incorporating additional functionalities complementary to the transportation aim, for instance related to ecology, recreation, and sustainability). These latter aspects are often regarded as part of political discussions that emerge when the construction of new infrastructure is considered. Given that the need for renewal will significantly increase in the upcoming decades (OECD,

2014a), the way in which waterway renewal is perceived and defined by policymakers is a crucial issue to understand if either the current waterway configuration is maintained, or new configurations are explored.

To date, different interpretations on the public management of waterway renewal seem to exist, which will lead to different renewal practices. To illustrate, the work on urban water infrastructures (Malekpour et al., 2015; Furlong et al., 2016) demonstrates how policy processes are driven by technical and rational views, leading to engineering-driven renewal approaches. In contrast, a body of literature emphasises that mainstreaming alternative functional requirements into existing infrastructure design processes, for example because of climate adaptation, requires the combination of goals and functions, linking climate change with other drivers of change (Huq and Reid, 2004; Gersonius et al., 2012). In order to grasp the prevailing, but indistinct views on both the root of waterway renewal and how to deal with this, discourse analysis is helpful. Several authors have demonstrated how discourses condition infrastructure planning practice (Richardson, 2001; Low et al., 2003, 2005; Tennøy, 2010; Pettersson, 2013). According to Flyvbjerg (1998), powerful actors define what is considered legitimate knowledge, which is seen in and communicated through discourses. Hajer and Versteeg (2005: 175) define discourse as “an ensemble of ideas, concepts and categories through which meaning

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is given to social and physical phenomena, and which is produced and reproduced through an identifiable set of practices.” Discourses, thus, favour particular planning practices (those that are in line with the prevailing discourse), while deviant practices might be marginalised. Actors will strive for hegemony in order to impose their discourse on others and, ultimately, to be able to define what is regarded truth (Flyvbjerg, 1998; Sharp and Richardson, 2001; Torfing, 2001). Discourses are therefore continuously contested, making them dynamic constructs. For the emerging issue of waterway renewal, discourse analysis can help to unravel how different (groups of) actors make sense of this phenomenon and to disclose power relations in waterway planning, which helps to understand who eventually defines how waterway renewal should be perceived and approached (Low et al., 2003; Hajer and Versteeg, 2005).

As a result, our aim is to identify the differing, and competing, discourses on waterway renewal and their implications for waterway planning and management. To this end, we look into how relevant actors involved in the planning and management for waterway renewal consider the issue of renewal, both from a practical and strategic perspective, and how they capitalise their perspective. For that reason, discourse analysis studies actors’ language-in-use, for instance as seen in policies and practices. We research this in detail in a case study of the Dutch national inland waterway network, which is confronted with a major renewal challenge (Van der Vlist et al., 2015; Willems et al., 2016). Several initiatives to address this challenge have been initiated by the national government, for which € 1.4 billion has been set aside between now and 2030 (I&M, 2017). Our research question is therefore: *“How do current discourses on renewing waterway assets influence the renewal of waterway networks in the Dutch national inland waterway system?”* The identification of prevailing discourses will help policy-makers in understanding the influence of dominant actors on renewal practice, and provides them with clues how to effectuate different practices.

Our article consists of the following sections. The second, theoretical section discusses the potential of discourse analysis for understanding the current ways in which waterway renewal is interpreted, how these interpretations are embedded in wider transport policy discourses, and how they affect renewal practices. The third section presents the methodology, including an introduction to our case study of the national waterways in the Netherlands. The fourth section presents the empirical findings, i.e. the current interpretations on renewal, and their implications on transport policy practice. The fifth and final section presents the overall conclusions.

2. Discourse analysis in infrastructure planning

According to Richardson (2001), dominant discourses define the rationality of infrastructure planning in practice (see also Flyvbjerg, 1998; Tennøy, 2010). This makes it useful to analyse infrastructure planning in terms of its discourses in order to understand why specific planning approaches are practiced (Low et al., 2003: 94). Dominant discourses in infrastructure planning tend to be influenced by technical thinking and neoclassical economics (Owens, 1995; Næss, 2015). Water infrastructure planning therefore also sticks to an objective and rational process (Furlong et al., 2016). Recent advances in waterway planning practice, which integrate waterways with surrounding land use (Hijdra et al., 2014), are only partially applied, because they do not resonate well with the dominant discourse (Brown and Farrelly, 2009). Understanding dominant discourses is therefore crucial for examining what is considered legitimate knowledge for waterway planning, and hence why certain practices are favoured.

A discursive perspective stresses individuals’ capacity to organise and categorise, which accumulates into mental schemata or models (Hajer and Laws, 2006). Groups of individuals and organisations will develop shared discourses to structure interpersonal relationships (Giddens, 1984). As schemata of reference, discourses condition actors

in their interactions and can thus be seen as “constitutive of institutions” (Mayr, 2015: 755, emphasis in original). Institutions are general rules of conduct (Salet, 2002), which are enacted in and represented through discourses (Hajer, 1995).

With its focus on interaction, discourse analysis has become a concern of linguistics and can therefore be regarded the study of language-in-use (Hastings, 1999; Wetherell et al., 2001). In general, discourse analysis is positioned as a social constructionist account of seeing the world in which language does not simply mirror reality in how the world can be viewed, but rather mirrors prevailing discourses (Sharp and Richardson, 2001; Hajer and Versteeg, 2005). Discourse analysis presumes that multiple, socially constructed realities exist, which results in the ambition to understand the meaning-making process that underlies the construction of discourses. As a consequence, discourse analysis concerns “the way in which society makes sense of a certain phenomenon” (Hajer and Versteeg, 2005: 176).

In this study, we use a Foucauldian discursive approach in which discourses are seen in texts rather than as texts (Hajer, 1995; Flyvbjerg, 1998; Sharp and Richardson, 2001). Foucauldian approaches explicitly connect the concepts of power, rationality, and truth: how powerful actors manage to define truth (Flyvbjerg, 1998; Richardson, 2001). Whereas textually-oriented discursive approaches use discourse as “a device for making linguistic sense of organisations and organisational phenomena”, Foucauldian approaches include the socio-institutional context in which discourses are seen as a reflection of dominant actors (Alvesson and Kärreman, 2000: 1127). As a consequence, Michel Foucault’s methodology for studying such power/knowledge networks – known as genealogy – considers not only texts, but also rhetoric and practices to explore how dominant discourses are articulated (Carabine, 2001; Sharp and Richardson, 2001). To illustrate, the notion of waterway renewal can be seen in how people talk about it (language-in-use) and how it is enacted in shared practices across organisations (such as public norms).

Actors will compete for hegemony in defining waterway renewal. Their discourses are thus continuously contested by other actors (Giddens, 1984; Torfing, 2001). Indeed, as Hajer and Versteeg (2005) state, a discourse never solidifies. Consequently, actors will try to re-constitute discourses once they believe established discourses are not legitimate anymore (March and Olsen, 1989). New developments such as the rise of ageing waterworks or changing societal demands may question the appropriateness of dominant discourses. At the same time, discourses are said to bring predictability and stability, operating as conditioning factors in interactions (Low et al., 2005). This makes them susceptible for self-reinforcement. DiMaggio and Powell (1983) refer in that regard to “institutional isomorphism” – the tendency of actors to comply with institutional norms. Powerful actors will therefore aspire to maintain the status quo, trying to downplay or incorporate emerging discourses in order to prevent undermining their position and what is considered legitimate.

Given the focus on power, discourses can be analysed by looking at what is (not) said by whom and in which context (Hajer, 1995; Carabine, 2001). The central elements of discourses – the “variables” that allow for analysing discourses – are the structures and patterns in a discussion, in which three elements can be distinguished: institutionally embedded (1) storylines and (2) practices, which are shared by (3) specific discourse coalitions (Table 1; Hajer, 1995, 2006). Storylines are the outcome of interactive and reflexive positioning by actors, creating and sustaining a discursive order (Davies and Harré, 1990). They are often presented as claims (what is truth) and organised around ideas, events, characters, and dilemmas. Together, storylines form a coherent narrative that also provides a guide for action (Low et al., 2003). Accordingly, storylines can be translated into specific practices, becoming organisational routines and mutually shared rules. These practices can be intangible (norms) and tangible (policies, formal institutional frameworks). At the same time, practices such as Cost Benefit Analysis shape storylines, because they support particular ways of making sense

Table 1
Central elements in discourses (Hajer, 1995, 2006).

Discourse	Explanation
1. Storylines	Statements, claims brought together in narratives, grouped around events, characters and dilemmas
2. Practices	Operational routines such as mutually shared norms and rules
3. Discourse coalitions	Group of actors sharing the use of a particular set of storylines over a period of time

of the world. Storylines and practices facilitate discourse coalitions: they resonate with certain actors, because of their belief systems and interests. Actors will form coalitions to share storylines that they believe are credible, although their motives might be different. Discourse coalitions can operate as loosely coupled actors, but they can also be formally embedded in institutional frameworks (Hajer, 1995).

3. Methodology

3.1. A case study approach

In order to address our research objective of identifying the differing, and competing, discourses on waterway renewal, we follow a case study approach. Case studies are a common research methodology in discourse analysis, as they enable to acquire in-depth, context-specific knowledge (Yin, 2003). Our informed choice for studying the Dutch national inland waterway network is underpinned by three motivations. First, the Netherlands is an international frontrunner with regard to waterway management (OECD, 2014b). Second, the country has started several initiatives for addressing waterway renewal, since a major number of assets will soon reach their technical end-of-life (Van der Vlist et al., 2015; I&M, 2016). Third, the national Ministry of Infrastructure & Water Management has budgeted € 1.142 billion to be used in the period until 2030 for the renewal of waterway assets (I&M, 2017). Altogether, the Dutch national government acknowledges the issue of renewal and is developing new lines of thinking to address this issue.

The Dutch national inland waterway network consists of approximately 1500 km of natural rivers such as the Meuse and the Rhine, and man-made canals (RWS, 2014). Waterways are an important means for freight transportation between the ports of Rotterdam and Amsterdam and the Dutch and European hinterland. The waterways also facilitate water discharge, and as such, they contribute significantly to regional and national water safety. Other functionalities, for instance related to recreation and ecology, are increasingly incorporated into the waterways (Hijdra et al., 2014). Similar to other western European countries, the Netherlands considers national waterway planning and management a public task, in which the national government plays a pivotal role. More specifically, clear tasks are assigned to the Ministry of Infrastructure & Water Management and to its operating agency Rijkswaterstaat. Both work in close connection with local and regional stakeholders through consultation (mandatory by law). The national government is responsible for 119 navigation locks, 276 bridges, and 10 weir complexes in the national inland waterway network (RWS, 2014). Many of these assets were built in the 1920s and 1930s, with another peak in the 1960s and 1970s. It is in particular this first peak that is currently reaching its technical end-of-life.

In previous stages, Dutch waterway planning focused on accommodating growth and, more recently, incorporating new functionalities (Willems et al., 2016). Renewal, therefore, received limited attention and used to be part of operation and maintenance budgets. The growing need for renewal marks a new shift, with a changed institutional framework for renewal and renovation, examined in section 4.1 and 4.2. We look specifically into the three national Rijkswaterstaat initiatives (discussed in section 4.3), which aim at operationalising this changed

institutional framework. The three initiatives are named as follows:

1. Pilot study Meuse river (*Grip op de Maas*) (2014–2016): a project to explore the range of possibilities for transforming the Meuse corridor in the south of the Netherlands, because seven interrelated weirs have to be renewed;
2. MultiWaterWorks (*MultiWaterWerk*) (2012–current): a project to develop new designing and tendering procedures for 52 ageing navigation locks that need to be renewed;
3. Renewal Challenge Hydraulic Works (*Vervangingsopgave Natte Kunstwerken*) (2012–2015): a project to develop a new general systematic for renewing waterway works.

3.2. Data gathering and analysis

Our data set consists of two parts: 31 policy documents and 45 interviews. Using different qualitative methods, essential for case study research (Yin, 2003), the study was able to reconstruct the interpretations on Dutch waterway renewal. First, we collected 22 policy documents (both internal briefings and public policies) that describe the three initiatives and how they came about (Appendix A). We complemented this data set with 7 key national documents that provide a more general outlook on waterway planning in the Netherlands and the positioning of actors in relation to each other (see also Appendix A). Second, we conducted three rounds of interviews with senior officials who initiated or participated in the three initiatives regarding waterway renewal (Appendix B). The interviews, 45 in total with both state and non-state actors, were used to provide more context with regard to how these initiatives came into being and how they return in actual practice. Interviews took between 60 and 90 min and were conducted between 2014 and 2017, ensuring a prolonged engagement in time (Appendix B). The two last interviews were used for confirmation that all views were covered and data saturation was reached.

In our analysis, we followed a three-step-method for identifying the central elements of each discourse: storylines, practices, and discourse coalitions (Table 1). On the one hand, this allowed for an examination of the structures and patterns in the discussion that occurred when dealing with waterway renewal, for instance how storylines and practices unfolded (Hajer, 2006). On the other hand, the analysis helped to understand discourse coalitions (actors sharing storylines) and tensions between these coalitions (Carabine, 2001; Sharp and Richardson, 2001). The steps are:

- (i) Coding of 31 documents and 45 interviews using the computer software Atlas.ti: problem definition (what is renewal?), proposed approach (how should renewal be addressed?), and involved parties (who has what responsibility?). An example is given in Fig. 1;
- (ii) Identifying storylines, practices, and discourse coalitions based on the markers of step (i), thus identifying discourses (cf. Table 1);
- (iii) Look for interrelationships and differences between the discourses found;
 - a. E.g. counter-discourses, resistances, and what is not said;
 - b. Eventually: the outcome of these tensions may indicate a change in power relations (if discourses have altered).

The next section presents the discourses through discussing storylines, its practices, and the discourse coalition involved. In the text, references are made as much as possible to the documents used for the analysis (appendix A) and the interviews (appendix B). Quotes in italics are derived from these sources. The documents and transcripts are originally in Dutch, so they are translated into English by the author.

4. Results

The discourses regarding waterway renewal will be discussed chronologically: section 4.1 and 4.2 present the established discourses,

Fig. 1. An example of the coding process: the family code "problem definition", its sub-codes and relationships.

and section 4.3 examines how the new initiatives both build on and contest the discourses, leading to a new discourse. These discourses are summarised at the end of section 4.2 in Fig. 3. The tensions between the discourses are discussed in section 4.4 and summarised in Fig. 4.

4.1. Renewal as an operational issue: the technical discourse

According to several interviewees, waterway renewal is a relatively new issue for infrastructure planners. Interviewee #18 describes: *"The awareness for renewal grows. You cannot only develop [your infrastructure networks] and execute regular and incidental maintenance. Eventually, you have to renovate and renew these assets full-scale."* The construction of new infrastructure and the maintenance of existing infrastructure are two relatively divided worlds in the Netherlands. First, the construction of new infrastructure is a task led by the national Ministry of Infrastructure & Water Management. It follows an extensive set of rules as part of the national Planning, Programming, and Budgeting framework, in which mobility and accessibility objectives are translated into distinct state-funded infrastructure projects (in Dutch: *Meerjarenprogramma Infrastructuur, Ruimte en Transport*). Subsequently, the implementation of these projects is commissioned by the Ministry to its operating agency Rijkswaterstaat. Second, maintenance and operation of developed infrastructure networks is streamlined through the agreement upon performance indicators between the Ministry and Rijkswaterstaat. For example, Rijkswaterstaat is contracted by the Ministry through a "Service Level Agreement" to safeguard a 98% availability of navigation locks. Consequently, an analysis executed by KiM (2016)¹ concludes that constructing new infrastructure is very much *project-based*, whereas maintenance is *performance-based* (Fig. 2).

Waterway renewal is considered a "stranger in the midst", caught between both worlds. At present, the key national policies and frameworks, such as the White Paper on Infrastructure & the Environment (*Structuurvisie Infrastructuur and Ruimte*, 2012) and the Infrastructure Fund (*Infrastructuurfonds*, 2016), define renewal as guaranteeing that *"the current functionality is sustained"* in order to secure safety and availability of the waterway network. In these frameworks, renewal

becomes necessary once assets are technically written off and regular maintenance and operation is no longer sufficient. It is explicitly stated that existing functionalities have to be protected. Altering functionalities falls beyond the scope of renewal and renovation and is considered to be the same as the construction of new infrastructure, for which different procedures apply (I&M, 2016). As such, renewal is positioned in the maintenance and operation domain (Fig. 2).

Decision-making for renewal predominantly relies on a technical lifecycle analysis (Fig. 3; I&M, 2013b; KiM, 2016). The operator Rijkswaterstaat executes detailed technical forecasts to determine the best option when which asset has to be replaced. This assessment is bundled in the "Risk Inventory Hydraulic Works" (*Risico-Inventarisatie Natte Kunstwerken*; e.g. I&M, 2016). Based on this study, the Ministry has prioritised certain assets, for which distinct projects were created with the purpose of bringing assets up to current performance standards. A Rijkswaterstaat official (#29) clarified:

"We observe that a specific asset has almost reached its technical end-of-life-cycle, so we have to ask for money to make a new one. [...] You will put a request to the policy departments [of the Ministry], in which you will say, 'you have to make a budget reservation, because this asset will have to be replaced soon. We are making you aware of this now and we will need this amount of money for it.' Then, the request is returned [by the Ministry], saying, 'yes, go ahead in executing these projects.'"

In sum, we can conclude that waterway renewal is defined by a technical discourse, in which renewal is characterised as a technical exercise for which the operator of the waterway is responsible (summarised in Fig. 3). The operator's responsibilities are tendered to construction companies as much as possible. Together, they shape the discourse coalition that ensures the sustainment of the waterway network.

4.2. Streamlining budgets and procedures: the financial discourse

According to KiM (2016), no official procedure exists on what renewal projects should consist of, so renewal occurred in an *"ad-hoc"* fashion. Although the position of renewal in the maintenance domain (Fig. 2), renewal requires relatively high investments compared to regular maintenance. Furthermore, whereas maintenance has stable, annual budgets, renewal requires incidental, but large investments. Interviewees indicated that the performance-based approach for maintenance did not seem tailored for renewal investments. Rather, the incidental investments seemed to demand a more project-based way of working, similar to procedures established for constructing new infrastructure. As a result, the ad-hoc nature of renewal was increasingly contested by the policymakers within the Ministry of Infrastructure & Water Management. A Ministry official (#28) stated:

"Technical information was delivered to us, quite randomly in our opinion, by regional districts from Rijkswaterstaat, who do the operational work in the waterway. They offered their information in a fragmented manner, which made me think, 'so how must I steer in this and what should I think of it?'"

The Ministry noticed that renewal investments are likely to increase substantially in the future (I&M, 2013b). Consequently, it sensed a need to legitimise its budget allocations better, which is in line with the ministerial objective to function *"soberly and effectively"* (I&M, 2015). Also, the Ministry feels that ageing waterworks might hamper the performance of the network. For example, it does not want to be surprised by disruptions in waterway corridors. Altogether, this led to the objective to work more *"systematically and planned"* in regard to renewal and renovation (I&M, 2013b: 2). The storyline developed by the Ministry thus centred on becoming more *"in control"* and operating cost-effectively, therefore complementing a financial discourse to the technical discourse (summarised in Fig. 3).

The storyline returns in two new practices. First, the Planning,

¹ Note that all references to the policy documents in the results section can only be found in Appendix A.

Fig. 2. The positioning of renewal and renovation in Dutch infrastructure planning (RWS, 2017).

Programming, and Budgeting (PPB)-framework was expanded with the newly created “Programme on Renewal & Renovation for Inland Waterways” in 2014 in order to guarantee the safety and availability of the waterway network (I&M, 2013a). Previously only used for the project-driven construction of new infrastructure, the Ministry decided to start using the PPB-framework also for programming and allocating budgets for renewal and renovation. The Programme consists of an execution agenda with distinct renewal projects and a research agenda. A new budget category for renewal and renovation was created in the national Infrastructure Fund in order to secure financial funds for the Programme. The aim of the Programme echoes the principles stated by the national White Paper and Infrastructure Fund: “*Renewal and Renovation will maintain the existing functionality of the waterway asset in accordance with the current norms and requirements. In principle, no additional wishes or functionality will be added*” (I&M, 2013a: 82; compare Fig. 2). Moreover, the document states that “*renewal is not politically controversial*”, since the functionalities are already present (idem). This confirms the position of renewal within the operator’s domain.

Second, the financial budget of this Programme will be assigned through the newly developed “Procedural Rules of the Game for Renewal & Renovation” (*Procesmatige spelregels programma Vervanging & Renovatie*; I&M, 2013b). This document aims to provide clear starting points and an evaluative framework for prioritising waterway assets. To

this end, principles from asset management are used. An example is the “RAMSSHEEP”-methodology that helps to prioritise investments based on Reliability, Availability, Manageability, Safety, Security, Health, Environment, Economics, and Politics. I&M (2013b: 3) states that this methodology “*allows for a complete description of the function, requirements and performance, which an object and a (part of the) network has to meet.*”

The new practices widen the discourse coalition slightly, with the commissioner (the Ministry) becoming the party mainly in charge, compared to its executor Rijkswaterstaat. The Programme on Renewal & Renovation for Inland Waterways is used to streamline the financial budgets, so the Ministry is more enabled to control Rijkswaterstaat in its budget demands for replacing infrastructure assets. However, Rijkswaterstaat remains the dominant actor in providing (technical) information on the condition of the waterway assets and in the subsequent implementation. Because of the seemingly uncontested political nature, it is argued that renewal does not require the incorporation of other parties. We conclude that the technical, maintenance-oriented discourse is expanded with a financial discourse that argues for cost-effectiveness. In general, these arguments fit well with the established technical discourse, for instance seen in the “RAMSSHEEP”-methodology, so the technical and financial discourse often go hand-in-hand (Fig. 3).

Fig. 3. Three discourses on waterway renewal in the Netherlands.

4.3. Three renewal initiatives: complementing and challenging existing discourses

The firmer positioning of renewal and renovation in legislative frameworks led to a growing attention for renewal from 2014 onwards. As a result, three initiatives were launched: (1) the *MultiWaterWorks* project, started by the construction division of the agency Rijkswaterstaat; (2) the *Replacement Challenge Hydraulic Works* project, as part of the research agenda within the national Programme Renewal & Renovation; and (3) a regional pilot on the Meuse river, initiated by a regional division of Rijkswaterstaat. With the launch of these initiatives, new storylines have emerged that both complement and challenge the existing technical and financial discourse.

4.3.1. *MultiWaterWorks*

The construction division of Rijkswaterstaat observed that 52 of the 119 national navigation locks need replacing before 2040. The *MultiWaterWorks* project was launched to explore if large-scale waterway renewal can be an impetus for achieving a better operation of the waterway system. Currently, the different designs of waterway assets are a threat to the manageability of the operation and to the availability of the waterway. To illustrate, a study by Deltares et al. (2012: 22) for *MultiWaterWorks* reads: *“In the Netherlands, Rijkswaterstaat operates 141 navigation locks. These locks are currently all different!”* Likewise, in a *MultiWaterWorks*-meeting, one participant refers to *“a patchwork of exotics”* when he discusses navigation locks (De Bouwcampus, 2017: 1). A Rijkswaterstaat official (#11) confirms this image: *“In practice we see that waterway assets are all disjointed objects, all built and designed differently”*. Operators in practice therefore argue that they use different solutions for similar problems, caused by a project-based way of working (RWS, 2015). The *MultiWaterWorks* project team signalled that *“currently, much specialised, local expertise is required and for each navigation lock, unique spare parts have to be ready”* (idem.: 2). From this viewpoint, future navigation locks should be more *“maintenance-friendly, reliable, and sustainable”* (RWS, 2015). As 52 locks are due for renewal, this is an opportunity to align the *“patchwork”* of lock designs. The project argues that there exists *“a need for a creative, innovative approach now to save money and time in the future”* (idem.). In sum, the *MultiWaterWorks* initiative developed a storyline and practices in which renewal can benefit the operation of the waterways.

In order to achieve this, *MultiWaterWorks* focuses on *“standardisation, innovation, and more market involvement”* (Deltares et al., 2012). Thus, solutions are developed in the context of the dominant project-based way of working. On the one hand, the project team pleads for standardisation across navigation locks to make them more reliable and maintenance-friendly. On the other hand, they aim to create more space for innovation in regard to sustainability. In order to bring these two aspects together, *MultiWaterWorks* centres on construction technologies and innovative procurement procedures. With a standardised navigation lock design, they hope to set a baseline design for all navigation locks. At the same time, they argue that this leaves room for creativity per individual asset, allowing for the innovative capacity of private companies. To this end, they propose new tendering possibilities that fit European tendering guidelines, such as design alliances, since current tendering frameworks are considered insufficient (Deltares et al., 2012). Thus, the *MultiWaterWorks* project examines efficient organisational structures for Rijkswaterstaat in order to get standardised navigation lock designs, while simultaneously allow for innovations from construction companies.

The storyline pursued by *MultiWaterWorks* demonstrates how ageing assets are perceived as a potential danger to the manageability of the waterway network (cf. Willems et al., 2018). Accordingly, it takes a rather operational or managerial perspective on renewal, which underscores that renewal is considered apolitical. This is perhaps not surprising, as the initiative was launched by Rijkswaterstaat's construction division. The Ministry of Infrastructure & Water Management,

which controls Rijkswaterstaat, is largely absent in these discussions, because of the operational viewpoint taken by Rijkswaterstaat. In this storyline, Rijkswaterstaat becomes especially occupied with organising the procurement of infrastructure works. As a consequence, the *MultiWaterWorks* storyline focuses on the standardisation of waterworks in order to support the manageability of the waterway. This fits well with the existing technical and financial discourses, because of its focus on the technical operation and cost-effectiveness (Fig. 3).

4.3.2. *Replacement Challenge Hydraulic Works*

The *Replacement Challenge Hydraulic Works* project was started as part of the research agenda of the Programme on Renewal & Renovation in order to provide more accurate data of when to renew which assets. The current technical end-of-lifecycle reports provide a specific year for renewal of a particular asset, which was considered too limited an angle. According to interviewees, this current practice did not suffice, which gave rise to the development of new practices and storylines. The project leader (#19) argued: *“We will face a renewal challenge. It involves high investments, but it can also be an incentive to make a system shift or a deliberate choice with respect to our waterway network.”* The project team therefore proposed to modify the technical, asset-oriented risk inventory of when each asset has to be renewed into a broader, integrated renewal challenge. Also, the team argued that the many developments that surround renewal investments can be incorporated with a more integrated perspective, for instance related to socio-economic and climate-related developments. A Rijkswaterstaat official (#23) explained further: *“If you start renewing anyway, it is a very good opportunity to incorporate changes and to implement them.”*

Consequently, the *Replacement Challenge* project developed a novel systematic that complements technical information with these wider developments: the *“Sensitivity Test Hydraulic Works”* (*Gevoeligheidstest Natte Kunstwerken*; RWS, 2015). The findings from this test can be used as input for policy-making. The method incorporates technical knowledge, functional knowledge (use of the waterway), regional developments, and wider socio-economic developments. Moreover, it takes a long-term perspective, in which it relies on *“adaptive delta management”* from the adjacent Dutch Delta Programme (RWS, 2014). The project acknowledges that society and the climate can change in unpredictable ways. Instead of envisioning a single future, it sets out multiple adaptive pathways that may be switched between when necessary.

The more integrated perspective also expands the discourse coalition of the national government (the Ministry and Rijkswaterstaat) with other parties. To illustrate, RWS (2014) states that *“[the project] establishes relationships with external stakeholders, such as [regional or local] governments, knowledge parties, and private companies.”* However, the other parties are unspecified. This is remarkable, since knowledge related to the functionality of the waterway network and regional developments gains in importance – knowledge often outside the domain of Rijkswaterstaat. Regional governments see ample opportunities to link regional developments to national waterway infrastructure. Interviewees from provinces stress that a functional view is key for approaching renewing infrastructure. For instance: *“It is less relevant when and how the financing and renewing takes place. It is all about the function of an asset in relation to the network.”* (#38) For example, interviewees refer to how infrastructure investments in multimodal transportation can boost the regional business climate (e.g. in the regions of Noord-Brabant and Twente), in which waterways are one of the modalities next to railways and highways.

However, the new ideas also clash with the established discourses. The Ministry is positive about connecting wider developments, but also points out that this will require additional financial resources. A Ministry official (#43) explained: *“In general, we are very open to provincial ambitions, but we do expect that provinces pull their weight.”* This means that provinces themselves should actively look for synergies with the national government and that they are willing to contribute financially as well, which fits with the financial discourse. The national

operator Rijkswaterstaat seems less eager to start such regional explorations, as the transportation function may clash with regional governments' ambitions. Rijkswaterstaat officials underscore that it has *"to protect what's already there [i.e. the transportation function]"* (#40). Interviewee #18 stated that *"you have to be well-aware for which renewal challenge you see opportunities [for wider explorations]. Otherwise you raise a lot of expectations."* This relates also to the technical discourse, i.e. to safeguard the waterworks that are already in place. Nevertheless, the *Replacement Challenge Hydraulic Works* initiative opens functional discussions that touch upon other public and private parties. In conclusion, the technical and financial discourses are challenged with a more functional discourse, to which regional governments in particular can adhere (summarised in Fig. 3). The new discourse does not regard renewal as an apolitical, operating issue, but as a trigger to initiate political, functional discussions on future waterway configurations.

4.3.3. Pilot study Meuse river

While the previous initiative was a means to develop a somewhat abstract, theoretical systematic on the national level, an additional pilot on the Meuse corridor (*Grip op de Maas*) was started in the southern regional division of Rijkswaterstaat. This division noticed that the seven large-scale weirs in the Meuse river would soon need to be renewed. The weirs in the Meuse, the oldest of which dates back to 1927, together regulate the river's water level, roughly between the cities of Maastricht and Den Bosch. They were originally built to enable coal transportation. Interviewees state that, by replacing each individual weir one-by-one, the rationale appears to be that the current functionality suffices. An official (#29) involved in this study argued:

"You have to take a look at the bigger picture: each weir is part of the Meuse-system. In principle, what you do here immediately affects what you will do at the other weirs. Don't we have to take a better look at that?"

The initiator of the study argued that such a decision requires more than just a few technical experts. He explained: *"For this huge question, I searched for ways of utilising a knowledge potential as large as possible"* (#37). Indeed, the study group articulated its ambitions right from the start: *"we aim to get to different solutions"* (De Bouwcampus, 2015: 3). For that reason, different parties were purposefully approached. The knowledge platform *De Bouwcampus* offered as a platform in which this *"renewal challenge"* was addressed in a pre-competitive, *"co-creative setting"* in which governments, companies and knowledge institutes participate on an equal basis (unlike the traditional client-contractor relationship). Several engineering firms, universities, and consultancies joined this process to develop innovative ideas on the future of this part of the Meuse corridor. Together, they started exploring from which other perspectives the Meuse river might be looked at – beyond enabling coal transportation – and what the implications may be for the renewing of the seven weirs. In other words, they deliberately questioned the usefulness of renewing assets one-by-one. For example, one report stated that *"sector-wide research should take place to find out all possible scenarios, apart from the existing situation"* (idem.: 2). Also, it was argued that, at a later stage, *"the challenge will be to connect developments and tasks, so added value can be created. With one-to-one renewal, this added value will not be utilised from other tasks"* (De Bouwcampus, 2016: 1).

In the practices of the pilot study, long-term thinking was stimulated and a comprehensive water system perspective was taken. To illustrate, De Bouwcampus (2016: 1) states that *"we have to look at the overall picture and design the water system well"*. Also, a wide array of stakeholders was identified to be included in the process. Participants from the Ministry, however, immediately noted that regional and local stakeholders were largely absent in the actual discussions. Visions that were proposed include foci on recreation, heritage, climate change, and regional developments. Out of those visions, regional *"guiding principles"* were formulated that could be used as input for the actual renewal

tasks, such as *"treating waterworks in the Meuse as heritage"* and *"the Meuse as a freshwater reservoir"* (De Bouwcampus, 2016).

The discourse coalition that emerged from the pilot is driven by national and regional governments (table 3). The Ministry joined the study meetings and saw this as an opportunity to develop more strategic policies for renewal. For them, the study became an outstanding example to which many interviewees referred if they said that *"more is possible than just one-by-one replacement"*. Regional governments also see opportunities. A provincial official (#34) illustrated:

"If Rijkswaterstaat has to renew a weir, perhaps we can create a bit more of an integrated transport and land use development. We can, for example say, 'perhaps add a small marina, or let us build a hotel on the weir. Just name it. You create more than just that sterile weir, and you can generate money in different ways.'"

Although Rijkswaterstaat initiated the study, other parties can relate more to the ideas developed in the Meuse study, as it entails political discussions on the functionality of the inland waterway corridor. Accordingly, it is a confirmation of the establishment of a new functional discourse (Fig. 3). It should be noted, though, that the pilot is an exploratory study without actual practical implications. Nevertheless, interviewees from the Ministry and provinces aim to translate the ideas generated in this study to renewal practice.

4.4. Striving for influence: competing discourses

The three discourses on the public management of renewing waterworks in the Dutch inland waterway network (Fig. 3) all try to put their mark on waterway practice, reflected in the redrafting of renewal and renovation frameworks and policies. Although they deal with the same problem context, they formulate different responses to the issue of renewal. They also respond to each other, so discourses are driving each other. For example, particular actors are unsatisfied with dominant streams of thought and try to 'correct' that by developing alternative storylines and practices – which result in new discourses. These attempts have led to changes in policies and financial frameworks, thus showing that established discourses are modified to retain legitimacy. This section discusses the relationships between the discourses and how actors are striving for influence (visualised in Fig. 4).

The dominant technical discourse and the financial discourse fit well with each other in our case study, because they share a similar instrumental rationality focused on an efficient and effective allocation of resources. To illustrate, asset management balances a technical assessment with financial considerations, expressed in trade-offs between performance, costs and risks. In line with previous research by for example Furlong et al. (2016), both discourses presume an objective and rational planning process. The *MultiWaterWorks* project is an example in which both discourses come into their own: standardisation is attractive to both engineers and treasurers, as both groups emphasise risk reduction. Especially in discussions regarding desired versus required investments, the technical and financial discourse may clash: engineers might strive for *best* solutions, whereas treasurers might look for *sufficient* solutions (Fig. 4). In contrast, the functional discourse stands by a different, value rationality, in which the ends are questioned (cf. Low et al., 2003; Flyvbjerg, 2004). This discourse is less aimed at reducing risks, but rather embraces ambiguity through acknowledging the broad range of interests and options regarding renewal. The pilot in the Meuse river and the development of the systematic by the *Replacement Challenge Hydraulic Works* project are instances of new knowledge production practices, in which actors have tried to substantiate the functional discourse. This suggests that ideas from the literature on mainstreaming infrastructures, such as incorporating different drivers of change into existing infrastructures, slowly become institutionalised (cf. Gersonius et al., 2012).

As a consequence, the functional discourse is challenging the established technical and financial discourse. For example, the Procedural

Guidelines from 2013 were considered too limited. Thus, they were replaced in 2016 by a Strategic Vision on Renovation and Renewal, in which two elements stand out. First, the Ministry assigns Rijkswaterstaat the task to provide the technical end-of-lifecycle reports with regional consultation. The technical end-of-lifecycle report from 2017 states that “the integrative systematic developed is used as a model to shape the regional consultation” (RWS, 2017: 15). Second, a distinct decision-making moment was created in order to deliberately decide between either maintaining the existing network or expanding the functionality of the network (I&M, 2016). This should result in the avoidance of pure replacement, as the Ministry aims to connect renewal investments to broader developments, “in particular when there are possibilities of expanding functionalities and/or a so-called system shift is possible” (I&M, 2016: 4). The Ministry increasingly advocates the functional discourse, seen in internal documents such as I&M (2015, 2016), and pushes Rijkswaterstaat to follow suit. According to interviewee #43 from the Ministry: “It is very simple. I will not assign money for pure replacement. Period. And as long as I do not commission Rijkswaterstaat, they will not receive any money” (Fig. 4).

At the same time, the financial discourse downplays the functional discourse, because it stresses that connecting aims also requires financial investments from all parties. Actors thus have contradictory roles in the different discourses. To illustrate, although the Ministry aspires to foster regional economic development with renewal investments, it does not take many regional waterways into account because the Ministry does not perceive many bottlenecks there (I&M, 2017). Consequently, it is hesitant about being too ambitious, as the inland waterway network is already functioning well. A Ministry official (#28)

specified: “Our targets have not been changed since 2012’s White Paper. Everything is very stable, but you can also say that almost nothing is happening.” The strategic, integrated Replacement Challenge Hydraulic Works systematic, then, seems to fade into the background, since the assumption is that there is no need for further upgrading because of limited bottlenecks. As a result, renewal remains close to its initial positioning (Fig. 2), focused on a strict programming and financing of particular waterworks. The unchanged targets also clarify why the Ministry stresses that, should regional parties have ambitions, they should pro-actively bring these forward and be willing to make substantial financial investments themselves (Fig. 4; see also section 4.3).

Also, the technical discourse operationalises ideas from the functional discourse rather differently. For example, the notion of regional consultation is explained in the functional discourse as “a sort of continuous dialogue between parties surrounding the waterway, so you have an overview of the developments and ambitions that those parties have.” (#24) However, interviewees relating to the technical discourse argue that they only have to scan regional policies to see if there are major developments planned for the future. According to interviewees, this is often not the case and, thus, “for the – say – seventy potential renewal projects, of which eventually twenty will proceed, perhaps only three will really need such regional consultation.” (#39) Instead, they argue that maintaining the current waterway network is already quite a challenge in itself. The downplaying of elements from the functional discourse shows how waterway renewal is perceived as an expert-driven, apolitical activity in the technical discourse, in which the decision whether functional discussions need to be started is mainly made by engineers (Fig. 4).

Fig. 4. Three competing discourses in the Dutch inland waterway network.

The development of new management discourses therefore implies a shift in power relations, which are gradually becoming more accepted. Typically, technical aspects were predominantly dealt with by the operator Rijkswaterstaat, and as such, were less of a concern for its commissioner, the Ministry of Infrastructure. The establishment of the financial discourse has placed the Ministry in a stronger position. As the Ministry is also more familiar with political discussions, the functional discourse is appealing as well. As a consequence, the incorporation of functional discussions in Dutch waterway renewal practice can be witnessed. This is appealing for policymakers, as it provides them with a “window of opportunities” for integrating other wishes and demands in infrastructure networks. Regional governments are said to play a large role in the functional discourse, but they remain largely absent in these discussions so far. Regional governments are vaguely aware of these opportunities and take a more reactive stance, because renewal investments are nationally initiated. Moreover, the national government has a powerful legal position, being able to overrule or ignore regional plans. The challenge for policymakers is to look for regional governments to include them in national infrastructure redevelopment. The traditionally dominant operator Rijkswaterstaat seems to be losing some of its power, as technical discussions are becoming one of the considerations, in addition to regional and functional aspects. Nevertheless, it remains an important actor, as renewal discussions are initiated by the technical state of infrastructure.

5. Conclusions

As waterway renewal is increasingly becoming an urgent issue for infrastructure planning, we examined different, and competing, discourses on renewing waterways and their implications for waterway planning and management (Figs. 3 and 4). Discourse analysis can help to understand what is considered legitimate in infrastructure planning, as it unravels values and assumptions underlying planning practice. A discursive perspective posits that infrastructure planners have to be aware of how dominant actors rationalise their practices as legitimate (Flyvbjerg, 1998). Rather than there being one single reality that defines infrastructure planning practice, multiple realities exist on issues such as waterway renewal. These realities are dynamic constructs, because discourses are constantly contested (Hajer and Versteeg, 2005).

The discourse analysis we conducted in a case study of the Dutch national inland waterway network brings forward several implications for waterway planning and management. Our analysis demonstrates how a technical and financial discourse causes waterway renewal to be oriented towards the maintenance of current performance levels in a cost-effective way. This confirms the ongoing dominance of the rational and objective orientation of infrastructure planning (cf. Næss, 2015; Furlong et al., 2016). At the same time, a counter-discourse that focuses more on functional issues has emerged, in which renewal is approached as an integrated planning practice for improving (or altering) the functionality of the waterway network. This discourse presumes a more integrated, collaborative form of infrastructure planning, in which the broad range of interests and views is incorporated. Alterations of recent policies and procedures in our case study demonstrate how the different discourses strive for influence. For instance, elements of the functional discourse are slowly being incorporated in the technical and financial discourses, seen in new terms such as “regional consultation” and

“exploring system shifts” that have been added to terms such “risk inventories” and “technical end-of-lifecycle”. Despite these attempts, actors from both discourses disagree on how to operationalise these new terms in practice.

With the prevalence of the technical discourse, infrastructure operators play a key role when it comes to making decisions about the future of infrastructure networks – although operators usually work in the background (Graham, 2010). For the planning of traditional transportation networks such as waterways and railways, the linkages between infrastructure operators and planners and policymakers therefore have to be strengthened. Whereas an implementation gap is usually observed between strategic plans and their eventual reflection in practice, we identify a reverse gap, which may be coined a strategy gap. The emergence of new discourses demonstrates that ageing infrastructure assets are increasingly regarded as not solely a technical affair for operators, but that more strategic and political discussions on the future of waterway corridors and their surroundings are required. While typically strategic objectives are translated by policymakers into new transport demands, the ageing condition of infrastructures also offers a window of opportunity to incorporate wider strategic aims. Thus, the existing transport network itself also offers a context for action, which marks the need for a more two-sided interaction between strategic and operational stakeholders. However, these stakeholders are often set up along different organisational lines and funding schemes. On the one hand, infrastructure operators need to clearly communicate the urgency of ageing infrastructure and the potentials of incorporating new developments to departments responsible for policymaking and planning. Technically driven and often apolitical operators will thus increasingly have to navigate a political environment, in which their expertise may be valued differently. On the other hand, policymakers have to reason less from building *new* infrastructure, but rather take *existing* infrastructure as a point of departure. They can articulate their needs to the operator and provide according means, enabling operators to mainstream these new demands into existing infrastructures. Altogether, increased mutual interaction between the worlds of “operation and maintenance” and “policymaking and planning” seems much needed if a shared language and understanding of the issue of waterway renewal is to be developed. Future research can further examine policymakers’ and operators’ capacity to achieve better interaction.

Declarations of interest

None.

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Appendix A. list of policy documents (in Dutch)

(Dutch) abbreviations used:

- VONK: Replacemete Challenge Hydraulic Works
- MWW: MultiWaterWorks
- Grip op de Maas: regional pilot study on the Meuse river
- Pr. V&R: Programme Vervanging & Renovatie (related to the Programming, Planning, and Budgeting-framework)
- RWS: Rijkswaterstaat

- I&M: Ministry of Infrastructure & Water Management
- KiM: KiM Netherlands Institute for Transport Policy Analysis

#	Source	Year	Title	Initiative
1	I&M	2012	Deltaprogramma 2013. Bijlage H: Vervangingsopgave Natte Kunstwerken	VONK
2	I&M	2014	Deltaprogramma 2015. Bijlage F. Achtergronddocument	VONK
3	RWS	2014	VONK – VervangingsOpgave Natte Kunstwerken. Brochure	VONK
4	RWS	2014	De VONK systematiek	VONK
5	RWS	2015	Vragen en antwoorden (Q&A's) VONK	VONK
6	RWS	2015	De nieuwe aanpak: de Gevoeligheidstest Natte Kunstwerken	VONK
7	RWS	2015	Samen naar de slimste sluis ter wereld. MultiWaterWerk: standaardisatie bij nieuwe sluisen	MWW
8	Deltares/Van Hattum & Blankevoort/ipv Delft	2012	MultiWaterWerk: Verkenning Vervangingsopgave van de Natte Kunstwerken	MWW
9	RWS	2013	Plan van aanpak MultiWaterWerk (concept)	MWW
10	Taskforce Delta-technologie	2014	Reactie op MWW	MWW
11	De Bouwcampus	2017	Verslag slotbijeenkomst	MWW
12	RWS	2017	Prognoserapport V&R	Pr. V&R
13	I&M	2016	Strategische Visie V&R	Pr. V&R
14	I&M	2013	MIRT - Programma V&R	Pr. V&R
15	I&M	2017	MIRT - Programma V&R	Pr. V&R
16	I&M	2013	Procesmatige spelregels programma Vervanging en Renovatie	Pr. V&R
17	I&M	2016	Spelregels MIRT	Pr. V&R
18	Rebel Group	2015	Vernieuwde MIRT-filosofie bij Beheer en Onderhoud	Pr. V&R
19	KiM	2016	Maatschappelijke prioritering V&R projecten	Pr. V&R
20	De Bouwcampus	2015	Vorbereidingsbijeenkomst Grip op de Maas	Grip op de Maas
21	De Bouwcampus	2016	Oogstboekje Grip op de Maas	Grip op de Maas
22	De Bouwcampus	2016	Bijeenkomst	Grip op de Maas
23	I&M	2012	Structuurvisie Infrastructuur & Ruimte	General
24	I&M	2015	Rijksbegroting 2016. Infrastructuurfonds	General
25	I&M	2015	Koers IenM	General
26	I&M	2016	Rijksbegroting 2017. Infrastructuurfonds	General
27	I&M	2017	Nationale Markt- en Capaciteitsanalyse 2017 (NMCA). Hoofdrapport.	General
28	RWS	2009	Beheer- & Ontwikkelplan voor de Rijkswateren	General
29	RWS	2014	Beheer- & Ontwikkelplan voor de Rijkswateren	General

Appendix B. list of interviewees

Function	Organisation ¹	Datum
1 Technical manager	Rijkswaterstaat	Lelystad 07-01-2014
2 Project leader	BAM Civiel	Gouda 09-01-2014
3 Contract manager	Rijkswaterstaat	Rotterdam 09-01-2014
4 Programme director	Rijkswaterstaat	Utrecht 21-01-2014
5 Consultant	Techxess Group	Amersfoort 21-01-2014
6 Director	Heijmans Civiel	Rosmalen 04-02-2014
7 Chairman	Topsector Water	Den Haag 25-02-2014
8 Secretary	Topsector Water	Den Haag 25-02-2014
9 Manager knowledge development	Kennis in het groot	Utrecht 13-03-2014
10 Knowledge development	Rijkswaterstaat	Utrecht 08-04-2014
11 Technical manager	Rijkswaterstaat	Utrecht 08-04-2014
12 Advisor project management	Rijkswaterstaat	Utrecht 27-05-2015
13 Project leader	Rijkswaterstaat	Utrecht 27-05-2015
14 Advisor project management	Rijkswaterstaat	Utrecht 02-06-2015
15 Project leader	Rijkswaterstaat	Utrecht 02-06-2015
16 Programme manager	Rijkswaterstaat	Utrecht 03-06-2015
17 Policy advisor	Bouwend Nederland	Zoetermeer 16-06-2015
18 Director	Rijkswaterstaat	Rotterdam 24-06-2015
19 Project leader	Rijkswaterstaat	Lelystad 24-06-2015
20 Tender manager	VolkerWessels	Utrecht 14-07-2015

21	Tender manager	BESIX	Utrecht	15-07-2015
22	Tender manager	VanOord	Utrecht	29-07-2015
23	Policy advisor	Rijkswaterstaat	Utrecht	05-10-2016
24	Consultant/researcher	Antea/Saxion Hogeschool	Deventer	13-10-2016
25	Director	Vereniging van Waterbouwers	Den Haag	13-10-2016
26	Consultant/assistant professor	TU Delft/Mercurius Shipping Group	Delft	17-10-2016
27	Policy advisor	TNO	Delft	03-11-2016
28	Deputy head inland waterways transport division	Ministerie van Infrastructuur & Milieu	Den Haag	08-11-2016
29	Policy advisor	Rijkswaterstaat	Utrecht	08-11-2016
30	Secretary	Nederlandse Vereniging van Binnenhavens; Centraal Bureau voor de Rijn- & Binnenvaart	Per telefoon	15-11-2016
31	Policy advisor	BLN-Koninklijke Schuttevaer	Per telefoon	16-11-2016
32	Policy advisor	Rijkswaterstaat	Utrecht	21-11-2016
33	Policy advisor	Rijkswaterstaat	Arnhem	12-12-2016
34	Policy advisor	Provincie Gelderland	Arnhem	12-12-2016
35	Policy advisor	Provincie Overijssel	Zwolle	05-01-2017
36	Network manager	Provincie Overijssel	Zwolle	05-01-2017
37	Project leader	Rijkswaterstaat	Den Bosch	11-01-2017
38	Policy advisor	Provincie Noord-Brabant	Den Bosch	11-01-2017
39	Policy advisor	Rijkswaterstaat	Rotterdam	17-01-2017
40	Network manager	Rijkswaterstaat	Rotterdam	17-01-2017
41	Head of Operations	Havenbedrijf Amsterdam	Amsterdam	18-01-2017
42	Programme leader asset manager	Provincie Noord-Holland	Haarlem	09-05-2017
43	Deputy head water policy and safety	Ministerie van Infrastructuur & Milieu	Den Haag	24-05-2017
44	Special advisor asset management	Rijkswaterstaat	Zwolle	29-05-2017
45	Special advisor adaptive water management	Rijkswaterstaat	Utrecht	28-06-2017

¹ Working at the moment of interviewing.

Appendix C. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.tranpol.2018.09.011>.

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