A programme management approach for supporting a transition to integrated flood management in the Netherlands

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Abstract

In the Netherlands and many other developed countries, flood management is transitioning from sectoral engineering approaches to more integrated approaches. The 2.3 billion Euro Room for the River programme plays an important role in this transition, because it is the first large scale infrastructure programme in the Netherlands that breaks with a long history of reducing the space for river to flow and that has adopted a multi-level governance approach. Based on a document analysis, face-to-face interviews (n=55) and a quantitative survey (n=151), this paper explores the strengths and weaknesses of a programme management approach, such as is applied in Room for the River, to influence a transition to integrated flood management in the Netherlands. We conclude that the case of the Room for the River programme shows that a goal-oriented programme management style can provide a valuable contribution to transition management. The performance of the programme to establish integrated output relies on a balanced combination of centralised and decentralised governance approaches. However, we have identified that the programme management faces difficulties to successfully transfer the lessons to other water infrastructure programmes. This could slow down a transition to integrated flood management. We recommend combining research insights from programme management and transition management to address this challenge.

Keywords

1. Introduction

In many developed countries, flood management is transitioning from sectoral engineering approaches to more integrated approaches (Brugge and Rotmans, 2007; Pahl-Wostl, 2007). Similarly, in the Netherlands flood management practice is gradually moving away from an engineering approach oriented at controlling nature. One consequence of this approach towards water management has resulted in reduced room for the rivers and necessitated the repeated heightening of flood defenses. However, since the 1970s, this traditional sectoral engineering approach to flood risk management is gradually being replaced by an integrated (multi-disciplinary) approach that incorporates various disciplines such as water management, spatial planning and ecology (e.g. van der Brugge et al., 2005; van Stokkom et al., 2005; Wiering and Arts, 2006). This change is manifesting itself through a series of large flood protection programmes to increase safety against floods (Table 1).

Table 1. Past, present and future programmes related to flood risk management in the Netherlands

Name	Description	Duration	Budget (mln)	Programme manager
Delta Works	Coastal flood protection through large scale infrastructure works	1937 - 1997	Approx. € 5000	RWS[1]
Maaswerken	To increase the discharge capacity of River Meuse to 3275 m^3/s (1:250yr discharge capacity) through extraction of gravel from the river bed whilst maintaining transport capacity.	1997 - 2022	€ 1211	RWS[1]
Room for the River	Discharge capacity of large rivers from 15.000 m^3/s to 16.000 m^3/s through river widening. Since 2011 formally a part of Delta Programme.	2000 - 2015	€ 2180	Programme Directorate Room for the River (RWS[1], assigned by I&M[2], EL&I[3])
Stroomlijn	Streamlining floodplains by removing excessive vegetation	2007 - 2016	€ 75	RWS[1]
Nadere Uitwerking Rivieren Gebied	Nature development in flood plains	2004 - 2015	€ 122	I&M[2], EL&I[3]
Zwakke schakels	Keeping coastal flood defense system up to standard. From 2008 in HWBP.	2004 - 2020	€ 756	I&M[2]
Hoogwater beschermings programma (HWBP & HWBP2)	Keeping flood defence system of coast, river and polders up to standard. Since 2011 formally a part of Delta Programme.	2006 - 2017	€ 3187	Waterboards and RWS[1]
Delta Programme	Protecting NL's water safety and supply security on the long term through adaptive delta management	2011 -	€ 1000/yr	Staff Delta Commissioner (assigned by I&M[2], EL&I[3])
Nieuwe Hoogwater Beschermings Programma (NHWBP)	Keeping flood defense system of coast, river and polders up to standard. This programme will become part of the Delta Programme.	2018 -	-	Waterboards and RWS[1]

[1] Rijkswaterstaat (RWS), the executive arm of the Ministry of Infrastructure and the Environment. RWS is is responsible for the design, construction, management and maintenance of the main infrastructure facilities in the Netherlands.
[2] Ministry of Infrastructure and the Environment (I&M)
[3] Ministry of Economic Affairs, Agriculture and Innovation (EL&I)

After near-miss river floods in 1993 and 1995, which in 1995 led to the evacuation of 250,000 people and 1 million cattle, the awareness increased amongst the public, politicians, public administration and water professionals that nature cannot be controlled and that new ways of managing rivers was required; i.e. through creating more room for rivers to discharge their flows. This opened a new

policy window for the implementation of integrated water management (van der Brugge et al., 2005; van Stokkom et al., 2005; Wolsink, 2006) and resulted in the development of a new policy line, the Room for the River Directive (ten Heuvelhof et al., 2007). Within the scope of this policy line, the water safety programmes Maaswerken, Stroomlijn and Room for the River were established. Hence, these three programmes determine a stepping stone in a transition to integrated flood management.

Furthermore, Room for the River differs from Maaswerken and Stroomijn in that it is considered an "exemplary project" for adopting new governance approaches by the Ministry of Infrastructure and Environment and Rijkswaterstaat (van den Brink, 2009, p. 15). These new governance approaches are less formalized with power more evenly devolved between various actors and organizations compared with the 'old' hierarchical and institutionalized forms of governance that were performed by a dominant bureaucratic and administrative government (e.g. Arts et al., 2006). New governance approaches such as are being applied in Room for the River are considered to be necessary for supporting integrated flood management (van den Brink, 2009; Wolsink, 2006). For example, the recently established Delta Program is using Room for the River as an example for governance and developing integrated strategies. Although the transition management literature has described the implications of knowledge programmes on transitions (Bressers, 2011; van Herk et al., 2011b), little has been documented about the implications of practical infrastructure programmes during a transition to integrated flood management. Therefore, we focus in this paper on the effectiveness of a programme management approach, such as applied in Room for the River, for supporting a transition to integrated flood management.

2. Background theory

2.1 Transition management

A transition is a long-term non-linear process (25-50 years) that results in structural changes in the way a society or a subsystem of society (e.g. water management, energy supply) operates (Rotmans et al., 2001). Governance to establish transitions, often referred to as transition management, aims at influencing interactions between the dominant 'regime' (meso level) with its societal 'landscape' (macro level) and 'niches' (micro level) where innovation occurs, so that these innovations become mainstream (Berkhout et al., 2004; Geels, 2002; Rip and Kemp, 1998). The transition management literature focuses on how change in socio-technical systems (societal systems interacting with technical systems) can be influenced. Because socio-technical systems are considered to behave as complex adaptive systems, they change as a result from self-organisation and external pressure (de Haan, 2006; Scheffer, 2009). Therefore, transition management focuses on influencing rather than managing change. In order to anticipate to changing conditions, transition management requires continuous monitoring and evaluation, and iterative adjustment of governance practices (Loorbach, 2007). Therefore, it focuses particularly on learning through, for example, learning and action alliances (van Herk et al., 2011a) and transition arenas (Loorbach, 2010).

However, there is a lack of effective prescription for governance approaches that enhance transitions towards integrated flood management (Loorbach, 2010; Pahl-Wostl et al., 2010; Rijke et al., accepted-a). Creating effective prescription is complicated by the fact that the complex nature of socio-technical systems inhibits the existence of blueprint solutions for good governance that operates successfully in all conditions and across all scales (Pahl-Wostl et al., 2010). However, several

attempts have been made to establish principles and attributes for 'good' transition governance (e.g. Farrelly et al., 2012; Loorbach, 2010; Pahl-Wostl et al., 2010). In these prescriptive approaches, the importance of multi-level (or polycentric) governance is emphasised for enhancing integrated water management (Huitema et al., 2009; van de Meene et al., 2011). Multi-level governance is the outcome of interaction between public sector agencies, private sector organisations and the community and can be described as decision making dispersed across multiple centres of authority (Hooghe and Marks, 2003). It enables knowledge exchange and mutual adjustment of governance at different levels and sectors of governance (Agrawal, 2003) and potentially leads to synergetic effects (Ostrom and Cox, 2010) that enable more adaptive governance regimes (Armitage et al., 2007).

Multi-level governance combines centralised and decentralised governance and relies on formal institutions and informal networks. Various configurations of centralised/decentralised and formal/informal governance are considered more or less effective during consecutive transition phases because they are typically effective for facilitating particular activities (Rijke et al., submitted). For example, centralised governance enables actors at the top of hierarchies to access valuable information and control action by making others accountable (Burt, 1995; Degenne and Forsé, 1999); whereas decentralised governance approaches such as transition arenas enhance cross-pollination of disciplinary knowledge and outcomes with broad support (Loorbach, 2010). Formal institutions typically include legislative and regulative frameworks, whereas informal networks play an important role in connecting actors, learning, knowledge management, and accessing resources and support (Gunderson, 1999; Olsson et al., 2006). Whilst a balanced governance configuration (centralised/decentralised and formal/informal) is considered most effective for managing transitions, it remains unclear how to effectively organise such a balance (Rijke et al., submitted). We aim to address this knowledge gap through combining scientific knowledge about transition management and programme management (Section 2.2), because a parallel can be drawn between multi-level governance and the interface between programme management (centralised governance) and project management (decentralised governance).

2.2 Programme management

There is an emerging body of literature about programme management that originates from the project management literature, but has several theoretical bases such as organizational theories, strategy, product development manufacturing and change (Artto et al., 2009). As such, there are many different interpretations to the meaning of programme management (Artto et al., 2009; Pellegrinelli et al., 2007). The traditional view of programme management is an extension of project management and focuses primarily on the definition, planning and execution of a specific objective (Lycett et al., 2004; Pellegrinelli, 2002, 2011; Pellegrinelli et al., 2007). In this view, programme management is a mechanism to coordinate the performance of a group of related projects (Ferns, 1991; Gray, 1997). A more recently developed view stems from strategic planning and attributes a broader role to programme management in terms of value creation for the organisations involved beyond the performance of projects in a particular programme (Murray-Webster and Thiry, 2000; Thiry, 2002, 2004). Overall, programme management is used to create portfolios of projects (Gray, 1997; Turner, 2000), implement strategies (Partington, 2000; Partington et al., 2005) and generate change in products, business or ways of working (Pellegrinelli, 1997; Ribbers and Schoo, 2002; Thiry, 2004).

Three different types of programme management have been identified in the programme management literature: 1) portfolio management; 2) service management; and 3) goal oriented programme management (Table 2). All typologies combine centralised (i.e. programme management) and decentralised (i.e. project management) governance approaches. However, they include varying degrees of freedom for individual projects in terms of decision-making about objectives, planning, budgets and organisation. As such, they can be considered as various forms of multi-level governance. Nevertheless, in practice, programme management often occurs as a combination of different typologies (Pellegrinelli et al., 2007). Because programme management often takes a wider strategic view for the organisation than project management, which is often inward focused and task oriented, a number of issues are commonplace at the interface of programme and project management (Lycett et al., 2004). For example, Lycett and colleagues (2004) argue that: 1) when programme management applies excessive bureaucracy and control to the management of individual projects, it tends to create inflexibility and reporting pressure, which could compromise the relationship between programme and project managers and divert energy from value adding activities; 2) there is often insufficient flexibility for programme management to adapt to changes in the context of individual projects; and 3) cooperation between projects within a programme tends to be difficult due to inter-project competition and failure to harness organisational learning.

Table 2. Typologies of programme management (adapted from van Buuren et al., 2010a)

	Type 1: Portfolio management	Type 2: Service management	Type 3: Goal oriented programme management
Aim of programme management	1) Effective use of resources, risks management, branding	1) Effective use of resources, risks management, branding; 2) Effective knowledge management among multiple projects	1) Effective use of resources, risks management, branding; 2) Effective knowledge management among multiple projects; 3) Accomplishment of strategic goals beyond project delivery
How are projects influenced?	Mutual adaptation based on open information, relying on coordinating activities with low level of influence on the internal management of individual projects (project objectives are leading).	Mutual adaptation based on information provided by a 'service centre', relying on coordinating activities with low level of influence on the internal management of individual projects (project objectives are leading).	Hierarchical direction from a goal-oriented programme management arrangement (programme objectives are leading).
Focus of programme management	Programme management contributes to a higher level fine-tuning of project ambitions, without altering the planning and budget cycles of individual projects	Programme management integrates e.g. financial, legal, administrative and technical services into one 'service centre' that is used by multiple projects	Integral project selection and management to achieve overarching ambition.

3. Research approach

The aim of this paper is to demonstrate how a programme management approach can be used to manage different degrees of centrality in multi-level governance and how it influences successive practice in water management. This paper focuses on governance activities within the programme management, project management and the interface between programme and project management of the Room for the River programme. We consider programme management as centralised

governance and project management as decentralised governance. In particular, we focus on the design stage (2007-2012) of the programme, because this phase of large scale infrastructure programmes typically involves complex governance processes (Hertogh and Westerveld, 2010). Because the realisation of the program is not yet completed (completion is scheduled for 2015), conclusions about the governance arrangements' effectiveness for achieving objectives should be reconsidered when the realisation of the programme is completed.

We have used the 2.2 billion Euro water safety programme Room for the River in the Netherlands as a case study, because it plays an important role in several ongoing transitions in the way water is managed in the Netherlands: a transition towards integrated water management and a transition from 'government' to governance (see also van Buuren et al., 2010b; van den Brink, 2009; van der Brugge et al., 2005; Wiering and Arts, 2006). In this transition, Room for the River has closed a gap between strategic policy visions and practical implementation and it has overcome impediments to integrated water management, including governance pitfalls related to centralized planning cultures (lack of participation, lack of consideration of local identity in planning decisions) (Rijke et al., accepted-b).

Room for the River is the first large scale infrastructure programme in the Netherlands that has adopted a multi-level governance approach in which the traditional hierarchical governance approach is replaced by an approach that combines centralised and decentralised steering processes: the decision frameworks of the programme for establishing improved water safety and landscape quality are set by the national government, whilst the 39 designs are prepared and decisions taken by local and regional stakeholders (Rijke et al., accepted-b; ten Heuvelhof et al., 2007; van Herk et al., accepted; van Twist et al., 2011b). Furthermore, it is considered to play an important role in a transition towards integrated water management in the Netherlands, because it is the first program that breaks with a long history of reducing the space for river to flow (Rijke et al., accepted-b; van der Brugge et al., 2005). Instead, it creates at 39 locations more room for the rivers using measures such as floodplain excavation, peak discharge channels and dike relocation (Figure 1). Also, it is the first large water safety programme that explicitly takes into account spatial quality by setting a dual objective: 1) improving safety against flooding of riverine areas of the Rivers Rhine, Meuse, Waal, IJssel and Lek by accommodating a discharge capacity of 16.000m^3/s; and 2) contributing to the improvement of the spatial quality of the riverine area.

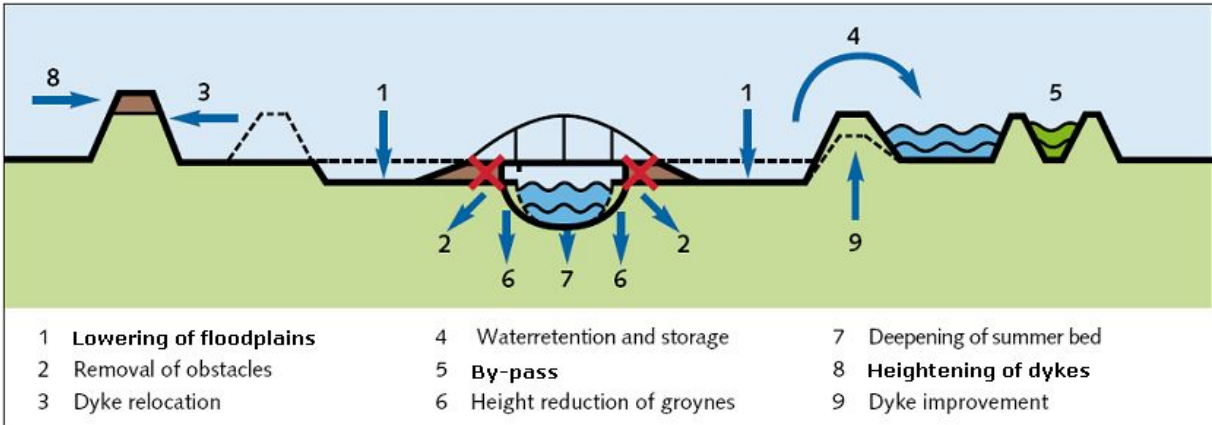| 1 | Lowering of floodplains | 4 | Waterretention and storage | 7 | Deepening of summer bed |
| 2 | Removal of obstacles | 5 | By-pass | 8 | Heightening of dykes |
| 3 | Dyke relocation | 6 | Height reduction of groynes | 9 | Dyke improvement |

Figure 1. Nine types of measures as classified by the Room for the River programme. (Source: Program Directorate Room for the River)

The implications of Room for the River's governance approach to influence a transition to integrated flood management are being assessed through a combination of document analysis, face-to-face interviews (n=55) and a quantitative survey (n=151). Also, observations were made at three training sessions about stakeholder management (45 participants), two political conferences (approximately 220 participants) and a network event for the diffusion of lessons learnt from Room for the River within Rijkswaterstaat (approx. 150 participants). Interviews were conducted with people who were involved with the initiation (n=10), design and realisation (n=31) stage of the program, as well as people in the initiation stage of the Delta Programme (n=3) and other strategic positions at the levels of senior policy maker and decision maker (n=11). Interviewees represented a range of different disciplines and organisations, including the Room for the River programme office, Rijkswaterstaat, waterboards, provinces, municipalities and the Ministry of Infrastructure and Environment. Each of the interviews was semi-structured and covered similar topics: the motivation for the design of the organisation of Room for the River, collaboration between stakeholders in the programme and projects, the lessons learnt in terms of governance from Room for the River, and the translation of knowledge developed in Room for the River to other programmes and organisations.

In addition, the quantitative survey was used to confirm the interview responses about the output and outcome of Room for the River for when the design phase of nearly all plans in the program is completed (see Section 4.1). In total, there were 151 survey respondents (48 from PDR, 10 from other parts of Rijkswaterstaat, 10 from involved Ministries, 11 from Provinces, 22 from waterboards, 36 from municipalities, 7 from the private sector and 7 other). Survey respondents included individuals working for the Programme Directorate, regional project teams, policy makers and Delta Programme staff, as well as executive decision makers at the national, regional and local governments. The survey covered the following topics: actor contentment about the processes and output of the programme, contributions of actors to processes and output, key factors for successful realisation, and the outcome of the programme.

The research data were analysed to answer three questions: 1) What is the output and outcome of the programme thus far? (Section 4.1); 2) What were the key characteristics of the programme management and what were their implications in terms of multi-level governance? (Section 4.2); 3) Was knowledge transferred to other programmes and how did this occur? (Section 4.3).

4. Research findings

4.1 Room for the River's output and outcome

The Dutch Parliament has required the Programme Directorate to report the progress and the output of the programme every six months. The 19th progress report states on 31 December 2011, that the total cost estimate for the programme was 2170.9 million Euro compared to a budget of 2180.8 million Euro (with a margin of 10%; PDR, 2011b). This means that the expenditures until completion of the programme are expected to be between Euro 2.0-2.4 billion (price index 2011) and within the initial cost estimates (2.2 billion Euro and a bandwidth of 37%; price index 2005). Also, the 19th progress report states that on 31 December 2011, the investment decisions for 73% of programme budget were made. Furthermore, it reports that out of the 39 initial projects that were in 2006 described in the policy decision (PKB), 5 are cancelled because other projects will deliver more water level reduction than expected, 8 are expected to be completed before 2015, 18 to be completed in 2015, and 8 are expected to have a delay of approximately one year (completion originally scheduled

for 2015). Hence, it can be concluded that Room for the River is on track to achieve its hydraulic targets without budget over-run or major time delay. As such, the Room for the River programme is performing, to date, significantly better than other large water programmes in the Netherlands, such as HWBP and HWBP-2 (Taskforce HWBP, 2012), and other major infrastructure projects such as the Betuweroute and the High Speed Line (Hertogh and Westerveld, 2010).

According to an evaluation of the design process, Room for the River also meets its second programme objective of contributing to the spatial quality of the project locations (Hulsker et al., 2011). The evaluation concluded that spatial quality was successfully integrated in the water safety projects in terms of dealing with agriculture, recreation, cultural-historic values and existing residences. In some cases, the projects have provided and/or improved opportunities for urban development through improved connection of both sides of the river (e.g. in Lent and Deventer). According to a large number of interviewees in our research, the rationale behind the dual objective was, besides contributing to the spatial quality of the project locations, to create local support for the measures by providing local and regional actors an incentive (improved spatial quality) for collaboration. The results of the survey indicate that this has worked well: overall, the actors involved are satisfied with results of the programme, with 85% of the respondents indicating that they were satisfied or very satisfied (total average 3.96/5; standard deviation 0.69). Similarly, a survey that was carried out for the mid-term review of the programme shows a large overall satisfaction with the results in terms of technical/design aspects of the programme (3.91/5; standard deviation 0.67; see van Twist et al., 2011a). It could, therefore, be concluded that Room for the River has an output in which water safety and spatial quality are integrated to an extent that is satisfactory to the majority of involved stakeholders.

Table 3. Outcome of Room for the River beyond its programme objectives (not exhaustive).

Type of outcome	Description
Policy outcomes	- River widening as standard option - Influence on existing legislation and policy for water management, soil management, nature, management of large infrastructure projects
Changed relationships between governments at multiple levels	- Rijkswaterstaat as progress/quality controller and facilitator - More planning and design responsibilities with waterboards, provinces and municipalities - Provinces as regional intermediary
New tools and methods	- Proactive risk management - Milestone management (SNIP) - Consistent balance of project / process / knowledge management throughout programme and projects - Application of calculation tools in planning process (Blokkendoos) - Application of a central programme office for large water infrastructure projects - Application of an independent team of advisors to enhance the quality of plans and designs (Q-team)

Furthermore, both the interview and survey data suggest that Room for the River has generated three main types of outcome beyond the programme's objectives: 1) policy outcomes; 2) changed relationships between governments at multiple levels; and 3) demonstration of new tools and methods (Table 3; for an extensive overview of the outcomes, see van Herk et al., submitted). A number of interviewed representatives of the Programme Directorate explained that many policy changes in Room for the River have resulted from activities to overcome hurdles in the planning processes of individual projects in the programme that have set a precedent for other Room for the River projects; for example a reimbursement arrangement in case of inundation of residential

dwellings lying in the flood plain after dike relocation in the Noordwaard project is now, albeit unofficially, adopted as the new standard. Whilst some outcomes can be attributed as the result of Room for the River, others are the result of processes of change that were already ongoing prior to Room for the River. For example since the 1980s, Rijkswaterstaat has increasingly emphasized the need to improve its operational excellence to make its operations more effective and efficient (see also van den Brink, 2009).

Room for the River's outcomes show that governance pitfalls related to centralized planning cultures (lack of participation, lack of consideration of local identity in planning decisions) that previously impeded integrated water management are being tackled in Room for the River (Rijke et al., accepted-b). Although the programme management has not explicitly planned to influence a transition to integrated water management, the outcome of the programme suggests that it has made an important contribution to such a transition.

4.2 Programme management across multiple governance levels

The initiation phase (2000-2006) of Room for the River worked towards the Room for the River Policy Decision (PKB Ruimte voor de Rivier; see also ten Heuvelhof et al., 2007). This document set out the vision of establishing more room for the river to accommodate extreme water discharges. Also, after a long process of engagement between different stakeholder groups, 39 locations were selected (out of a total of 600 potential measures) and general ideas were provided for the types of measure that needed to be implemented at these locations (see also van Herk et al., accepted, submitted). Furthermore, the PKB documented the procedures for the planning and realization phases of the program and the roles and responsibilities of the stakeholders. It described the principle that decentralized steering and execution of tasks should be applied where possible. However, a central program office (PDR) was established at Rijkswaterstaat to monitor progress, quality of plans, and achievement of objectives. As such, the PKB described a goal oriented programme management style (type 3; see Table 2) for the Room for the River programme that would be based on a steering philosophy of 'controlled trust'. After the national government approved the PKB, Room for the River officially commenced in December 2006. However, the interviewees held a common view that the PKB remained important during the design stage of the program, because it provided a point of reference for the later phases of Room for the River by documenting the vision, objectives, procedures, roles and responsibilities in a document that was supported and co-signed by all the governments involved.

Table 4. Centralised and decentralised activities in the Room for the River programme

Centralised activities *Key activities performed by PDR*	Decentralised activities *Key activities performed by regional project teams*
Monitoring and quality control Standardization of project management Facilitation/knowledge management Influencing national policy and legislation Capacity and network building amongst involved professionals Gaining political support of national stakeholder groups In case of conflict, bringing local/regional stakeholders together Justification of progress to Ministries and RWS Communication about programme	Planning, design and engineering Justification of progress and decisions to national government through PDR Procurement and tendering Community engagement Gaining political support of regional stakeholder groups Communication about projects

The interview data suggest that the distinction between centralised governance activities that are performed by PDR and decentralised governance activities that are performed by regional project partners are, during the planning and realisation phase indeed taking place as described in the PKB (Table 4). Centralised activities in Room for the River included primarily monitoring of the progress and quality of the 39 individual projects (i.e. monitoring of budget, time, project risks, hydraulic performance, spatial quality, soil management, legal issues, coherence of design). Later, after the PDR identified that time and resources could be used more efficiently, it also has been facilitating the projects by providing guidelines for issues that are common across multiple projects (guidelines are, for example, prepared for topics for spatial quality, underground cables and pipes and risk assessment) and (ad hoc) expert knowledge of all aspects that are monitored. Also for individual projects, the program office assists project teams in discussions with decision makers at national, regional and local levels and in bringing together various stakeholders. If the program-wide realisation of projects is inhibited by existing policy and legislation, the program office discusses this with national policy makers and legislators. Furthermore, the PDR enhanced the capacity of the project teams through training sessions (e.g. risk management, process management) and network events (e.g. political conference, project leaders day, stakeholder managers day). All other aspects of the planning and realisation of the measures are relying on the decentralised management of the projects. As such, problems and potential solutions are being explored including local/regional stakeholders. This has resulted in collaborative learning processes that have, in most cases, created mutual trust amongst stakeholders and led to broadly supported designs (see also van Herk et al., accepted).

The interview data highlighted four key factors that enhanced the effectiveness of the programme management across multiple governance levels. First, the dual objective of the programme created incentives for the local/regional governments to engage with the PDR and strive for synergetic outcomes in terms of agriculture, urban development, recreation, nature and cultural-historic values (see Section 4.1). As a result, provinces, waterboards and municipalities have managed the majority of the projects in the planning phase to ensure that their interests were well represented in the planning and design processes. For example, a local politician whose municipality was responsible for a project during the planning phase explained: *"We wanted to be in the lead of the project to stay in control during the design process and protect the interests of the companies in our area"*. Although the dual objective has created opportunities for local/regional governments to link their ambitions with the river widening projects (e.g. urban development in Lent, growth opportunities for an industrial area in Avelingen, agriculture in Overdiepse Polder and Noordwaard), the additional investments of third parties for spatial developments are small compared to the national budget for the realisation of water safety objective (3,7% of total budget; PDR, 2011a). Accordingly, the dominant view amongst the interviewees was that water safety rather than spatial quality was the leading driver for the projects and remained so during the development process. It can, therefore, be concluded that the dual objective created wide support for the proposed projects by providing an opportunity for shared ownership.

Second, a balanced 'triangle' of project management, process management and knowledge management is being applied throughout the whole programme. The PDR contains three major departments for project control & risk management, process management and knowledge management (as well as a communication department). Respondents working for PDR suggested that balancing between performance (i.e. budget, time, risk), quality (i.e. hydraulics and spatial

quality) and process (i.e. community, stakeholders) was a key success factor for the effectiveness of the programme. They argued that maintaining such a balance prevented overemphasising one of the three aspects which could lead to unrealistic planning schedules, inadequate empathy with regional projects or unsatisfactory quality of project outputs (if project management was too dominant), unrealistic ambitions and expectations of regional stakeholders and project delays (if process management was too dominant), and too intensive involvement of PDR with regional projects (if knowledge management was too dominant). Similarly, the regional project teams are structured according to Rijkswaterstaat's standardized 'Infrastructure Project Management' (IPM) roles and contain an overall project manager, technical manager (knowledge management), process manager (process management with regional stakeholders), contract manager (procurement, tendering and contracting) and project controller (project performance and risk). Because the regional governments that were involved with the management of the projects were not familiar with the IPM model, interviewees from these organisations indicated that they felt that Rijkswaterstaat had forced the IPM model on them. However, they also indicated that it didn't differ much from what they called 'normal' configurations of project teams. Furthermore, interviewees from the project teams and the PDR indicated that having counterparts in project teams and PDR enabled effective cooperation and that it enabled the formation of informal networks of individuals that fulfil similar roles in different projects.

Thirdly, a proactive 'justification cycle' enabled the PDR to monitor progress and quality of the projects, facilitate projects where needed, and justify projects to Parliament (Figure 2). A milestone management procedure is used for the monitoring and facilitation processes in this cycle. According to this procedure, the project teams need to follow a pre-set design process and deliver products (e.g. alternative designs option, preferred design, final design and supplementary material) to the program office accordingly. It is the task of PDR to evaluate the quality of these products in terms of hydraulic performance, spatial quality, legal procedures, soil, integrated design, budgets and risk management. Every 6 months, the programme office is required to send a progress report about the programme as a whole to the Dutch Parliament. In order to achieve the desired quality and progress within the programme's boundary conditions, the program office continuously monitors the project teams through 'river branch managers' who have regular interaction with project teams. These 'river branch managers' form the front office of the programme office to the project teams and establish the link with the people who conduct the evaluations. This continuous connection between the project teams and the program office enables pre-assessment of the milestones before they are submitted for approval as well as pre-assessment of risks for projects and the programme as a whole. This provides the opportunity for the program office to take timely action to facilitate improvements. However, several interviewees from decentralised governments indicated that the need to justify is resource intensive for the project teams. The PDR facilitates the interaction with Parliament by doing pre-assessments of the progress in order to ensure that the desired progress is being achieved and any required remedial action is pro-actively taken to achieve the objectives on time and within budget, before submitting the half-yearly progress reports.
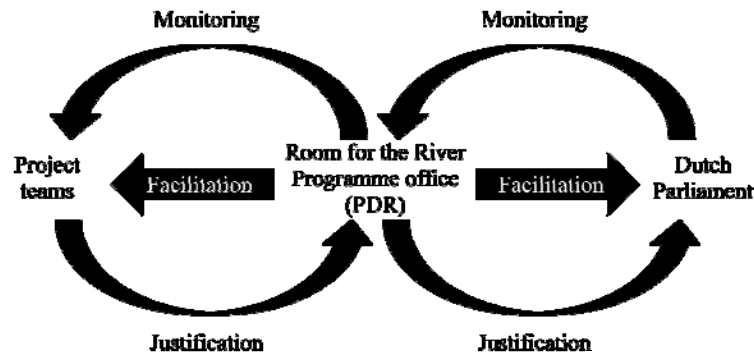
Figure 2. Room for the River's justification cycle

Fourthly, the interview data suggest that independent auditing and evaluation of performance, processes and quality of output are playing an important role in the programme to reach consensus about important decisions during the planning process and generate supported programme output. Research institutes were involved in auditing and validating computer models and calculations. For example, at the start of the program, the hydraulic model was validated and standardised for all 39 projects by a leading water research institute. This supported the status of the model, illustrated the need for taking measures for improved safety against floods and, through the uptake of the hydraulic model in a selection tool (Blokkendoos), it made the impact of different sets of measures visible to decision makers. Furthermore, an independent 'Q-team' of experts from multiple disciplines assessed and gave advice about the spatial quality of the individual projects. During the design phase of each project, the 'Q-team' visited at least three times to assess the spatial quality and discuss it with the project team and programme management before sending their recommendations to the State secretary. As such, the advice of this independent expert panel was used to justify design decisions and acquire high level political support. With regard to risk management, the PDR discussed potential future risks and risk mitigation measures with an independent panel of risk management experts. This was used by the PDR to justify risk management strategies and anticipate better any contextual changes, such as political or economic change. Furthermore, the PDR used evaluations carried out by policy scientists and consultants regarding design processes (Hulsker et al., 2011) and the decision making processes and outcomes of Room for the River (ten Heuvelhof et al., 2007; van Twist et al., 2011b) to confirm decisions and to adjust the governance arrangements where necessary.

The interview data suggest that the combined centralised-decentralised set-up of the programme management has worked well. Interviewees from both sides confirmed that the dual objective and the clear roles and responsibilities have contributed to a shared ownership of the programme. For example, a respondent commented that *"because of the dual objective in the PKB, it was easier to involve the Province."*, whilst a staff member of the PDR suggested: *"The spatial quality objective was useful process input. The integration in the design depended on the initiator of the project, who could fit in the water safety works with other functions in the project area"*. According to interviewees from the PDR, the combination of the management 'triangle' (project, process and knowledge management) enabled responses to be made appropriately to changing contextual circumstances throughout the duration of the programme. For example, the role of the PDR changed from predominantly monitoring to a more balanced combination of monitoring and facilitation when the PDR recognised that certain expertise (e.g. hydraulic, soil, legal) was inadequate in the project teams.

Later, when most projects shifted into the realisation phase, the justification cycles was instrumental in recognising a shortcoming of required expertise (e.g. procurement, tendering, logistics, litigation). As a result, the programme office enhanced its front office for each individual project with a senior staff member from its knowledge department and its project control department to the 'river branch manager' (process manager) who previously managed the front office task alone. As such, the management 'triangle' and the justification cycle were mutually reinforcing with regard to signalling potential problems and solutions and anticipating these.

Both the interview and the survey data suggest that the programme management was instrumental to the delivery of the programme's output and outcome, but that the success of Room for the River cannot be attributed to the programme management alone. In the survey, respondents were asked to indicate to what extent several different factors contributed to the realisation of the programme. From most to least (average) rated importance (5 = very important, 1 = very unimportant): sense of urgency after the near floods of 1993 and 1995 (average of 4.3 out of 5); human factors, such as leadership, trust, political decisiveness (average of 4.19 out of 5); the connection of the water safety and spatial quality objectives (average of 4.03 out of 5); transparency and milestone management (average of 3.99 out of 5); centralised-decentralised set-up of organisation (average of 3.89 out of 5); contextual factors, such as previous large infrastructure projects High Speed Railway Line and the Betuwe Railway project, the economic crisis, and reorganisations of waterboards and Rijkswaterstaat (average of 3.19 out of 5). The great majority of the interviewees confirmed the importance of the governance approach of Room for the River for delivering its results. However, several interviewees also highlighted that several factors outside the influence of programme management have contributed, such as the quality of the staff involved, leadership of individuals and the economic crisis.

4.3 Knowledge transfer to other programmes

Room for the River is considered an example for the Dutch water sector (e.g. waterboards and Rijkswaterstaat) as to how best to manage other large water infrastructure programmes, such as the Delta Programme and the new Hoogwaterbeschermingsprogramma (NHWBP; Table 1). For example, the interviewees that are involved with the Delta Programme and NHWBP all share the perception that Room for the River has broadened the range of potential options that are to be considered when taking flood protection measures in river areas. Furthermore, they believe that Room for the River's multi-level governance approach (Section 4.2) is being adopted by these new water infrastructure programmes. In 2011, Room for the River officially became a part of the Delta Programme, but kept its own programme management, budget, objectives and staff. However they indicated that the transfer of the lessons learnt from Room for the River to other programmes is not a straightforward process.

Although it is part of the milestone management procedure that each project delivers a report about lessons learnt during the design phase of the project, individuals interviewed from the Room for the River programme suggest that the knowledge regarding the key contributors to the success of the programme is in the form of tacit knowledge of individuals and shared values within the programme (e.g. transparency, getting-things-done mentality, collegiality) that cannot be documented effectively. The interviewees of Room for the River and the Delta Programme confirmed that there is interaction between staff members of Room for the River and the Delta Programme. However, they commented that such interaction is mostly coincidental and infrequent. Several interviewees raised a

second issue relating to the fact that much relevant knowledge is in the form of tacit knowledge. All Room for the River staff are hired only for the project. After completion of the project, they need to find a new work place within Rijkswaterstaat or elsewhere. At this moment, RWS is re-structuring its organisation: 1500 fte need to be cut. Staff could be attracted by the Delta Programme, but so far little staff transfer has taken place. Also, individuals interviewed in executive positions in the programme management have estimated that the majority of the programme management staff have been external staff (freelancers or external consultants). Hence, there is a significant risk of losing the tacit knowledge these people carry (mainly for Rijkswaterstaat).

The incumbents interviewed from both Room for the River and the Delta Programmes indicated that because of the differences of the context, scope and objectives of the two programmes, one-on-one translation of the lessons learnt is not desirable. Due to contextual changes such as the economic crisis and political change, the importance of transparent and cost-effective solutions is emphasized for the Delta Programme. As a result, nature is increasingly being considered as a luxury in contemporary Dutch politics. For Room for the River, this has increased the weight of the water safety objective as being the leading objective compared with the second objective of contributing to spatial quality (see also van Twist et al., 2011b). Several interviewed decision makers questioned, therefore, whether it would have been possible to establish a dual objective if Room for the River would have started now. As described above, the main effect of the dual objective was the support of regional stakeholders, although it has not invoked significant investment from third parties. Hence, the Delta Programme needs to encourage regional stakeholders to collaborate in a different way. During the initiation phase of the Delta Programme (2011-2014), an intensive engagement process has been set up in which actors from governments involved across different levels, the private sector and community groups engage with each other to discuss the challenges with regard to water safety and security and consecutively establish potential strategies, promising strategies, and preferred strategies. However, one politician interviewed warned *"The Delta Programme has become a big Christmas tree with a large preparation phase in which not much is happening. The region should work more rapidly towards a strategy."* This interviewee argued that engagement would otherwise fade away.

Furthermore, interviewees from both programmes indicate that Room for the River and the Delta Programme are in different phases and are therefore facing different challenges. Most projects in Room for the River have completed the design stage. Problems have been explored, solutions designed, and partnerships formed. The main concern of the programme management is therefore to effectively realise the developed designs. The Delta Programme, however, is in its initiation stage. Whilst it has developed an overall steering philosophy of adaptive delta management, the programme management is currently dealing with framing of problems, exploration of potential and preferred strategies to address the problems and to develop partnerships to establish these strategies in practice (Delta Programme, 2011). This initiation stage will result in Delta Decisions, a set of decisions about the water safety and water security objectives for the future and strategies that are needed to achieve these objectives. Interviewees working in Room for the River recommend that this would include a clear broadly supported decision making framework in which the vision, objectives, procedures, roles and responsibilities are documented in a way that this can serve as a point of reference throughout the complete duration of the Delta Programme. As such, the Delta Programme can use lessons from earlier phases of Room for the River whilst having the benefit of hindsight and evaluating how the lessons have worked out for and come from, Room for the River.

At present, Room for the River is applying a different type of programme management than other present-day programmes such as the Delta Programme and the HWBP. In Section 4.2 it was described how Room for the River is using goal-oriented programme management. Interviewees have described the HWBP as a *"common funding pool for a large number of flood defence projects".* If the performance of flood defences does not meet its standard during a 6-yearly assessment, a project will become part of the HWBP. Furthermore, the HWBP lacks a central programme office that facilitates individual projects through a service centre. As such, it applies a portfolio management type of programme management. Knowledge transfer should, therefore, focus on lessons about operational excellence, such as project control, stakeholder management and risk management. It is too early to make similar recommendations for the Delta Programme, because the Delta Programme is still in its initiation phase and no decisions are made yet about the programme management during the design and realisation phases.

5. Concluding discussion

Many governments have the ambition to stimulate transitions to more sustainable water management, including the Dutch government (through the Delta Programme). Although the Room for the River programme did not have an explicit objective to support a transition, it demonstrates that a goal-oriented programme management style can be applied for transition management, because it provides guidance for organising a multi-level governance approach in practice. Our research has shown that the performance of the programme to establish integrated output relies on a balanced combination of centralised and decentralised governance approaches. Planning, design and engineering were decentralised activities in the programme, whilst the national government set out the decision making framework, monitored performance and facilitated where necessary. The multi-level governance approaches that are being applied in Room for the River are resulting in effective delivery of programme objectives (i.e. so far, the programme performs on schedule and within budget). Similarly, the scholarship about transition management (and adaptive governance) suggests that a mix of centralised and decentralised governance approaches is required for establishing integrated water management (Pahl-Wostl et al., 2010; Rijke et al., submitted; van de Meene et al., 2011).

We have identified several key factors for balancing centralised and decentralised governance approaches in the Room for the River programme (Section 4.2). A multiple objective that emphasized the importance of spatial quality created an incentive for decentralised government (i.e. municipalities and Provinces) to actively engage in the programme (particularly relevant for goal oriented programme management). A proactive justification cycle of justification, monitoring and facilitation that was supported by a balanced 'triangle' of project management, process management and knowledge management, enabled programme-wide collaboration, learning and anticipation to contextual change (relevant for all types of programme management). A starting document that was co-signed by all government levels involved provided a point of reference in terms of vision, objectives, procedures, roles and responsibilities and independent advisory boards assisted in generating supported programme output (particularly relevant for portfolio management and goal oriented programme management). These lessons are relevant for establishing multi-level governance in water management in the Netherlands and abroad.

In this paper, connections have been made between the scholarships of transition management and programme management. The case of Room for the River has shown that this combination provides useful insights for challenges in both the transition management and programme management literatures. The transition management literature focuses on establishing structural system change. Recently, the transition management literature has started to focus on addressing the challenge to provide effective prescriptions for establishing change (Loorbach, 2010; Pahl-Wostl et al., 2010). Accordingly, it is focusing on social learning and suggests that multi-level governance as a prerequisite for effectively establishing change (Huitema et al., 2009; Pahl-Wostl et al., 2007). It refers to knowledge programmes (Bressers, 2011; van Herk et al., 2011b), bridging organisations (Moss, 2009) and transition arenas (Loorbach, 2010) as attributes for learning and multi-level governance. This paper has described how large scale infrastructure programmes can be applied to organise multi-level governance. For water management in the Netherlands this is particularly relevant, because here upgrades to the technical flood protection system, and thus systemic change/transitions, unfold through sequence of programmes. Hence, we conclude that the programme management and transition management literatures complement each other.

Furthermore, developing practical guidance for knowledge transfer is a challenge in both scholarships. Based on our findings, we conclude that there is a risk of a stagnating transition when the lessons about multi-level governance are not being transferred to new programmes such as the Delta Programme and the new HWBP. It is in the temporary nature of programmes that there is limited attention for knowledge management during the life of programmes because knowledge management often goes beyond the objectives of programme management (Lindner and Wald, 2011; Turner and Müller, 2003). However, from the perspective of organisational change and transition management, inclusion of performance criteria for knowledge transfer would be beneficial. Hence, we recommend combining the direct output focus of programme management and long term focus of transition management to address this challenge in future research. For example, application of the concept of bridging organisations within mother organisations could assist in sustainable accumulation of knowledge for periods longer than the duration of individual programmes. We recommend that the implications of such a combined approach are studied further in future research.

Acknowledgements

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