

# Transition in governance of River Basin Management in the Netherlands through multi-level social learning

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## Abstract

This paper presents a case study of a new adaptive, multi-level governance approach that supported a transition in river basin management in the Netherlands. The floods of 1993 and 1995 in the Netherlands triggered a paradigm shift in flood management. The 2.3 billion Euro flood safety programme Room for the River (RftR) was launched to increase flood safety by giving the rivers more room instead of merely enforcing the defence systems. This programme has been studied as a major stepping stone in the transition to integrated flood risk management: integrating spatial planning and flood risk management; and stimulating multi-level and multi stakeholder decision making. This research studied the outcomes of RftR beyond its mere delivery and how these outcomes came about. It comprised: 55 qualitative interviews, a survey amongst professionals and politicians (151) and extensive document analysis. First results indicate impact on: practice through guidelines in various disciplines; policy and regulation for e.g.: land use in outer marches; dyke requirements; regulation on soil and water quality; and other policy domains; scientific models and methods; and capacity building of people; organisational and management processes; and the creation and connection of networks. This outcome was obtained by stimulating social learning, within a multi-level programme organisation. This made it possible to signal, escalate and address barriers and opportunities for transition at the appropriate scale level and subsequently disseminate the lessons. For scholars in transition management and adaptive management RftR provides an example of a large-scale programme that changes the regime from within at the meso level.

## 1. Introduction

The frequency and consequences of extreme flood events have rapidly increased worldwide in recent decades (e.g. Bouwer et al., 2007; Kron, 2009). The global flood cost has reached a total of USD470bn since 1980 (*HSBC Global Research*, 2011). Climate change is likely to exacerbate this trend in the near future (e.g. IPCC, 2007). The key drivers for these increases in flood risk are the world's population growth and the increase in socio-economic activities in flood prone areas and their growing interdependency on flood protection and drainage infrastructure of which a significant part is of unknown or poor condition (Ashley and Cashman, 2006; National Committee on Levee Safety, 2009). The majority of flood risk management policies have focused on protection (Saeijs, 1991) and during the 20th century, the scope shifted from indigenous, local-scale solutions (e.g. mounds) to large-scale protection, such as flood

embankments and channelization. This shift to large scale engineering responses was mainly driven by economic development and technological innovations. More recent experience has revealed important limitations to these engineering-based practices (Newman et al., 2011). On the one hand, these include limitations to the infrastructure: incorrect design assumptions (that is, circumstances for which the systems were designed proved to be more severe than originally predicted), inadequate funding (systems never meeting their design criteria), and poor maintenance (the performance of the systems declining over time) (e.g. Gordon and Little, 2009). On the other hand, the engineering responses are less adaptive in the long term considering the drivers of increasing flood risk: climate change increases the stress on these systems, whilst increasing socio-economic activities might require higher protection standards (e.g. Gersonius, 2012). It is increasingly recognised that engineering alone cannot accommodate the future frequencies and impacts of flooding and a shift in emphasis is required from hard structural solutions to a mixed integrated approach that consists of both structural and non-structural responses. Among the non-structural responses land use planning is considered as one of the most crucial in managing exposure and vulnerability to floods (Van Herk et al., 2011a). Many scholars call for a transition to policies focussing on reducing the exposure to floods and accommodating floods: 'living with water', rather than merely on reducing the hazard probability: 'fighting against water' (e.g. Zevenbergen et al, 2008). An integrated approach to flood risk management set within land use planning processes is now seen as an effective way of minimising flood risk, although this has not always been recognised in practice and empirical guidance for implementation is still lacking (e.g. Watson and Adams, 2010; DCLG, 2012; van Herk et al, 2011a).

Integrated flood risk management faces multiple barriers such as: short term actions need to be combined with long term plans (Geldof, 2007); spatial development planning has many drivers other than flood risk management (Van Herk et al., 2011a); lack of understanding of the effectiveness of non-standard response measures (Adger et al., 2005); and a technical lock-in to structural solutions, such as defence measures (Walker 2000). To overcome persistent barriers such as: institutional structures, cultures and approaches in land use planning and flood risk management a transition or regime change is required (e.g. Pahl-Wostl et al., 2007; van der Brugge and Rotmans, 2007; Wong and Brown, 2009). In the recent past, major flood disasters have acted as catalysts for changing flood risk management policies (Mauch, 2009). The implementation of new integrated policies will have to address these and possibly other unforeseen barriers. These cases need be monitored and evaluated to document and draw lessons on the impact of these implementation processes on supporting a wider transition. Those managing, or rather, contributing to a transition need these lessons for iterative adjustment of governance practices (Loorbach, 2007).

For example, the floods of 1993 and 1995 in the Netherlands and increased attention for climate change triggered a paradigm shift in flood management. The 2.3 billion Euro flood safety programme Room for the River was approved by Dutch parliament in 2006 to increase flood safety by giving the rivers more room instead of merely reinforcing the defence systems. The programme is to be delivered in 2015 to increase the river discharge capacity to 16.000m<sup>3</sup>/s by river widening measures. The Programme comprises of 39 measures or projects for giving more room for the rivers Rhine, IJssel, Waal and Lek. Measures, such as flood by-

passes, excavation of flood plains, dike relocation, and lowering of groynes (Fig. 1), have a stronger spatial component than traditional measures such as dyke reinforcement alone. 'Room for the River' explicitly aims to increase flood safety combined with increased spatial quality of landscape, nature and culture (Schut et al., 2010). Also the Programme studied the long-term robustness of the measures by focusing on a hypothetical long-term discharge objective of  $18,000\text{m}^3\text{sec}^{-1}$ . Dyke reinforcement along a wider river would also remain possible if future flood risk drivers would require this. This programme has been studied as a major stepping-stone in the transition to integrated flood risk management, integrating spatial planning and flood risk management. It is not only the mere delivery and thus demonstration of this policy ('output') supporting the transition, but also initial expert interviews and document analysis indicate that 'outcome' beyond the delivery was achieved. This paper presents 2 years of research into the different outcomes that have been obtained to document the legacy of Room for the River and to draw lessons on how to manage the governance challenges related to overcoming the barriers and seizing unforeseen opportunities. The multi-level and multi-stakeholder interaction (social learning: working and learning together) proved valuable to create an impact beyond the programme output.

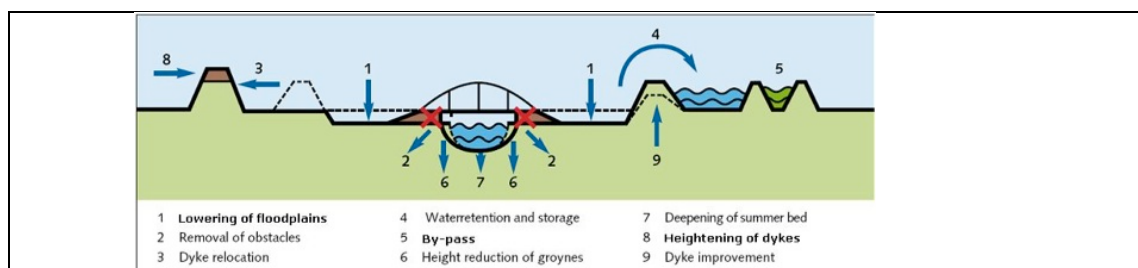


Figure 1: Types of measures in the Room for the River programme.

## 2. Positioning Room for the River in the Transition to integrated flood risk management

First the question arises how Room for the River is positioned in the transition to integrated flood risk management. Transition scholars have developed multiple frameworks to describe transitions in terms of transition stages, transition pathways and levels, transition patterns and paths. It is beyond the scope of this paper to apply these rigorously, but insight can be obtained on the role RftR plays in the transition.

Transition literature provides several different definitions for transition. Rotmans et al. (2001) define transition as 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). De Haan and Rotmans (2010) further specify that a transition is a fundamental change in the *structures* (the formal, physical, legal and economic aspects of functioning restricting and enabling practices), *cultures* (the cognitive, discursive, normative and ideological aspects of functioning involved in sense-making of practice) and *practices* (the routines, habits, formalisms, procedures and protocols by which actors, which can be individuals, organisations, companies, etc., maintain the functioning of the system) of a societal

system, profoundly altering the way it functions. Other authors refer to a process of regime-change (e.g. Kemp et al. 1998; Pahl Wostl, 2006; Van de Brugge and Rotmans, 2007); the functioning of the regime is the typical way societal needs are met (De Haan and Rotmans, 2010). Several authors have shown that the changes in flood risk management can be considered a transition (e.g. Pahl-Wostl, 2007; van der Brugge and Rotmans, 2007; Wong and Brown, 2009, Rijke et al., 2008). Room for the River is part of a wider transition to integrated flood risk management combined with collaborative spatial planning moving away from a sectoral (water management) and regulatory (complying with protection standards) approach focusing on traditional engineering solutions to reduce the probability of flooding (Woltjer, 2007). Room for the River contributes to a change in the culture of flood risk management with its central discourse of accommodating floods and living with water (Rijke et al, subm). It embraces new practices of participative planning, stimulating collaboration and learning amongst authorities, private companies, research institutes and inhabitants (Van Herk et al, subm). Room for the River changes structures by supporting policy development, institutional and organisational changes that enable these practices. The contribution of Room for the River to new practices and structures will be described in more detail later in this paper.

Rotmans et al (2001) distinguish four different transition phases for socio-technical systems: 1. predevelopment phase, 2. take-off phase, 3. breakthrough or acceleration phase, 4. stabilisation phase. Rijke et al. (subm) explains how these relate for water management to the four adaptive cycle phases for socio-ecological systems from adaptive governance scholarship (Folke, 2006; Gunderson, 1999; Gunderson and Holling, 2002; Olsson et al., 2006; Walker et al., 2004): 1. Collapse / release; 2. re-organisation / renewal; 3. growth / exploitation; and 4. conservation. It is possible to hypothesise as to what activities typically occur during these phases, such as network formation, response to a crisis and policy development, implementation and regulation. Overlaying these with RftR activities from 1999 to 2015, indications are found that the Programme supported all phases in some way, but mostly phases 2 and 3. After the 1993 and 1995 floods in the Netherlands the take-off or renewal phase started and policies for integrated flood risk management could be devised (Van der Brugge et al., 2005; Wolsink, 2006). During the initiation phase of Room for the River (1999-2006) the regime started to change by stimulating local authorities to propose measures along the river basin to enhance flood safety, traditionally the task of central government. Furthermore, the programme proposed river widening measures and set spatial quality as a second objective besides flood safety and thus spatial planning had to be combined with flood risk management. The Dutch Parliament approved the collaborative approach, measures and objectives explicitly with the Programme Decision Room for the River. During the design phase (2006-2011) the various stakeholders further developed the 39 measures comprising the Programme that are being delivered in the current Delivery phase (2011-2015). These two phases contribute to the acceleration or growth phases due to the intense collaboration between many stakeholders (municipalities, waterboards, provinces, etc) in large parts of the country and the actual implementation of measures and thus large-scale demonstration of the new approach. The Delta Programme (DP) builds upon the experiences of RftR and can be positioned in the growth phase having the potential to take the transition well into the stabilisation phase. The DP is the next large flood risk management programme in the Netherlands. The DP was launched in 2009 and subsequently approved by Dutch parliament in the Delta Law 2012 that secures 50 Billion

Euro until 2050 to work on flood safety and fresh water supply for the entire country with a long term perspective until 2100 (Deltacommissaris, 2011). The Delta Programme has a broader scope in terms of geography and substance, but embraces a similar collaborative, trans-disciplinary or multi-actor and multi-objective approach.

Geels and Schot (2007) use a multi-level perspective based on work of Rip and Kemp (1998) to analyse transition pathways. They distinguish between: the Macro or landscape level; the Meso or regime level; and Micro or niche level. Several authors have applied this perspective on transitions in water management in the Netherlands. Rijke et al. (2008), Van Herk et al. (2011a) and Van der Brugge et al. (2005) describe how the 1993 and 1995 floods were landscape changes that put pressure on the regime. Examples of niche innovations at a Micro level include experiments and learning processes for e.g.: building in outer marches, building on water (Van Herk et al, 2012b), and river restoration (Vreugdenhil et al., 2008; Scholten, 2009). These niche innovations can adjust or change the regime. Room for the River is considered to function at the Meso level within the regime and thus changing the regime from within. RftR is the largest water management project in the Netherlands since the Delta Works of the 1970s. The Delta Programme was initiated from the landscape pressures following the wake-up call after the Katrina floods in the USA and the political attention for Climate Change. The DP is also functioning at the Meso level, but explicitly aims to leave freedom and flexibility for bottom up initiatives and innovation (Deltacommissaris, 2011)

De Haan and Rotmans (2010) provide a framework for transition stories; to describe a transition path as a concatenation of patterns. Ideal-typical patterns of constellation change are: top-down *reconstellation*; bottom-up *empowerment*; or *adaptive* and internally induced. These patterns can be intertwined and simultaneously at play. They are driven by three possible conditions: *tensions* from the environment; *stress* internally; or *pressure* from alternatives. To better understand RftR contribution to the transition we apply this framework to the Programme, in view of its paramount role in various stages of the transition. The 1993 and 1995 floods put tension on the regime. A reconstellation followed the Programme Decision that set the double objective of flood safety and spatial quality and prescribed a collaborative approach between state and regions. This put stress on the regime that was inadequately organised in a top-down manner for such collaboration. Regional steering groups were created, as well as a programme directorate to manage the interface between regions and national government. They implemented a justification cycle of monitoring and facilitation between the multiple levels (Rijke et al, subm.; Van Herk et al, subm). A more bottom-up pattern followed during the Initiation and Design phases. Local and regional stakeholders started participatory planning processes to develop measures that could be included and financed by the RftR programme. They were empowered to propose measures using a computerized hydraulic model/scenario planning tool called 'box of blocks' (Schut et al., 2010; Reuber et al., 2005) that supported the design and selection. The new structures, culture and practices put the regime under continuous pressure during the Design and Delivery phases. Van Herk et al. (subm.) describe how the Programme Directorate cultivated a culture of continuous learning and improvement of the organisation; i.e. reflexive and adaptive governance (Voß and Bornemann, 2011). Also much effort was put into incorporating and influencing policy and regulation at national and European level to enable delivery of new river widening measures as these ran

into environmental, soil and other regulation. With reformed legislation a new round of reconstellation could be emerging that paves the way for the fourth transition stage of stabilisation in river basin management. For flood risk management in a broader sense the Delta Decisions that are to be distilled in a Delta Act in 2015 could establish a new reconstellation (Deltacommissaris, 2011).

### **3. Research objectives and approach**

The purpose of this research is to analyse the outcome of Room for the River beyond its mere delivery and how this outcome came about to draw wider lessons on how such outcomes can be obtained. As a by-product, this paper documents part of the legacy of Room for the River in terms of the transition to integrated flood risk management and collaborative spatial planning. The case study analysis of Room for the River involved a triangulation of multiple methods (see also: Yin, 2003). The data comprised a) document analysis, b) 55 face-to-face semi-structured interviews, c) a quantitative survey (n=151), d) observation at 3 training sessions with 45 participants, 2 political conferences with approximately 220 participants and 1 RftR and Rijkswaterstaat community-building event with approximately 150 participants. Semi-structured interviews were conducted with people who were involved in 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 directorate; Rijkswaterstaat; waterboards; provinces; municipalities; the Ministry of Infrastructure and Environment; and independent scientists and representatives of planning bureaus. Each of the interviews was semi-structured and covered the following similar topics of relevance for this paper: examples of outcome of RftR; (if any) how this outcome came about; if, why and how this process was actively managed; and what the value of this outcome is. The outcomes mentioned by interviewees were verified in documents, such as: guidelines, policy & regulation, training documents, minutes of team meetings.

The survey served to verify if respondents recognize RftR impacts on various changes such as: river widening as a possible solution; new approaches for design and analysis supporting integrated flood risk management; collaboration between authorities; project and programme management and organisation. More specifically, the researchers analysed and compared what type of professionals and organisations use RftR lessons.

The outcomes found were classified according an adaption of the categories of impact factors from Van Herk et al. (2011a): practice; policy & regulation; science; capacity building of people, organisations and networks. This classification proved useful for lessons on governance arrangements that support obtaining such outcomes. This paper presents various examples of processes that created outcomes and compares them to draw general lessons.

#### 4. Results: outcomes of Room for the River

As expected, the actual implementation of the measures (process and output) is considered to have the most important influence on the transition. All 55 interviewees and 131 out of 141 survey respondents\* mentioned Room for the River's contribution to the transition by: 1. implementing and thus demonstrating river widening measures that combine flood safety with spatial quality; and 2. improving collaboration between authorities in flood risk management and spatial planning. On average survey respondents rated the influence of RftR on river widening as a possible solution to increase flood safety with a score of 4.24<sup>1</sup>, where 1. is a very small influence and 5. is a very large influence. Collaboration between authorities scores highest of all impacts: 54 out of 141 respondents use these lessons 'structurally' and 52 'sometimes'. 3 representatives of the Delta Programme stressed in interviews that the multi-level collaboration between authorities as developed in RftR is the basis for the government approach of the DP and that DP can build upon the networks and trust created in RftR.

The research data, however, also provided many, elaborate and convincing examples of other outcomes of Room for the River. All but a few fit in the categories of impact factors from Van Herk et al. (2011a). Unexpected outcomes related primarily to programme and project organisation and management, for which a category of impact factors was added to existing theory: capacity building of people, organisations and networks. Effective programme and project management and organisation helps the delivery of complex programmes and thus indirectly integrated flood risk management. Rijke et al. (subm) further discuss the contribution of RftR to more effective programme management and, more broadly, to a transition from government to governance. The other categories are: practice; policy & regulation; science, and are used to describe the RftR outcome. Figure 2 shows the outcome factors and their mutually interdependent relations. Capacity building and networks support policy, practice and science. New scientific insights and methods can drive policy change and new practice (Van Herk et al. subm\_b, Sabatier and Jenkins-Smith, 1993), that in turn can be researched and enhance science. New policy and regulation will lead to new practices and vice versa. Hence, the classification of impact factors is useful to describe and analyse, here, the creation of that impact, but categories are not necessarily mutually exclusive.

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<sup>1</sup> out of 151 survey respondents, only 141 answered the survey questions on RftR's contribution to changes

<sup>2</sup> standard deviation: 0.82

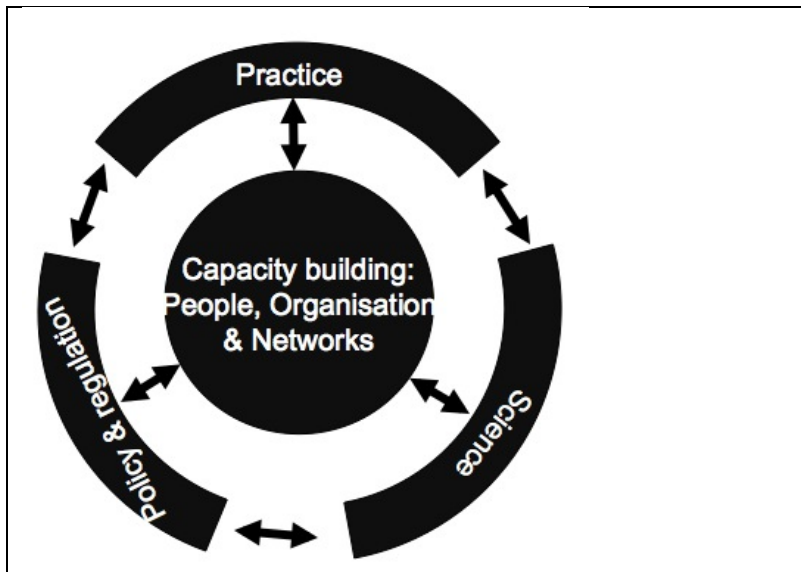


Figure 2: Outcome factors and their mutual relation

## 4.1 Practice

Impact factors related to practice are new work approaches that are established and disseminated beyond the innovative project or programme through e.g. guidelines for a specific policy domain or disciplines. Room for the River has actively contributed to guidelines for: soil movement planning; planning for spatial quality; groynes information systems; consistent information requirements for hydraulic, vegetation, landscape mapping and planning; and asset monitoring and maintenance protocols. It is not likely that this list is exhaustive, but lessons can be drawn from a more detailed analysis of the creation of these outcomes. Some examples are presented with different approaches to creating and managing outcome.

In Room for the River approximately 500 groynes are being lowered along the Waal river to increase the river's discharge capacity as the water level will be 10cm lower at a flood wave of 16.000 m<sup>3</sup>. Existing groynes along the Dutch rivers have been constructed and restructured in various time periods (some are more than 200 years old) for different reasons: 1. local river diversion; 2. land reclamation; 3. sediment control; and now 4. increase river discharge. The groynes have thus different characteristics such as: function, material, shape. RftR discovered many different groynes in different projects and decided to create a so-called groyne-passport to document each groyne's characteristics in an open access database to support the delivery of RftR, but also for future operation, maintenance and construction of these and other groynes. Local and regional authorities, contractors and engineering firms have been invited to use and add to this information system.

Experts interviewed initially estimate<sup>2</sup> that soil excavation and movement can sum up to 30-40% of the RftR programme costs as dykes are to be relocated, flood channels are to be excavated and quays and mounts are to be constructed for assets in the outer marches. However, in the early RftR projects soil experts were only more actively involved in the final design stages.

<sup>2</sup> more than 70% of the projects are yet to be tendered and thus costs are dependent on market offerings.



Recompiling the lessons from these projects the Knowledge Department of the Programme Directorate (PDR) created guidelines in 2009 and is involved more actively in early design stages. Cost reduction opportunities are explored to move soil within and between RftR projects, as well as with other projects. The future function and the quality of the soil are a determinant for its use elsewhere and is subject to regulation and permits. The PDR organised a parallel process to develop a programmed approach together with all directors of regional authorities granting permits and the Inspection of the Ministry. Nationally renowned experts working for the PDR have the required overview, competences, status and networks and used this to disseminate the guidelines to external stakeholders, such as engineering firms that have confirmed their use, e.g. the proposed soil quality map is the legal proof for contractors to move soil.

Much experience has been gained with designing for spatial quality. This experience is documented in RftR internal evaluations by its Knowledge department for Spatial Quality and external Quality team, and in external evaluations (Hulsker et al., 2011). Lessons are drawn on the substance or measures and processes and procedures. E.g. the dyke is to be a leading design element as a long term investment embodying a river landscape, not to be easily compromised to local elements with a shorter life span. Also the removal of objects and local landscape structuring (e.g. zoning of functions such as nature, intensive and extensive recreational use) can increase spatial quality whilst increasing river discharge capacity, without other major interventions. Many appealing design elements have been developed, taking the local land use, cultural, geomorphological and hydraulic situation and history as starting points for design elements. Process lessons relate to: the establishment of an independent Quality-team supporting local projects, the role and collaboration of landscape architects with project managers, checklist for products that anchor spatial quality in different phases such as: tendering documents, political agreements, maintenance plans, etc. Also lessons can be drawn on the balance between design and analysis activities, much like as proposed by Van de Ven et al. (2006) and Van Herk et al. (2011a). The director of the Delta (sub)Programme for Rivers confirms the use of the abovementioned evaluations and tries to involve RftR people and their approaches in the DP. The Quality team consists of external experts that use their experience when working on other projects, as will RftR employees if deployed elsewhere. Besides this, the knowledge and experience (admittedly intangible) seems not actively anchored or disseminated in a structured manner beyond the Programme.

## **4.2 Policy & regulation**

Room for the River created impact by influencing the development or implementation of new and existing policy and regulation. Existing policy and regulation can be an important barrier for the uptake of new approaches. Likewise, its adaption is an important attribute to increase receptivity for new approaches ('application' in: Jeffrey & Seaton, 2003/4; Farrelly and Brown, 2008). Room for the River has influenced e.g.: policy for land use in outer marches; precedents for dyke requirements; regulation on soil and water quality; regulation for redevelopment of lakes; and nature-oriented planning. Some cases are described here in more detail to illustrate that impact on policy and regulation can be unconsciously created by precedents, or can be deliberately managed.

By relocating dykes inland to create more space for the river, land and assets are situated in outer marches that were previously protected by these dykes. Special policy has been developed to regulate safety standards for functions 'created' in outer marches based on RftR examples. Based on the depoldering of the Noordwaard, standards developed for residential dwellings include: return period of flood damage (1/25 years) and water levels (1m water in a dwelling), availability of evacuation routes; construction requirements; hydraulic hindrance. Consequently, precedents were set to decide on the creation of earthen mounts for dwellings or expropriation, demolition and related reimbursement. For the same project, Provincial policy was interpreted to establish the size of agricultural plots at 1.5 hectares. RftR assumed a flood return period for agricultural functions of once every three years. Political lobby by agricultural organisations led to studies by the Institute for Agricultural Economics that proposed 1/25y for economically viable business that was adopted by Dutch national parliament. Quays were to be constructed and additional budget was reserved.

For decades dykes have mostly been renovated, but not designed and constructed from scratch in the Netherlands. This changed with Room for the River comprising of several measures including dyke relocation measures. Manuals for dyke design and engineering have been re-interpreted and precedents have been created and will be included in policy documents according to the experts at the Programme Directorate. Examples of interpretation-issues that surfaced from individual projects include: the thickness of the clay-layer required on dykes; possible inclinations of dykes for maintenance purposes or landscape values; and flexibility to reinforce dykes on the river-side (reducing discharge capacity) to avoid demolition of assets on the land-side as long as hydraulic compensation is created.

In 2010 a new Water Act was enacted with specific elaborations on soil quality that came from previous Surface Water and Contamination Act and Soil Quality Licence. The Act was accompanied by several guidelines such as Guidelines Soil that in turn drew from Guidelines for active soil management of Rijn and Meuse. The new regulation and guidelines used a more integrated, rather than sectoral approach by regulating the sources of contamination and application of soil instead of the contaminated soil itself. This policy change enabled the movement and use of soil for a specific function that would otherwise be disapproved (e.g. dredged spoil not always needed treatment). The Knowledge department on Soil of the Programme Directorate interacted with policy makers in a parallel process, whilst facilitating individual projects. The RftR project Scheldener en Oldeneler buitenwaard near Zwolle planned to fill a lake near a freshwater supply basin. The water company opposed this which delayed the project by 6 months. The PDR commissioned research by an independent institute to prescribe requirements for landfill. The Minister for the Environment later developed policy for the redevelopment of lakes, involving researchers from this project.

Nature-inclusive design, as conducted in RftR, has been set as an example by the European Union's Directorate General Environment to obtain environmental objectives in flood safety and spatial planning programmes. Furthermore RftR representatives advised the Dutch national committee Elverding on incorporating environmental objectives and stakeholders in early stages to avoid project delays and cost-overruns in the delivery of large infrastructure

programmes. The recommendations are included in a ministerial action-plan that provides guidance for such programmes. However, 2 interviewees and 15 participants in a workshop stated that: "Environmental regulation is not properly addressed. Often explicit wording in the regulation conflicts with flood safety measures and with the regulation's very own purpose, as nature conservation in outer marches can hinder river discharge and opportunities for dynamic nature development in these and adjacent areas are missed." Regional stakeholders sought creative solutions whilst the Programme Directorate lobbied for flexibility in the implementation of Natura2000 to national and European policy makers.

### 4.3 Science

Room for the River developed new methods and approaches that enriched science and engineering as scientist learnt from working with practitioners, co-developed the methods and evaluated their use in practice. Also these methods are to be used in other projects. 'New methods for design and analysis' was scored highest<sup>3</sup> by survey respondents from the Ministry of Infrastructure and Environment (n=10), when they were asked for RftR's influence on changes. Lower-ranked answers also included: 'increased collaboration' and 'river widening as possible measure'. There is a growing body of research into methods that support collaborative design and analysis, or decision support measures that help to involve a wide range of stakeholders including the public and politicians (e.g. Pahl-Wostl et al., 2007; Van de Ven et al., 2011;).

Interviewees mentioned especially the added value of the hydraulic model/scenario planning tool called 'box of blocks' (*blokkendoos* in Dutch) in RftR. Schut et al. (2010) explain how the instrument evolved from first a tool used by hydraulic engineers (also Reuber et al, 2005) to 'explore solution space' and calculate the hydraulic consequences of a combination of (river widening) measures, to later supporting the design and selection of measures, facilitating dialogue, cooperation and eventually decision-making between policy makers from different levels and regions. The tool was made available to all stakeholders to 'play with' and could demonstrate and visualise the effectiveness and interdependencies of measures to reduce water levels. Regional and local stakeholders could run their proposed measures through the model and nominate them for the long list of 600 measures. The Programme commissioned the development of such a tool to a renowned Research Institute in the Netherlands. However, scientists worked together with decision-makers and practitioners on the development and continuous improvements of the tool and posterior monitoring of its use. A member of staff of the Delta Programme said: "we want to work with science to develop a 'box of blocks' kind-of tool to support participative planning in the DP. We will call it the Delta-Instruments and Delta-Portal that comprise: a calculation tool for water safety and fresh water supply; a method for comparison of measures; maps, descriptions and scores for measures."

Lessons on the governance arrangements of Room for the River are of particular value for scholarships in e.g.: public administration; programme management; transition management (Rijke et al., accepted; Van Herk et al., accepted; Rijke et al., subm). The research presented in

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<sup>3</sup> Average 4.25, where 1. Is a very small influence and 5. is a very large influence.

this paper is another example. These governance lessons are to be used by future policy programmes such as the Delta Programme.

Other examples of impact on science and engineering include: morphologic and hydraulic modelling for e.g. groyne and quay design. Models have been further developed and improved by validation through a monitoring programme. Physical field measurements monitor: actual water levels (comparison with hydrograph), sediment and patterns in the riverbed after flood waves (morphological), flora and fauna (ecological models). Also new 3D areal measurements (laser altimetry) are being applied to study the dynamics of river banks.

#### **4.4 Capacity building of people, organisations and networks**

During each of the 55 interviews examples were mentioned of RftR outcome in terms of capacity building of people and organisation and the creation of networks. These outcomes varied from: increased collaborations between administrations; the adoption of a central programme office for large scale water management programmes; permit and compliance coordination between authorities; competences and awareness of spatial planning at regional Waterboards; the adoption in corporate policies of regional authorities of: project management structures and roles; project control procedures; risk management; justification cycles and milestone management; and tendering procedures.

These outcomes came about as a consequence from working and learning together that was stimulated from the outset by the programme's double objective of flood safety and spatial quality and related collaborative governance approach (Rijke et al., subm; and Van Herk et al., subm). Specific management of these outcomes involved: cultivating a culture of learning; audits and evaluations; community building; and training programmes. Van Herk et al. (subm) already highlighted the importance of the focus on continuous improvement of the organisation. The vast experience and procedures for programme and project management in the delivery of large infrastructure projects of Rijkswaterstaat, the executive body of the Ministry of Infrastructure Environment, were applied in RftR. Regional and local authorities in water management and spatial planning were exposed to this experience and their representatives confirmed in interviews and survey the learning opportunity provided. RftR was an especially valuable case study as RftR is set to deliver within budget and time constraints (PDR, 2011) as opposed to e.g. the large scale projects the Betuwelijn freight rail and High Speed Rail (Hertogh et al., 2008).

### **5. Discussion: multi-level social learning**

The previous section presented case study results on the outcomes of RftR, raising the question: how this outcome came about and what lessons can be drawn for governance arrangement to obtain outcomes? A first observation is that RftR was delivery-focussed and the creation of outcome has been a by-product. Secondly, however, some characteristics of the governance arrangements are distilled that have supported the creation of outcome: multi-level social learning within a programmed approach.

## 5.1 Delivery-focussed learning by doing

All examples found indicate that outcome was created to overcome barriers or seize opportunities towards delivery. Project management was needed to deliver within scope, time and budget. Capacity building was stimulated to support progress in RftR projects, using experience from frontrunner projects and the knowledge base at the Programme Directorate. The 'box of blocks' was created to enable decision-making between stakeholders in RftR, but not for public participation in water management in general. Improved hydraulic and other models were needed as a legal basis for decisions on measures and to optimise designs and thus investments. Regulation and policy on the creation of functions in outer marches was developed based on the first case studies in RftR under time pressure to deliver these projects in time. These processes were diligent to safeguard that decisions were litigation-proof, but the decisions created precedents for which it is too early to judge their consequences. The new Water Act and soil quality guidelines were developed thoroughly with policy makers. RftR representatives collaborated actively because 'soil'-related regulation was of paramount importance for the Programme (budget). Conflicts between flood safety and environmental policy are solved at a project level, but are not addressed in a structured manner. Practical guidelines were first and foremost targeted on the application within the RftR community.

Hence, RftR created much outcome, but has not adhered explicitly to objectives or models of transition management. Interviewees indicated that an explicit objective, process or budgets to contribute to a transition, were not politically viable, e.g.: "Public investment assessments of the planning bureau did not include non-flood safety-related benefits of RftR, such as spatial quality, increased public support (and thus potentially reducing progress hindrance), let alone a contribution to a transition." However, the Minister embraced the new paradigm after the 1993 and 1995 floods and some local politicians stated in interviews: "we can't continue like this (continuously upgrading our defence system)". The new paradigm of accommodating water was the basis of RftR and that innovative basic concept enabled the creation of much impact by merely aiming to deliver the Programme. Learning by doing is central to most adaptive management and transition management literature. These bodies of literature provide mostly descriptive frameworks, rather than prescriptive frameworks (Van der Brugge and Raak, 2007; Anderies et al., 2006), but prescriptive frameworks or tools include learning arenas, experiments and monitoring (e.g. Loorbach, 2007; Kemp and van den Bosch, 2006; Van den Bosch and Taanman, 2006; Gunderson et al, 2006; Olsson et al., 2006; Pahl-Wostl et al., 2007). Rotmans and Loorbach (2007) even combine these tools in one framework, but this seems too ambitious and prescriptive based on the RftR experience. The actual programme delivery has been the main driver and not transition. Besides, socio-technical systems are considered to behave as complex adaptive systems that change as a result of self-organisation and external pressure (de Haan, 2006; Scheffer, 2009) and not by explicit attempts by programme management.

## 5.2 Multi-level social learning

Three governance elements stand out in supporting the creation of outcome: 1. social learning; 2. multi-level governance; and 3. a programmed approach. Social learning can be summarised

as working and learning together. Pahl-Wostl et al. (2007) recommend “social learning” processes as a means of developing and sustaining the capacity of different authorities, experts, interest groups, and the general public to manage their water systems effectively. Social learning is considered an alternative, complementary policy instrument in water governance (Blackmore et al. (2007) and is gaining recognition as a potential governance or coordination mechanism (Ison & Watson, 2007). Many authors stress the need for multi-party collaboration and propose some sort of social learning framework (White, 2008; Boelens, 2006; Pahl-Wostl et al., 2007; Farrelly et al., 2009, etc.). Social learning can support both the delivery of policies and a wider transition. Van Herk et al. (subm) analyse how social learning processes supported the delivery of RftR and how it was organised at different scale levels and in different phases. This paper studies how social learning contributed to outcome beyond the delivery of RftR. The multi-level arrangements that governed the collaboration between the national government, the Programme Directorate and the projects with regional stakeholders proved especially relevant. The same holds for the programmed approach of RftR comprising 39 regional and local projects that could learn from each other.

Examples show common threads in the social learning process: 1. signal barriers and opportunities; 2. escalate; and address these at the appropriate level, often in a shadow process; and 3. anchor or disseminate the outcome (see Figure 3). Signalling of barriers and opportunities took place at the level of individual projects, whilst designing the measures, analysing the system and solution (e.g.: hydraulics; morphology; soil quality; piping and cabling, archaeology) and discussing ambitions and compliance with other policy and regulation. Guidelines were deemed necessary for soil movement planning, policy was to be developed to regulate functions in outer marches, more accurate models were necessary for groyne design and monitoring, local competences in stakeholder management did not suffice for politically complex projects such as Zwolle and Veessen-Wapenveld. At a programme level recurrent issues for several projects were signalled through its project control systematics and through stakeholder managers it assigned to monitor and facilitate individual projects. Also, the PDR monitor upcoming issues from national politics through periodic meetings with the Ministries involved and informal contacts with parliament. Similarly the PDR’s Knowledge department monitored developments in terms of new regulation in their policy domains.

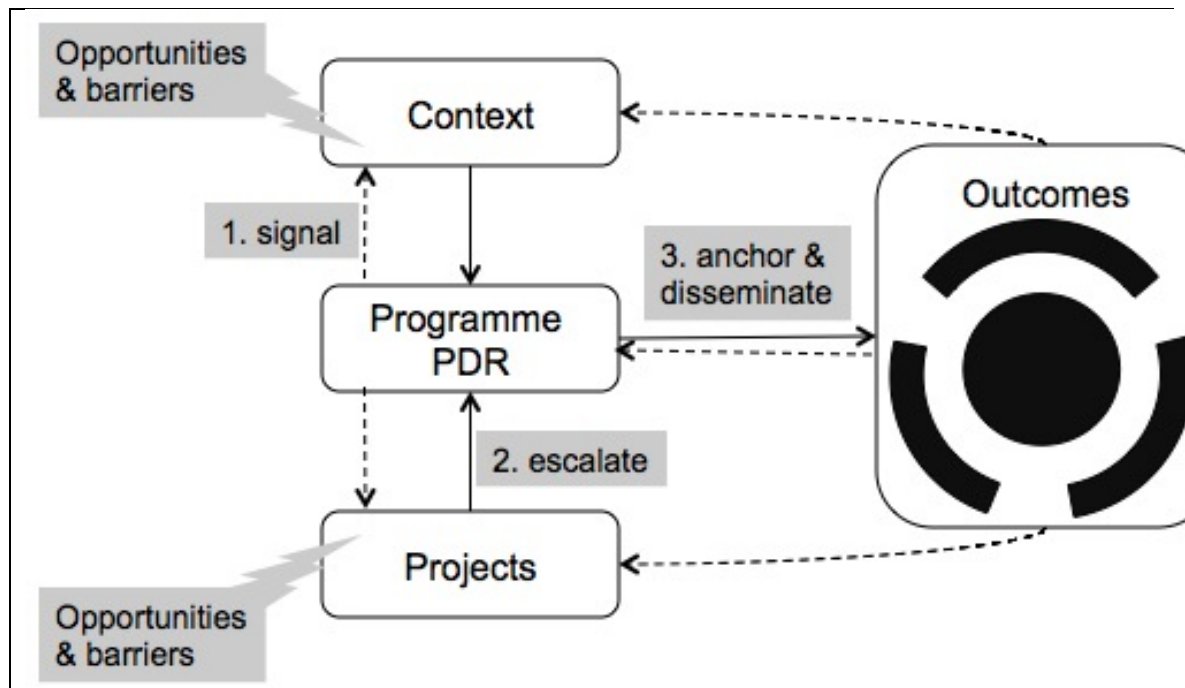


Figure 3: trends in multi-level social learning processes to create outcome: 1. signal; 2. escalate; 3. anchor & disseminate

Recurrent issues in terms of: practice; policy and regulation; and science, were escalated to the PDR, particularly its Knowledge department. Thus operational (projects), tactical (regime) and strategic (societal system) networks were linked, in terms of the transition management theory of Van der Brugge and Van Raak (2007). For example, the PDR deliberately centralised important scientific challenges to get consistent models and results. Deltares, a renowned research institute, was exclusively commissioned by PDR for the flood modelling for the entire river basin and set the standard for the models and the underlying assumptions. The PDR addressed recurrent policy and regulatory issues mostly at a national level, where the PDR operated as well within the RWS mother organisation. PDR Knowledge employees have the competences, the overview of challenges and contacts at national level to be a counterpart in discussions on national policy and regulation. They organised shadow processes, parallel to the overall programme and project progress that were shielded from these discussions. At PDR such processes were called 'sub-processes', contrary to the 'primary process' of managing time, budget, scope and related risks. In case such challenges were merely project-specific the PDR could facilitate that project and a shadow process was not necessary. Practical guidelines also required the status, competences and overview at national level. The PDR carefully designed internal projects or sub-processes to work on such issues. These processes included expert workshops, field trips, subcontracting external experts and in some cases had steering committees.

Dissemination of lessons was actively managed to support other projects within the programme, but not necessarily beyond. I.e. this was driven by the programmed approach. This holds particularly for social learning activities to support capacity building and the creation of networks. Lessons were fed into training courses and guidance documents. A platform for exchange and learning was consciously created through community building. Annual events

were organised for e.g. project managers; stakeholder managers; and local politicians to learn from each other and use this in their projects. Systematics for project organisation were consistently imposed on individual projects. Respondents of the survey score the influence of RftR on systematics for project control on average with: 3.72<sup>4</sup>, but respondents from Provinces with: 4.0 and Waterboards with: 4.05. For project management these figures are respectively: 3.63; 3.82; and 3.85. Impact on policy and regulation is inherently anchored and to be applied beyond RftR. In 2012 RftR has entered the delivery or construction phase and the PDR is starting to plan for its dissolution. The imminent potential loss of knowledge and experience seem to have ignited a new wave of interest in knowledge transfer by the RWS mother organisation and Delta Programme. RftR representatives are invited to speak at conferences and workshops are being organised. The PDR employees seem keen to transfer their knowledge and legacy, also positioning themselves for new jobs. In fact, the management of PDR commissioned the scientific evaluation of which intermediate findings are presented in this paper. Taking stock of RftR seems worthwhile as RftR is set to deliver within budget and time constraints (PDR, 2011) and because survey results indicate that RftR scores highly on both satisfaction and enrichment by a wide range of stakeholders (Van Herk et al. subm).

## 6. Conclusions

The purpose of this research was to analyse the outcome of Room for the River beyond its mere delivery. RftR is leaving a legacy in terms of the transition to integrated flood risk management and collaborative spatial planning. This paper presented the impact of RftR on: practice through guidelines in various disciplines; policy and regulation for e.g.: land use in outer marches; dyke requirements; regulation on soil and water quality; and other policy domains; scientific models and methods; and capacity building of people; organisational and management processes; and the creation and connection of networks.

These outcomes were obtained by focussing on the delivery of the Programme objectives within time and budget constraints and not by aiming for a contribution to a wider transition. It required political courage to decide and implement such a large-scale investment programme based on a new paradigm. In fact, people factors such as political leadership and trust scored highest<sup>5</sup> (4.19) as a success factor, in addition to the sense of urgency created after the floods of 1993 and 1995. The challenge of implementing river widening measures inherently required the creation of these outcomes. Hence outcomes are not a by-product, but are instrumental. The size of the Programme, its collaborative nature, its multi-level organisation and programmed approach enabled the outcome creation and implicitly the management thereof. The multi-level governance approach was designed for control and facilitation of individual measures, but it made social learning possible to signal, escalate and address barriers and opportunities for transition at the appropriate scale level and subsequently disseminate the lessons.

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<sup>4</sup> Where 1. is a very small influence and 5. is a very large influence.

<sup>5</sup> Average of 4.19 with standard deviation of 0.71, with 1. Being of very small importance and 5. of very large importance.



Transition management literature mostly refers to the value of innovative experiments at the micro or niche level, but RftR provides an example of an experiment at the meso level, directly changing the regime from within. Analysis and comparison with similar examples of large scale programmes based on new paradigms can enrich that scholarship. Examples could include the coastal restoration plan in Louisiana (USA) after hurricane Katrina based on the concept of building with nature (NRCC, 2006), or the reconstruction scheme in Japan after the 2011 earthquake and tsunami that is currently being designed by the '3.11 Reconstruction Design Council' that considers taking a more resilient approach (Takemura, 2012). In the Netherlands the Delta Programme provides an opportunity to further the transition to integrated flood risk management. It can build upon the networks and experiences of RftR, but is recommended to keep investing in a culture of social learning that first and foremost helps deliver the Programme.

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