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Assessing the soundness of water governance: lessons learned from applying the 10 Building Blocks Approach

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ABSTRACT

Sound governance is needed to address water issues, but soundness is a contested concept that should be further specified in societal debates. These debates can benefit from interdisciplinary knowledge. The 10 Building Blocks Approach, a tool developed to generate such knowledge, has been widely applied in research and teaching. In this paper, we draw on the literature and reflect on the experiences of using this approach by elucidating the strengths and weaknesses identified during its applications. Based on our reflections, we propose a revised version of the approach.

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Introduction

The development of sound water governance is an important societal challenge that is widely acknowledged to be a key factor for adequate and sustained progress towards achieving most of the United Nations' (UN) Sustainable Development Goals (SDGs) (Jiménez et al., 2020). In these times of climate change, population growth and ongoing changes in political, legal and technological systems, and in the land use of adjoining areas, it is important to reflect on water governance practices and to come up with suggestions to improve them (van Rijswick et al., 2014; Jiménez et al., 2020). A systematic assessment of water governance practices can guide the design of effective policy interventions (United Nations Development Programme (UNDP), 2013).

The literature offers a rich variety of frameworks and criteria that can be used to assess water governance practices (Wuijts et al., 2018). Examples are the city blueprint framework (Koop & van Leeuwen, 2015); the governance capacity framework (Koop et al., 2018); the conditions of good governance (Bucknall et al., 2006; Pahl-Wostl et al., 2012; Rijke et al., 2012); and the principles of good water governance (Akhmouch & Correia, 2016; Akmouch et al., 2018; Organisation for Economic Co-operation and Development (OECD), 2018). Apart from this, scholars use individual governance criteria such as effectivity, efficiency and legitimacy (Adger et al. 2005; Den Uyl & Driessen, 2015). Some publications focus on the role of one or more conditions, such as the interconnective capacity of governance and the importance of indicators (Akhmouch & Correia, 2016).

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This article has been corrected with minor changes. These changes do not impact the academic content of the article.

A framework that stresses the relevance of interdisciplinary knowledge for assessing water governance practices has been developed by van Rijswick et al. (2014). This so-called 10 Building Blocks Approach is intended to be used to assess and discuss the soundness of water governance. By offering a holistic perspective, it offers the possibility of identifying strengths and weaknesses in water governance cases (Wuijts et al., 2018). The approach has been used to assess water governance relating to issues such as flood protection, water quality and water distribution. These issue areas manifest themselves at different hydrological and institutional scales (local, basin, national and international), and in different political contexts (liberal democratic or centralized market economies). The approach has been applied not only in scientific studies (Dai, 2015b; Dai et al., 2017, 2018; Misiedjan, 2017; Suykens, 2017; Wuijts et al., 2018, 2020) but also in master's thesis research and, since 2013, in a student assignment in the Water Governance and Law MSc course at Utrecht University, the Netherlands. In this course, students are asked to assess the soundness of water governance in a particular issue area. The implementation of the approach has resulted in several observations on how the methodology could be improved (Andreska et al., 2019; Correia et al., 2019; Costa et al., 2019; Deval et al., 2015; Essex et al., 2018; Koop et al., 2014; Winkelaar & Benkendorf, 2016).

This article refines the approach by clarifying how it has been used so far and by explicating areas for improvement. Based on this analysis, we present a new version of the approach, which we call Water Governance Assessment Approach 2.0 (hereafter 'Approach 2.0'). To obtain information for our analysis, we reviewed nine academic journal papers, two academic books and 67 student papers (obtained from Utrecht University archives), all of which have applied this approach to analyse water challenges. Our analysis is also based on the experiences of eight MSc classes from 2013 to 2020, in which the approach was used in face-to-face discussions.

The remainder of the paper is structured as follows. The next section provides a brief introduction of the Building Blocks Approach; and the third section overviews the issue areas and locations in which it has been applied. Next, we share the challenges users faced in applying the approach, beginning with overall and more general challenges (the fourth section) and continuing with the challenges related to each building block (the fifth section). We then provide and discuss a modified version of the approach (the sixth section) and conclude with some recommendations on its future use (the seventh section).

The 10 Building Blocks Approach

The 10 Building Blocks Approach is an interdisciplinary assessment approach that aims to approach water issues in a holistic and integral way. It was developed by a team of scholars with backgrounds in hydrology and water management, economics, water governance, and water law. The approach is iterative and consists of three dimensions (Content, Organization and Implementation) and 10 building blocks (Figure 1). Assessing individual building blocks yields knowledge about the dimensions Content, Organization and Implementation. However, the three dimensions are interrelated: the knowledge developed for one dimension will also be relevant for the two others. This is shown by the arrows between the building blocks in Figure 1. The status of each building block must be assessed by answering specific questions (Table 1). Answering these

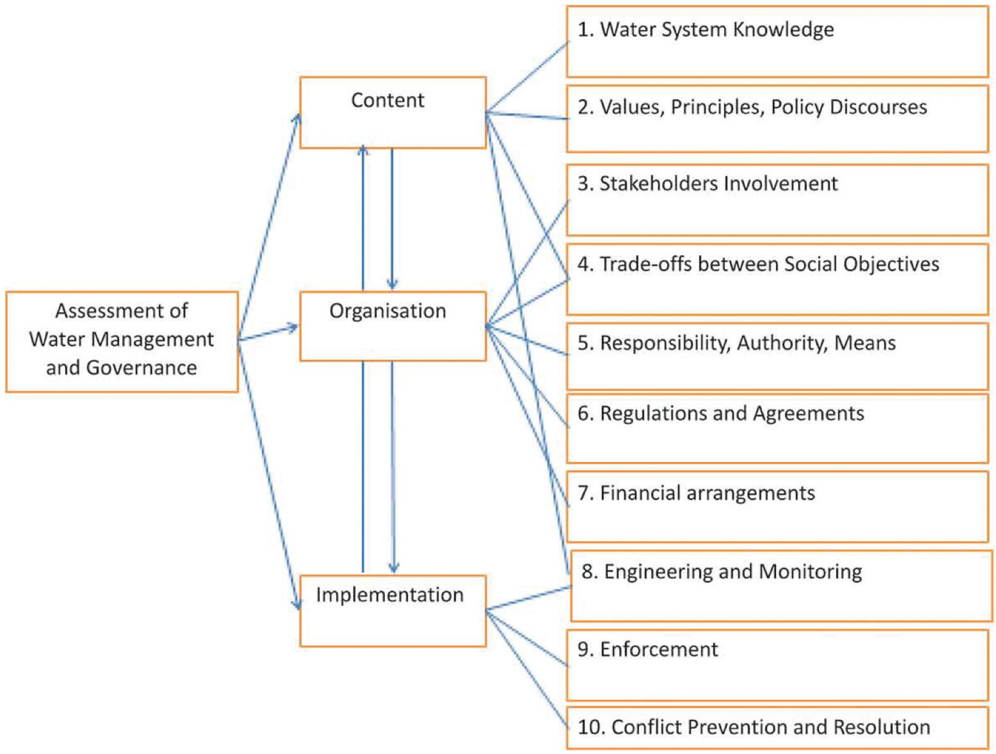

Figure 1. Overview of the 10 Building Blocks Approach for assessing water management and water governance. Source: van Rijswick et al. (2014).

questions provides an opportunity to identify and discuss the strengths and, especially, weaknesses in the way water issues are addressed in a particular area, which is helpful in enhancing the efficiency, effectiveness and legitimacy of water governance (van Rijswick et al., 2014). The building blocks are interconnected and evolve over time. Before starting to assess the 10 building blocks, it is important to define or describe the aims, goals or service-level agreements that the technical measures and governance approach in the case under scrutiny are intended to achieve. Aims or service-level agreements can be described qualitatively or quantitatively.

Applications of the 10 Building Blocks Approach

So far, the 10 Building Blocks Approach has been applied to assess different water governance practices and challenges ranging from the national and basin level to the regional and local (urban) level. It has been used to assess the following: national water quality management in China (Dai, 2018), Nigeria (Fritz et al., 2019) and the Great Lakes of the United States–Canada (Kranenburg et al., 2017); drinking and sanitation governance in Ghana (Zombori, 2016); water quantity management in the Scheldt River basin in Belgium (Suykens, 2017); the achievement of the right to water in Suriname (Misiedjan, 2017); and water management in the Incomati catchment in South Africa (van Rijswick et al., 2019). Comparative assessments have been carried out

Table 1. Assessment questions for each of the 10 building blocks.

Building block	Assessment questions for discussion
Water system knowledge	Is there sufficient knowledge of the existing water system in order to deliver the required service level of societal functions? If not, what are the gaps? Is sufficient knowledge available to assess the impact on the water system because of changes in environment and societal functions?
Values, principles, and policy discourses	Is there sufficient knowledge of shared or conflicting values, viewpoints and principles (represented by different policy discourse coalitions) for water issues and their consequences for facing water management issues?
Stakeholder involvement	Are all relevant stakeholders involved? Are their interests, concerns and values sufficiently balanced and considered in the problem analysis, solution search process and decision-making?
Trade-offs between social objectives: service-level agreements (SLAs)	Are agreed service-level decisions based on trade-offs of costs, benefits and distributional effects of various alternatives?
Responsibility, authority and means	Are authorities, responsibilities and means well-organized to deal with water issues at the appropriate administrative scale(s) in a participative and integrative way?
Regulations and agreements	Are regulations and agreements legitimate and adaptive, and if not, what are the main problems with regard to the abovementioned legitimacy aspects?
Financing water management	Is the financial arrangement sustainable and equitable?
Engineering and monitoring	Are SLAs sufficiently available (implicit or explicit) in order to redesign the existing infrastructure? Are the design and consequences of different alternatives sufficiently available? Is there sufficient monitoring of the system and are the data analysed?
Enforcement	Are regulations and agreements enforceable by public and/or private parties, and are appropriate remedies available?
Conflict prevention and resolution	Are there sufficient conflict prevention and resolution mechanisms in place?

Source: van Rijswick et al. (2014).

for the Dutch rainproof city programme (Dai et al., 2018), on the protection of drinking water resources in the Netherlands (Wuijts et al., 2018), and the allocation of water-use rights in China, Indonesia, Kenya, the Netherlands and South Africa (Dai et al., 2017). Several studies have focused on the development of nature-friendly riverbanks (Deval et al., 2015; Essink et al., 2017; Ewals et al., 2019; Winkelaar & Benkendorf, 2016), while others have focused on specific programmes, such as the Marker Wadden Project (Klinge et al., 2017) and the Room for the River Project (Burer et al., 2017), both in the Netherlands. Most studies, however, have applied the 10 Building Blocks Approach in single case studies on the governance of urban water issues (Table 2). It can be seen that European cities are overrepresented in the studies conducted so far, and that most studies focus on flooding.

Experiences in the application of the 10 Building Blocks Approach: general findings

During the various applications, both the strengths and application challenges of the 10 Building Blocks Approach have been identified. Several users are positive about the interdisciplinary nature of the approach. The approach is helpful in getting a broad overview of a given water problem, project or situation (Dai 2015a, Costa et al., 2019; Fritz et al., 2019; Lee et al., 2019; Wuijts et al., 2019, 2018). The approach can capture the

Table 2. Literature-based overview of cities and issue areas addressed in case studies using the 10 Building Blocks Approach.

	Water issues addressed using the 10 Building Blocks Approach					
Region	Water quality and sanitation	Flooding	Water scarcity	Sustainable urban drainage	Energy production	Green roofs
Africa			Cairo			
Asia		Hong Kong (Correia et al., 2019)				
Australia			Melbourne (Costa et al., 2019)			Sydney
Europe	The Netherlands (Wuijts, 2020)	Leeds (Mors et al., 2016; Gladh et al., 2019); Rotterdam Venice London Dordrecht (Koop et al., 2014)	London	Birmingham	Utrecht (Elstak et al., 2015b)	Amsterdam; London
North America	San Francisco (Slinger & Schermer, 2016)					Toronto (Dyck et al., 2015); Portland
Latin America			Lima (Essex etal., 2018); São Paulo (Nagasawa et al., 2019)			

complexity of water governance dynamics and is considered to be convenient for evaluating highly intricate water issues and the governance capacity to address them (Dai 2015a; Wuijts et al., 2018). The 10 building blocks are considered very useful in breaking down an overall issue into aspects to analyse (Costa et al., 2019).

However, the application of the approach is not without obstacles. The overlap between different building blocks is often identified as a major challenge: Block 5 (Responsibility, Authority, and Means) is considered to overlap with Block 3 (Stakeholder Involvement) since the latter also deals with the responsibilities of different stakeholders (Deval et al., 2015; Erkelens et al., 2015; Van den Berg et al., 2015). Another flaw mentioned by researchers is a lack of clarity about the terminology used. According to them, terms such as 'sufficient', 'sustainable' and 'equitable', which are used in several blocks, appear to be vague, since no definition is offered. Explicit benchmarks are lacking. The vagueness of the criteria leaves them open to subjective interpretation, which may result in different assessment outcomes when the assessment is carried out by different researchers (Buddelmeijer et al., 2016; Gladh et al., 2019; Jong & Los, 2014). In addition, several researchers also argue that the 10 Building Blocks Approach is applicable but should be confined to more developed parts of the world, since the individual blocks are built on European perceptions (Pirkl et al., 2014). Moreover, some researchers argue that assessment results may be biased because relevant data are often only provided by governments (Slinger & Schermer, 2016). The latter point, however, probably says more about the resources available for the research than about the quality of the approach.

Strengths and weaknesses in assessing the individual building blocks

In this section we will reflect on the experiences of researchers in assessing the individual building blocks.

Block 1: Water system knowledge

The 10 Building Blocks Approach refers to the water system as the combination of natural physical resources (precipitation, evaporation water levels and availability, water uses and their interactions, etc.) and manmade infrastructure (properties and capacities, etc.) (van Rijswick et al., 2014). In assessing this block, the researchers must check if the knowledge available on the existing water system is sufficient to ensure that the required service level of societal functions can be delivered and impacts of environmental conditions and/or societal functions can be assessed.

Several challenges in assessing this building block have been reported. In practice, information on a water system is usually published on a government or project website and has been collected through modern technologies such as flood prediction and warning systems, hydrologic models, and automatic sensing systems (Dai et al., 2018; van Rijswick et al., 2019; Wuijts et al., 2018). In domestic cases, the government is usually the only information provider. This is not problematic when institutional trust is high, as is the case in the Netherlands. However, when both institutional trust and stakeholder participation are low, as is the case in Nigeria (Fritz et al., 2019) and Bolivia (Pirkl et al., 2014), the information provided by the government source is often considered to be biased. Furthermore, in conflict areas, information about a shared water system is often manipulated. For example, in the Mountain Aquifer, which Israel shares with the Palestinians, Dai (2020) has observed that both Israel and Palestine appear to provide each another with biased information in order to manipulate perceptions about the (fair or unfair) distribution of the water resources between them. Another example refers to the Ems estuary, which is shared between Germany and the Netherlands. Cooperation between the two countries is complicated since they use different indicators for judging the water quality of the estuary. Apart from this, the boundary between the two countries is not formalized (Gerdes et al., 2014).

In addition, climate change and population growth, can have drastic impacts on water systems. We noticed that in many countries decision-makers have been aware of this, but also observed that the available knowledge of climate change and population growth have not yet been taken into account when making water-related decisions. This was the case, for instance, in Hong Kong, São Paulo and the Elbe basin (Andreska et al., 2019; Correia et al., 2019; Nagasawa et al., 2019).

Based on the above, we argue that although these issues will play a role in every assessment method or water governance approach, assessment questions should also address the sources of knowledge, the sharing of knowledge, and uncertainties related to natural variability (e.g., climate change), robustness of information (e.g., statistical uncertainty) and knowledge (e.g., epistemic uncertainty).

Block 2: Values, principles and policy discourses

In addition to knowledge of the physical aspects of the water system, sound water governance requires knowledge about shared or conflicting values, viewpoints, and principles (represented by different policy discourse coalitions) concerning water issues and their consequences for facing water management issues. This information need is addressed by this block.

The present review reveals that users report that this knowledge often seems to be available. Although water-related values differ per country or society, we also found that in many places around the world there has been a similar shift in values. In both the Netherlands and China, for example, values related to flood risk have shifted from 'keeping people away from water' to 'living with water' (Dai et al., 2018); in Leeds (UK), more sectoral approaches related to land drainage and flood defence have been replaced by a more integrated flood risk-management approach (Gladh et al., 2019; Mors et al., 2016). In Indonesia, the water values and discourse have shifted from 'water is a free social good' to 'water is an economic good with a social function' (Rahmasary & v. Selm, 2016), and in Italy, groundwater resources are no longer valued as 'inexhaustible' but as 'a limited resource whose quantity and quality need to be safeguarded' (Giorgi & Vlaar, 2016).

However, actors involved in water governance may differ in ideological beliefs and interests in water management. In these cases, it may be hard to find out what values dominate in policy discourses. Apart from this, one should be aware of value changes over time, especially after new governments come into power, as has been shown in a case study on water quality issues in Nigeria (Fritz et al., 2019). In cases in which actors with different ideological beliefs and interests in water management are evident, we contend that progress can only be made if bridging mechanisms are introduced in order to enhance connectivity between relevant actors. Such mechanisms stress the importance of information transfer, stakeholder involvement, coordination and cooperation (Gilissen et al. (2016), which could increase the overall legitimacy of governance. In the Netherlands, for instance, coordination has been enhanced by the introduction of the Water Test. This instrument obliges municipalities to take account of the consequences of spatial measures on water systems by requiring them to assess land-use proposals and to provide land-use authorities with a checklist of water themes (Dai et al., 2018). Elsewhere, multilevel coordination has been specified as an underlying value in river basin governance, for example, in the Delaware river basin (USA) by the establishment of a coordination agency and the provision of an overarching legal framework (Suykens, 2018). In the Riverbank Improvement Programme of Bangladesh, conflicts were reduced by acknowledging the need to involve stakeholders in the planning process and to implement compensation measures (Winkelaar & Benkendorf, 2016).

Our review did not reveal the need for any adjustments to this building block.

Block 3: Stakeholder involvement

The third building block focuses on stakeholder involvement. The assessment question postulates that all relevant stakeholders should be involved and that their interests, concerns and values should be sufficiently balanced and considered in the problem analysis, solution search process and decision-making.

The papers we reviewed (Benson et al., 2014; Borowski et al., 2008; Dai et al., 2018; Edelenbos et al., 2011; Kastens & Newig, 2008; Pretty, 1995) made clear that stakeholder involvement could provide benefits for policymaking. We also found that stakeholders can be involved in several ways. The city of Melbourne (Australia), for instance, developed a Communications, Consultation, and Stakeholder Plan in order to engage stakeholders in the discussions on the reconnection of water reservoirs (Buddelmeijer et al., 2016). The city of Utrecht (the Netherlands) has published guidelines on stakeholder involvement in projects such as the renovation of the central railway station (Elstak et al., 2015). And the River Basin Committee of Alto Tietê in São Paulo (Brazil) attempted to achieve fair representation of stakeholders in their decision-making processes by dividing them into three groups (state government, municipal government and civil society), each of which could present their policy preferences (Nagasawa et al., 2019). The papers also show that involvement may differ because of countries' political contexts. In Nigeria, civil society seldom has the opportunity to be represented in the decision-making process (Fritz et al., 2019). Marginalized groups and stakeholders at lower institutional levels in Kenya are mostly merely notified after water decisions have been made (Mogos et al., 2016). A similar observation is made by Dai (2018), who found that governments in China are more often knowledge sharers, that is, provide relevant water information to the stakeholders, but that they less often learn from participation processes or act to change decisions in response to stakeholders' input. More generally, an analysis of stakeholder participation in 81 biosphere reserves in 35 countries (Roldán (2017) revealed that democracies display more potential for multidirectional learning than non-democracies. However, effectively involving stakeholders is challenging even in democracies such as Germany, since in the end, decision-making on climate adaptation in the outer-Elbe basin remains largely top down (Andreska et al., 2019). It was observed that German stakeholder involvement is often 'superficial and predetermined by powerful stakeholders and expert groups' (Andreska et al., 2019, p. 4).

In the papers we reviewed, the terms 'stakeholder involvement' and 'public participation' are used interchangeably. This might be confusing. Stakeholder involvement refers to stakeholders being 'any individual, group of individuals, organizations, or political entity with a stake in the outcome of a decision' (IAP2, 2010). The stakeholders to be involved are not restricted to civil society actors but also include representatives of the private sector, government regulators, service providers, investors and other relevant constituencies (Akhmouch & Clavreul, 2016) who are within and outside the water sector and involved in activities linked to planning, decision-making, implementation, monitoring and evaluation (Dai, 2018). Public are stakeholders as well. Public participation, however, is seen as 'any process that involves the public in problem-solving or decision-making and that uses public input to make better decisions' (IAP2, 2010). The public may have a clear stake, but often it is not obvious what that stake is. In democracies, however, the general public normally has the right (constitutional or otherwise) to participate in decision-making. We believe that the assessment question could be clarified by explicitly addressing both stakeholders and the general public.

Block 4: Trade-offs between social objectives

The fourth building block focuses on the economic rationality of the decision-making process. Water can be used for drinking water supply, irrigation, navigation and power production, and in this way provides different services for people. Agreements should be concluded to specify what the service level in a particular case must look like. It is postulated that the development of such service-level agreements must be based on trade-offs between societal and monetary costs, the benefits and distributional effects of various alternatives, and their short-term benefits and long-term effects, for example, on nature conservation. During the bargaining processes of a governance approach, the pros and cons of different options must be explicated and weighed up.

The traditional economic approach to optimize societal decision-making is based on conducting a societal cost–benefit analysis. However, monetizing cost and benefits is oftentimes complicated and arbitrary. In cases in which decision-makers are willing to have a transparent decision-making process, it is often opted to use multicriteria analysis instead. For instance, in the decision-making process on the ecological recovery of the Barneveldse Beek (a brook in the Netherlands), the final decision was reached by comparing the results of a cost-effectiveness analysis with the results of an environmental impact assessment (Bijkerk et al., 2014). A similar approach was used in the cases of the reopening of the Dutch Haringvliet Sluices (the so-called Kierbesluit – in Dutch, *kier* means 'a narrow opening' (a chink) and *besluit* means 'decision') to improve fish migration and the ecological water quality (Buitenhuis & Dieperink, 2019). The selection of the final option (the sluice regime) was based on the comparison of different future scenarios concerning salt intrusion, economic growth, climate change and increasing flood risk (Pickup et al., 2014). In this case, ecological recovery was prioritized over agricultural interests, which seems to be quite exceptional, as decision-makers tend to focus more on the economic effects of decisions and tend to overlook the environmental effects. In Nigeria, for instance, the focus on economic growth and poverty alleviation has come at the expense of the environment (Fritz et al., 2019). Another example is the Flint water crisis in the United States, a case in which decisions on water supply were budget driven and the public health aspects of a bad drinking water source were neglected (Moestadja et al., 2019).

Our review of the studies that applied the 10 Building Blocks Approach also revealed that many people are unfamiliar with the concept of water service-level agreements and that it would be better to replace it with the term 'agreed policy targets'. In the literature, the term 'water service' generally refers to water supply and wastewater treatment (Lindhout, 2015). This was confusing in cases in which other water issues were at stake. Water-related targets include, but are not limited to, the designed targets of flood risk management, water quality management and other water governance programmes such as 'eco-friendly' riverbanks, green roofs and urban climate adaptation. Targets may differ in specificity, hydrological scale and/or time horizon. The Leeds Flood Alleviation Scheme, one of the largest river flood alleviation schemes in the UK, has rather specific targets: it aims to invest £112 million to 'reduce flood risk and better protect 1,048 homes and 474 businesses' (Gladh et al., 2019, p. 26). Since the scheme's target groups, financial support and timelines are all straightforward, it is easy to assess the progress of its implementation. Progress assessment is more complicated in cases such as the eco-friendly river programme of the Dutch province of Zeeland and the rainproof city programme of the cities of Amsterdam and Rotterdam. The target of the eco-friendly riverbanks programme – to develop 'thousands of kilometres of eco-friendly riverbanks in the period 2011–2019' (Ewals et al., 2019, p. 6) is rather vague. Both Amsterdam and Rotterdam aspire to be 100% rainproof in 2050, and 100% climate-proof in 2025, but have not specified what this entails. Performance indicators and periodic assessment mechanisms are also lacking, which in practice complicates compliance with and the enforcement of the programme (Dai et al., 2018).

Block 5: Responsibility, authority and means

The fifth building block focuses on the organization of authorities, responsibilities and means. The assessment question asks whether the overall organization is able to deal with water issues at the appropriate administrative scale(s) in a participative and integrative way.

When discussing the division of responsibilities, researchers most often only address the responsibilities of the public institutions. This is because the general public often considers water management to be the government's responsibility (Hartmann et al., 2019). Private parties, however, can play an important role in water management too. They can reduce flood risks by measures such as placing mobile barriers, installing backwater valves or not storing costly furniture on flood-prone lower floors (Bubeck et al., 2012; Fournier et al., 2016). Such measures can reduce damage substantially (Hartmann et al., 2019; Thaler et al., 2016). In cases of urban flood risk governance, it is also important to focus on the roles and responsibilities of private parties such as homeowners and insurance companies. The latter may incentivize homeowners to take risk-reduction measures (Suykens et al., 2016). Engaging private parties can take many forms, often resulting in hybrid governance structures that cross the public–private divide, such as policy networks, co-management, public–private partnerships and private–social partnership (Lemos & Agrawal, 2006; Mees, 2014).

In practice, when addressing this building block, the assessment question of how responsibility is divided among different parties is usually answered well. However, the question of whether and in what way private parties take responsibility is often overlooked.

Block 6: Planning, regulations and agreements

Regulations dealing with water issues must be legitimate and adaptive. Policies, initiatives and legislations are lumped together under the same umbrella of regulation, but they are different in nature. Policies often provide a set of guidelines that specify the way an issue has to be handled by the government (Iza & Stein, 2009). In general, such a policy is not legally binding for other authorities. Initiatives or programmes are particular projects undertaken to achieve specific objectives in the near future. Policies and initiatives have less legal status than laws – they are usually not legally binding.

Our review shows that legitimacy can be assessed by checking the process of developing the regulations. A high degree of stakeholder involvement and open discussions of policy alternatives enhance the legitimacy of the regulations. Legitimacy will also be higher in cases in which the distributive effects of the regulations are acceptable to the general public.

Soft regulations such as policies and initiatives are often more flexible and adaptive than legislation (Buijze, 2015). However, soft regulations are often unclear in terms of who is in charge and accountable, what actions are mandatory, and who enforces compliance. The Dutch Rainproof cities initiative, for example, is hardly enforceable due to a lack of enforcement mechanisms (Dai et al., 2018).

In several of the cases studied, an extra criterion was added to this building block. The coherence of water and spatial planning and management is essential to ensure water issues are addressed effectively. Spatial planning policies can help to protect groundwater resources, and zoning policies can be an integral part of flood risk management strategies (Carter, 2007). Spatial planning rules and their interaction with water management should therefore be taken into consideration when assessing the soundness of water governance. In most countries, spatial planning and water management are institutionally divided and act relatively independently (Scholten et al., 2020), which makes creating coherence challenging (Dekker et al., 2012). Bridging concepts such as flood-resilient cities, rainproof cities, or sponge cities (Dai et al., 2017, 2018; Restemeyer et al., 2015), 'living with nature' or 'living with water' (Busscher et al., 2019) can be used to create coherence between water and spatial planning regulations. Coherence must also be developed between water regulations and environmental, health, energy, agriculture and industry regulations (Havekes et al., 2013). Creating coherence in planning is a first step. The next step is coordinating a better alignment of legally binding policy instruments.

The application of this building block works well in practice as its addresses the presence of public regulations and of public–private and private–private agreements. Although planning obligations are often laid down in separate regulations, we suggest explicitly adding land-use planning to the assessment of this building block, as it is an important legal instrument for sound governance and that considers the interaction between land use planning and water management.

Block 7: Financing water management

Without sustainable and equitable financing, it will be difficult to achieve water-related policy targets.

In the papers analysed, we found three sources of financing of water governance. The first is government budgets. In the Netherlands, both the national government and the regional water authorities and municipalities can raise taxes (Dai et al., 2018). In Brazil, river basin committees also have the legal power to collect taxes for funding their water-related projects (Nagasawa et al., 2019). In general, tax-based government finances are more sustainable than user payments or donations from, for example, international organizations.

The second category consists of payments by users or beneficiaries. In the Netherlands, water users pay for their drinking water (full cost recovery) and wastewater treatment (more than 95% cost recovery) (Lindhout, 2015; Veeren, 2011). In this case, burden-sharing can be considered equitable, since it is the users who are expected to pay for using water services and for the associated environmental damage (Lindhout, 2015). However, in regions such as the Italian island of Sardinia, water pricing schemes are inadequate and do not reflect the actual costs of water use (Giorgi & Vlaar, 2016).

Third, the water sector in a country may be financed by donations. The Riverbank Improvement Program of Bangladesh is financed by loans supported by the World Bank (Winkelaar & Benkendorf, 2016). In Kenya, 44% of water governance expenditure are covered by the government budget and the remainder comes from various sources (Mogos et al., 2016). Such donor dependency imposes a risk to water management in the future, as loans or donations cannot always be guaranteed in the long term.

The review did not reveal a need to adjust this building block.

Block 8: Engineering and monitoring

The implementation of service-level agreements (or water governance targets) often requires that engineering or physical measures have to be taken and that existing infrastructure must be redesigned. A prerequisite for taking engineering measures is that service-level agreements are sufficiently available, explicitly or implicitly. Additionally, a rational choice for a particular design implies that the winning design is better than an alternative one. This implies that the development of alternative engineering designs should be combined with an assessment of their strengths and weaknesses.

As well as implementing engineering and physical measures, it is also necessary to develop reliable monitoring systems for checking the quality of the infrastructure and the performance of the entire water system. The three-level monitoring system (surveillance, operational monitoring and further investigation) of the European Union Water Framework Directive serves as a good example in this regard (WFD, 2000). Besides monitoring the biological, hydro-morphological, chemical and physicochemical parameters (surveillance monitoring), it is also necessary to monitor the implementation of measures taken and their effectiveness in order to know whether water objectives are met (operational monitoring). Furthermore, further investigation is needed if the water quality of a particular water body has not achieved the agreed targets, or in order to ascertain the magnitude and spatial scale of impacts of accidental pollution (Arle et al., 2016). Not explicitly mentioned, but of course of major importance, is the adequate follow-up of monitoring results.

In our review we found that assessing this building block was not too challenging. Some clarification, however, can be helpful as one should realize that the term 'engineering' includes taking physical measures, such as creating fish ladders, ecologically sound mowing of riverbanks, or the management of weirs and sluices to manipulate discharges. Furthermore, when monitoring shows that interventions are insufficient to meet the policy aims, the adaptive capacity of policies should be part of the assessment in this building block.

Block 9: Compliance and enforcement

Sound water governance as specified by the 10 Building Blocks Approach should pay attention to the entire policy process, from goal-setting to the actual implementation of measures and, ideally, the achievement of goals. However, compliance and enforcement are often overlooked in policy analyses. This building block focuses especially on the implementation of regulations and agreements and the possibilities for enforcing the agreements made (van Rijswick et al., 2014).

The question that should be discussed in this block is: Are regulations and agreements enforceable by public and/or private parties, and are appropriate remedies available?

From the papers reviewed, it is clear that a successful implementation of regulations and agreements is influenced by factors such as the allocation of responsibilities, the legal framework in place, the objectives set and the clarity of the consequences of non-compliance, as well as by the shared values, stakeholder acceptance and the presence of efficient communication channels. For several years, the Dutch decision to partly reopen the Haringvliet sluices was not enforceable because it was met with fierce stakeholder resistance (Buitenhuis & Dieperink, 2019). Stakeholders were not involved in the decision-making process and did not share the values underlying the decision. They attached more value to reducing salt intrusion than to ecological recovery (Pickup et al., 2014). Another Dutch project, on energy recovery from urban wastewater (the Energy Factory), was found to be unenforceable due to a lack of clear goals and targets in related policy documents (Ragazzo et al., 2015). The Dutch green roofs policy has also performed poorly; the reason is its voluntary status, which means that there are no enforcement mechanisms in place (Jong & Los, 2014). In contrast, green roofs regulations in Toronto were more successful, the reason being that non-compliers could attract serious fines (as much as C$100,000) (Dyck et al., 2015). In the Incomati basin shared between South Africa, Swaziland and Mozambique compliance and enforcement was improved by public participation and highlighting positive compliance behaviour (van Rijswick et al., 2019).

Corruption has been found to be another factor affecting compliance and enforcement (Fritz et al., 2019). The Bangladesh Riverbank Improvement Programme is an example in case: government attempts to reduce corruption failed (Winkelaar & Benkendorf, 2016).

The assessment in this building block should be expanded to include the question of how compliance with the objective of the governance approach is being monitored and secured. In this analysis, the role of private actors should be explicitly investigated.

Block 10: Conflict prevention and resolution

The studies that use the 10 Building Blocks Approach show that in cases with a high value consensus, conflict is rare. However, conflict may arise and should not be considered to be inevitable; in several countries, water authorities have established separate conflict prevention and resolution mechanisms. For example, the US Environmental Protection Agency (EPA) has established a separate Conflict Prevention and Resolution Centre to train and educate mediators to deal with environmental conflicts (Lee et al., 2019). Other examples are the local stakeholder councils set up by the South Korean government. These councils are used to collect stakeholder feedback on the implementation of the Four-River Project. As well as organizing knowledge-sharing and public hearings, these councils are also used for gathering advice from experts and to organize the compensation of farmers with lands adjacent to the project (Bugeja et al., 2019). In the Elbe River basin, 10 German federal states have set up the *Flussgebietsgemeinschaft Elbe* (Elbe basin community) as a forum for collaboration, coordination and conflict prevention (Andreska et al., 2019). Melbourne Water has also put significant effort into conflict prevention by organizing community and face-to-face meetings and providing water-relevant information (including traffic updates) on websites and in newsletters (Buddelmeijer et al., 2016).

In the event of disputes, parties usually approach an independent mediator, arbiter or court. However, although court decisions may settle a dispute, they rarely put an end to governance problems (Wuijts, 2020). In practice, if a given programme or project is enforceable, citizens and stakeholders may request enforcement, and litigation mechanisms are often available (Dai, 2019; Dai et al., 2018).

Assessing this block works well in practice. Notably, addressing water-related conflicts also benefits from elements addressed under previous blocks. If these blocks are well developed, the risk of conflicts will be reduced at an earlier stage.

Discussion

In the previous sections we have clarified ways in which the 10 Building Blocks Approach has been used so far. We found that the approach is helpful for obtaining a quick but also integrated overview of the soundness of water governance related to a particular water issue or challenge. In this section we will elaborate on this and present an improved version of the 10 Building Blocks Approach.

Improvements to the 10 Building Blocks Approach

First, the starting point of the approach could be better clarified. Users of the approach should be invited to be more explicit about the challenge or objective they want to assess, since that sets the context for the assessment. Water governance in itself is a very broad concept and not an aim in itself, and the same applies to the 10 building blocks. We recommend users of the approach take an explicit policy goal as a starting point. What do the actors involved want to achieve with the help of sound water governance? What policy goals are aimed for? The more specific a policy goal is (e.g., the construction of x km of nature-friendly riverbank in area y in the period until z) the better the building block approach can be customized and the easier it will be to identify which factors addressed under each building block are most relevant, whether they must be improved and what ideally is required for the policy goal to be achieved. After such clarification, the next step is to identify the actual status of each of the building blocks.

As observed by several authors (Deval et al., 2015; Erkelens et al., 2015), some of the building blocks could indeed overlap slightly. The specification of the building block Stakeholder Involvement will easily result in formal responsibilities being taken into account, which will reveal which public authorities will have a stake in addressing a particular issue. This overlaps with the building block on Responsibility, Authority and Means. In our opinion, this overlap is not problematic. The building blocks offer different viewpoints for assessing a water governance practice, but may also function as an entry point for data collection for other blocks. This could result in reporting with (too) much repetition, but overlap could be avoided by properly editing the text.

Based on the review we present a new, improved, version of the approach. The separate blocks have been visualized in a circular diagram (Figure 2) that emphasizes the interrelatedness and mutual dependency better than the original figure (Figure 1). The circular diagram also makes it clearer where to start the assessment, and which steps should be taken and in what order. Analysists should start in the centre by clarifying the water governance challenge at stake, and then move to the blocks in the inner circle, and subsequently to those in the second and third circles. Once the gaps or improvement needs have been identified, analysists could provide feedback and structured recommendations for improving the overall water governance in question.

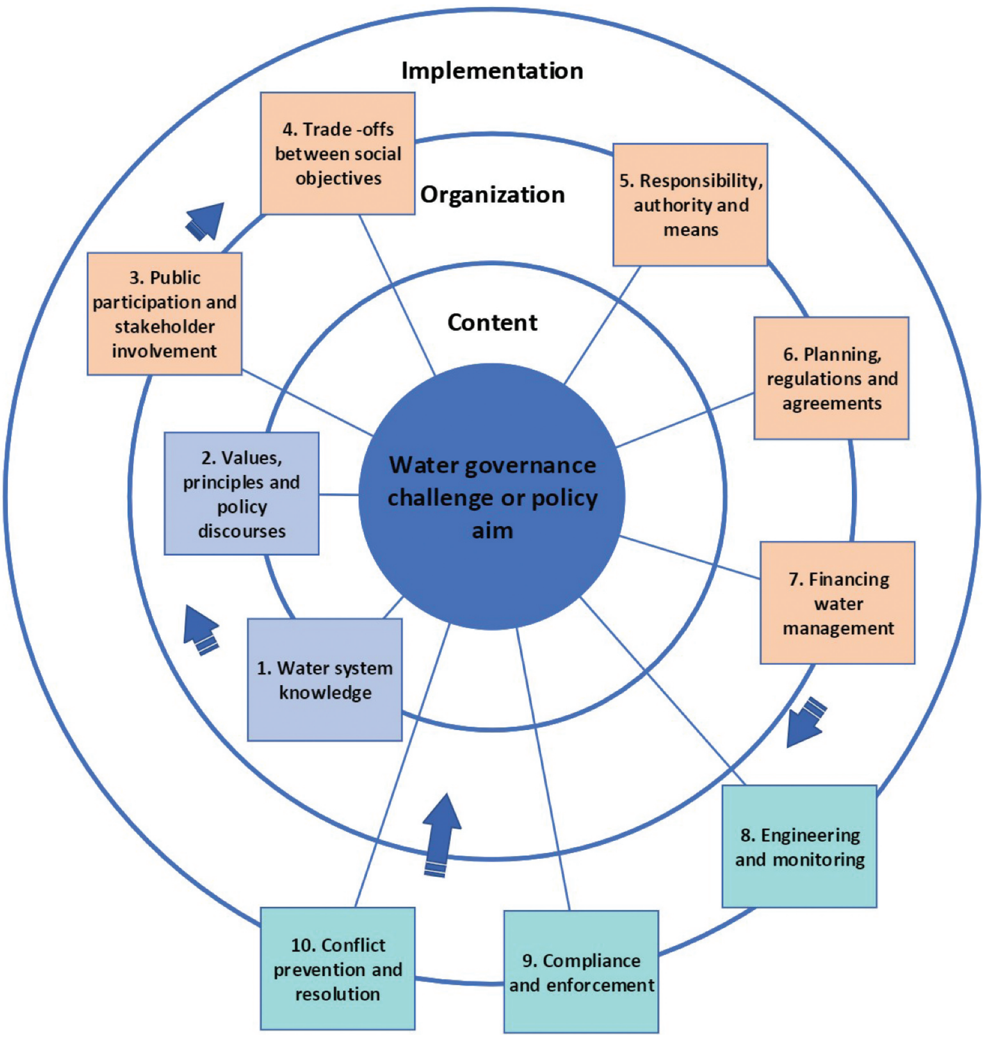

Figure 2. 10 Building Blocks Approach for assessing water management and water governance.

Table 3. Revised assessment criteria for each of the 10 Building Blocks 2.0.

Building block	Revised assessment criteria
Water system knowledge	The water system knowledge necessary for reaching the policy goals is available and shared and recognized by the stakeholders. Sufficient knowledge is available to assess the impact of changes in environmental and societal functions on the water system
Values, principles and policy discourses	There is sufficient understanding of shared, conflicting, and bridging values, viewpoints and principles represented by different discourse coalitions
Public participation and stakeholder involvement	Mechanisms for stakeholder involvement (including the general public) are effective. Consideration of stakeholders' interests, concerns and values is sufficiently balanced in the problem analysis, solution search process, and decision-making
Trade-offs between social objectives	The agreed water policy targets are clearly defined and measurable and based on a decision-making process in which societal costs, benefits and distributional effects of various alternatives have been explicated and weighed up
Responsibility, authority and means	Authorities, public and private responsibilities, and means are well-organized to deal with water issues at the appropriate administrative scale(s) in a participative and integrative way
Planning, regulations and agreements	Regulations relevant for addressing water issues are legitimate, adaptable and coherent
Financing water management	The financial arrangement is sustainable and equitable during all stages of a governance practice
Engineering and monitoring	Policies are sufficiently clear on the implications for existing infrastructure and the engineering methods needed. Sufficient knowledge is available on the design and consequences of alternative engineering methods. The monitoring of the system is sufficient and monitoring results lead to follow-up activities if considered necessary
Compliance and enforcement	Regulations and agreements are enforceable by public and/or private parties, and appropriate remedies are available
Conflict prevention and resolution	Sufficient conflict prevention and resolution mechanisms are in place and are used

Table 3 summarizes the findings from the fifth section. We have converted the questions from version 1.0 into statements for each of the building blocks in which we state what ideally the governance approach should contain in order to achieve a policy target. Where necessary, the names of the blocks have been modified.

Scoring the building blocks

The criteria mentioned in Table 3 can be applied in different ways. A first option is simply to demonstrate whether a criterion is met. For effective communication, it is stronger to use an indicator system such as a traffic light system to clarify the degree to which the criteria for each block have been met (e.g., green: *very good*, yellow: *needs improving*, red: *poor*) (Lee et al., 2019; Rahmasary & v. Selm, 2016; Winkelaar & Benkendorf, 2016). Another option is to use the criteria in a strengths, weaknesses, opportunities and threats (SWOT) analysis. For instance, the SWOT analysis carried out for each block by Essex et al. (2018) provided a clear overview of the current status of water security governance in Lima, Peru. Others have developed a scoring system: for example, a five-point scale ranging from 1, indicating very poor, to 5, indicating very good (Buddelmeijer et al., 2016; Correia et al., 2019; Costa et al., 2019; d'Avdeew et al., 2019; Deval et al., 2015; Nagasawa et al., 2019). The 10 individual scores can be used to calculate an average soundness score. Another option is to make a spider diagram, as done by Koop et al. (2014). By developing a scoring system, the user is challenged to establish and justify a benchmark, which in principle contributes to the transparency and reliability of the assessment. Moreover, a standard scoring system would make it possible to compare different cases, which may result in new learning opportunities. However, using a scoring system may also lead to (over)simplifying the complex and dynamic character of water governance systems (Ioris et al., 2008; Schneider et al., 2015) and may result in the neglect of factors that are difficult to measure (Schneider et al., 2015). The building block approach is highly normative, since it contains assessment criteria that contain adjectives such as 'sufficient', 'sustainable' and 'equitable', which cannot be used without making choices. In the end, the choices made are subjective, but a more intersubjective understanding may be reached if stakeholder panels are used to specify and apply a particular criterion and are asked to clarify their opinions on a Likert scale. Software tools such as Mentimeter could be very helpful in doing this. Such an approach in which benchmarks are explicated and perceptions are shared and discussed seems to be the maximum achievable.

Soundness of a governance approach versus effectiveness

The 10 Building Blocks Approach can be used to assess the soundness of the way a particular water governance challenge is addressed. As noted, the starting point is the identification of a policy goal that specifies the challenge. Next, it must be checked if the condition of the building blocks and their interactions are sufficiently good to meet the challenge, and where there are knowledge gaps. Although the building blocks are interrelated, they cannot be used to assess a policy's effectiveness directly, because they are not causally linked. The application of the approach can, however, provide the ingredients for developing a research design for assessing a policy's effectiveness. Assessing effectiveness requires a more in-depth longitudinal approach in which it is checked whether the policy goals have been met after a certain period of time and if such goal achievement is attributable to the implementation of a policy and not to other – external – factors. In assessing effectiveness, the results of the 10 Building Block analysis can be used as a starting point as a reflection of the results found for each of the building blocks, and they can offer potential explanations for the (lack of) achievement of the goals. The validity of these potential explanations can be tested in more in-depth research, for instance, by translating them into statements that can be tested in surveys or in-depth interviews with experts or stakeholders.

Conclusions

In this paper we have assessed the 10 Building Blocks Approach. Our review of the academic and grey literature revealed that the approach has been successfully implemented. However, we also found several points for improvement, which we have addressed in this paper. Based on this, we have proposed an updated version of the approach that can be used to provide insights into actual water governance practices. Whether these practices are sound will always remain a disputed question and, as such, open for further debate. By addressing the newly defined assessment points, version 2.0 of the 10 Building Blocks Approach can generate enough inputs for fruitful societal dialogues on the soundness of a water governance practice and options to improve that practice.

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References

Adger, W. N., Arnell, N. W., & Tompkins, E. L. (2005). Successful adaptation to climate change across scales. *Global Environmental Change*, *15*(2), 77–86. https://doi.org/10.1016/j.gloenvcha.2004.12.005

Akhmouch, A., & Clavreul, D. (2016). Stakeholder engagement for inclusive water governance: 'Practicing what we preach' with the OECD water governance initiative. *Water*, *8*(5), 204. https://doi.org/10.3390/w8050204

Akhmouch, A., & Correia, F. N. (2016). The 12 OECD principles on water governance–When science meets policy. *Utilities Policy*, *43*, 14–20. https://doi.org/10.1016/j.jup.2016.06.004

Akhmouch, A., Clavreul, D., Hendry, S., Megdal, S. B., Ross, A., Nickum, J. E., & Nunes-Correira, F. (2018). OECD principles on water governance. https://www.routledge.com/OECD-Principles-on-Water-Governance-From-policy-standards-to-practice/Akhmouch-Clavreul-Hendry-Megdal-Nickum-Nunes-Correia-Ross/p/book/9781138329768

Andreska, D., Parsons, G., & Dietrich, A. (2019). *Climate Adaptation of the Outer Elbe Area, An Analysis of Governance Challenges and Opportunities*. Utrecht University.

Arle, J., Mohaupt, V., & Kirst, I. (2016). Monitoring of surface waters in Germany under the water framework directive – A review of approaches, methods and results. *Water*, *8*(6), 217. https://doi.org/10.3390/w8060217

Benson, D., Fritsch, O., Cook, H., & Schmid, M. (2014). Evaluating participation in WFD river basin management in England and Wales: Processes, communities, outputs and outcomes. *Land Use Policy*, *38*, 213–222. https://doi.org/10.1016/j.landusepol.2013.11.004

Bijkerk, S.-J., Bolhuis, B., & D. Boer, L. (2014). *Analysis of the Barneveldse Beek management, Combining ecological and water quality objectives* [Master]. Utrecht University.

Borowski, I., Le Bourhis, J.-P., Pahl-Wostl, C., & Barraqué, B. (2008). Spatial misfit in participatory river basin management: Effects on social learning. a comparative analysis of German and French case studies. *Ecology and Society*, *13*(1), 1–22. https://doi.org/10.5751/ES-02341-130107

Bubeck, P., Botzen, W. J. W., & Aerts, J. C. (2012). A review of risk perceptions and other factors that influence flood mitigation behavior. *Risk Analysis: An International Journal*, *32*(9), 1481–1495. https://doi.org/10.1111/j.1539-6924.2011.01783.x

Bucknall, J., Damania, R., & Rao, H. (2006). *Good governance for good water management*. The World Bank Group.

Buddelmeijer, C., Haars, C., & Bonnema, J. H. (2016). *Tarago reservoir reconnection*. Water governance assessment Utrecht University.

Bugeja, S., Choi, Y., Herrewijnen, E., & Peters, S. (2019). *Authoritarian Environmentalism masked as Green Growth? A critical assessment on the South Korean Four Major River Restoration Project*. Utrecht University.

Buijze, A. (2015). Promoting sustainable water management in area development: A regulatory approach. *Journal of Water Law*, *24*(1), 166–173. https://www.lawtext.com/publication/the-journal-of-water-law/contents/volume-24/issue-1
Buitenhuis, Y., & Dieperink, C. (2019). Governance conditions for successful ecological restoration of estuaries: Lessons from the Dutch Haringvliet case. *Journal of Environmental Planning and Management*, *62*(11), 1990–2009. https://doi.org/10.1080/09640568.2018.1529556
Burer, K., Wezenberg, S., & V. D. Ster, H. (2017). *Governance Assessment on a Room for the River Project: The case of IJsseldelta-Zuid* [Master]. Utrecht University.
Busscher, T., van den Brink, M., & Verweij, S. (2019). Strategies for integrating water management and spatial planning: Organising for spatial quality in the Dutch "Room for the River" program. *Journal of Flood Risk Management*, *12*(1), e12448. https://doi.org/10.1111/jfr3.12448
Carter, J. G. (2007). Spatial planning, water and the Water Framework Directive: Insights from theory and practice. *The Geographical Journal*, *173*(4), 330–342. https://doi.org/10.1111/j.1475-4959.2007.00257.x
Correia, A., Song, Y., & Stuit, S. (2019). *Flood prevention strategies in Hong Kong, the multi-layered safety*. Utrecht University.
Costa, S. L., Menguzzo, E. V., Praga, A. S., & Semjanová, P. (2019). *Coping with water scarcity in Melbourne, An analysis of the Integrated Water Resource Management strategy*. Utrecht University.
d'Avdeew, M., Gale, M., Simpson, S. R., & Plotz, C. (2019). *Flood risk management in North Holland*. Utrecht University.
Dai, L. (2015a). *China's Water Resources Law in Transition* [Doctoral thesis]. Utrecht University.
Dai, L. (2015b). Identifying and understanding the main challenges for sustainable water resource management in China. *Journal of Water Law*, *24*(56), 249–264. doi:10.1007/978-3-030-02874-9
Dai, L. (2018). *Politics and Governance in Water Pollution Prevention in China*. Springer.
Dai, L. (2019). *Politics and governance in water pollution prevention in China*. Springer.
Dai, L. (2020). Implementation constraints on Israel–Palestine Water Cooperation: An analysis using the Water Governance Assessment Framework. *Water*, *13*(5), 620. https://doi.org/10.3390/w13050620
Dai, L., van Rijswick, M., & Schmidt, B. (2017). Towards a sustainable, balanced and equitable allocation of water use rights. In *Water Resource Management and the Law*. Edward Elgar Publishing.
Dai, L., Wörner, R., & van Rijswick, H. F. (2018). Rainproof cities in the Netherlands: Approaches in Dutch water governance to climate-adaptive urban planning. *International Journal of Water Resources Development*, *34*(4), 652–674. https://doi.org/10.1080/07900627.2017.1372273
Dekker, G., De Klerk, L., Witsen, P. P., & van der Cammen, H. (2012). *The selfmade land: Culture and evolution of urban and regional planning in the Netherlands*. Spectrum.
Den Uyl, R. M., & Driessen, P. P. (2015). Evaluating governance for sustainable development–Insights from experiences in the Dutch fen landscape. *Journal of Environmental Management*, *163*, 186–203. https://doi.org/10.1016/j.jenvman.2015.08.022
Deval, C. G., D. Kinderen, J. P. J., & Zoutendijk, M. (2015). *Eco-friendly river banks in the Dutch part of the Meuse River, A policy assessment* [Master]. Utrecht University.
Dyck, K. V., Cardon, G., & Bunsen, J. (2015). *Toronto's Green Roof Bylaw A Water Governance Assessment*. Utrecht University.
Edelenbos, J., Van Buuren, A., & van Schie, N. (2011). Co-producing knowledge: Joint knowledge production between experts, bureaucrats and stakeholders in Dutch water management projects. *Environmental Science & Policy*, *14*(6), 675–684. https://doi.org/10.1016/j.envsci.2011.04.004
Elstak, M., V. Haaster, S., & Kivits, T. (2015). *Take a bio-shower, Assessing the governance of soil and water management in the Utrecht Central station project*. Utrecht University.
Erkelens, M., Katona, P., & Wessels, J. (2015). *Flexible Water Levels in the Loosdrecht Lakes – Good Practice or a Waste of Time?* [Master]. Utrecht University.
Essex, B., Lituma, A., Pieffers, T., & van der Sluis, C. (2018). *Water Security in Lima, Peru: An Assessment of the Water Governance Structure*. Utrecht University.

Essink, L., Geitenbeek, L., & Hagos, F. G. (2017). *Eco-friendly riverbanks: A case study of the Kromme Rijn* [Master]. Utrecht University.
Ewals, J., Muelders, J., Sleegers, T., & Spruijt, M. (2019). *Eco-friendly riverbanks in Zeeland*. Utrecht University.
Fournier, M., Larrue, C., Alexander, M., Hegger, D., Bakker, M., Pettersson, M., Crabbé, A., Mees, H., & Chorynski, A. (2016). Flood risk mitigation in Europe: How far away are we from the aspired forms of adaptive governance? *Ecology and Society*, *21*(4). https://doi.org/10.5751/ES-08991-210449
Fritz, J., Pietro, S., & Heng, C. (2019). *Assessing water governance in the 'greening' process of the port of Lagos*. Utrecht University.
Gerdes, D., Hakkesteegt, K., & D. Miranda, J. (2014). *The Eems River – A River Full of Yoghurt* [Master]. Utrecht University.
Gilissen, H. K., Alexander, M., Beyers, J.-C., Chmielewski, P., Matczak, P., Schellenberger, T., & Suykens, C. (2016). Bridges over troubled waters: An interdisciplinary framework for evaluating the interconnectedness within fragmented flood risk management systems. *Journal of Water Law*, *25*(1), 12–26. http://eprints.whiterose.ac.uk/108073/
Giorgi, S., & Vlaar, T. (2016). *The Allocation of Water Use Rights in Italian, Water Law and Policy*. Utrecht University.
Gladh, R. E., Halevy, C., & Withaar, H. (2019). *The looming danger of the river Aire? An assessment of Leeds' flood risk management and governance*. Utrecht University.
Hartmann, T., van Doorn-Hoekveld, W., van Rijswick, M., & Spit, T. (2019). Editorial. *Water International*, *44*(5), 489–495. https://doi.org/10.1080/02508060.2019.1671464
Havekes, H. J. M., Hofstra, M., van der Kerk, A., Teeuwen, B., van Cleef, R., & Oosterloo, K. (2013). *Building blocks for good water governance*. Water Governance Centre (WGC).
IAP2. (2010). "*Public participation: State of the practice, Australasia*." Retrieved September 16, 2019, from https://www.iap2.org/page/ethics
Ioris, A. A., Hunter, C., & Walker, S. (2008). The development and application of water management sustainability indicators in Brazil and Scotland. *Journal of Environmental Management*, *88*(4), 1190–1201. https://doi.org/10.1016/j.jenvman.2007.06.007
Iza, R., & Stein, R. (2009). RULE–Reforming water governance. *IUCN*, https://portals.iucn.org/library/efiles/documents/2009-002.pdf
Jiménez, A., Saikia, P., Giné, R., Avello, P., Leten, J., Liss Lymer, B., Schneider, K., & Ward, R. (2020). Unpacking water governance: A framework for practitioners. *Water*, *12*(3), 827. https://doi.org/10.3390/w12030827
Jong, J. D., & Los, M. (2014). *Green Roofs for Stormwater Retention in Urban Areas* [Master]. Utrecht University.
Kastens, B., & Newig, J. (2008). Will participation foster the successful implementation of the water framework directive? The case of agricultural groundwater protection in northwest Germany. *Local Environment*, *13*(1), 27–41. https://doi.org/10.1080/13549830701581713
Klinge, J., Sorgedrager, N., & V. Velthuizen, L. (2017). *Marker Wadden – An example of good governance?* [Master]. Utrecht University.
Koop, S., Killaars, L., & D. Bruijn, J. (2014). *Dordrecht flood protection, assessing a multi-layered safety approach* [Master]. Utrecht University.
Koop, S., Monteiro Gomes, F., Schoot, L., Dieperink, C., Driessen, P., & Van Leeuwen, K. (2018). Assessing the capacity to govern flood risk in cities and the role of contextual factors. *Sustainability*, *10*(8), 2869. https://doi.org/10.3390/su10082869
Koop, S. H., & van Leeuwen, C. J. (2015). Assessment of the sustainability of water resources management: A critical review of the city blueprint approach. *Water Resources Management*, *29*(15), 5649–5670. https://doi.org/10.1007/s11269-015-1139-z
Kranenburg, D. V., Wijland, R., & Koekkoek, I. (2017). *Transboundary water quality governance of the Great Lakes – USA & Canada Strengths and Weaknesses* [Master]. Utrecht University.
Lee, J., Rijn, M. V., Vasilaki, P., & Verduijn, H. (2019). *Water Scarcity and Aquifer Contamination in Miami-Dade*. Utrecht University.

Lemos, M. C., & Agrawal, A. (2006). Environmental governance. *Annual Review of Environment and Resources*, *31*(1), 297–325. https://doi.org/10.1146/annurev.energy.31.042605.135621
Lindhout, P. E. (2015). *Cost recovery as a policy instrument to achieve sustainable and equitable water use in Europe and the Netherlands*. Uitgeverij 2VM.
Mees, H. (2014). *Responsible climate change adaptation: Exploring, analysing and evaluating public and private responsibilities for urban adaptation to climate change*. Utrecht University.
Misiedjan, D. (2017). *Towards a sustainable human right to water: Supporting vulnerable people and protecting water resources with Suriname as a case study*. University Utrecht.
Moestadja, K., Dijkstra, H., & Ronduite, M. (2019). *Flint's Water Crisis, Analysed through the 10 building blocks system*. Utrecht University.
Mogos, B., Otieno, A., & Weesp, R. V. (2016). *Water Allocation in Kenya*. Utrecht University.
Mors, G. T., Rolf, L., & Roosjen, J. (2016). *Urban flood risk management in Leeds, Governance assessment and recommendations for improvement*. Utrecht University.
Nagasawa, B. D. S., Balduino, C. D., Garrido, F. P. J. O., & Handayani, P. (2019). *Dry cities: A case study of the Metropolitan Region of São Paulo*. Utrecht University.
Organisation for Economic Co-operation and Development (OECD). (2018). *Implementing the OECD Principles on Water Governance-Indicator Framework and Evolving Practices*.
Pahl-Wostl, C., Lebel, L., Knieper, C., & Nikitina, E. (2012). From applying panaceas to mastering complexity: Toward adaptive water governance in river basins. *Environmental Science & Policy*, *23*, 24–34. https://doi.org/10.1016/j.envsci.2012.07.014
Pickup, J., Vreugdenhil, H., & IJzer, R. (2014). *Kierbesluit: Water policy analysis* [Master]. Utrecht University.
Pirkl, M., Rocha, I. T., & Shaproski, A. (2014). *The Role of the "Cochabamba Water War", Influence of Current Cocharbamba, Bolivia Water Management Policy* [Master]. Utrecht University.
Pretty, J. N. (1995). Participatory learning for sustainable agriculture. *World Development*, *23*(8), 1247–1263. https://doi.org/10.1016/0305-750X(95)00046-F
Ragazzo, C., D'Arrico, V., & Harten, F. (2015). *The Energy Factory*. Utrecht University.
Rahmasary, A. N., & v. Selm, M. (2016). *Water Allocation Governance in the Brantas Basin*. Assessment Using The Ten Building Blocks, Utrecht University.
Restemeyer, B., Woltjer, J., & van den Brink, M. (2015). A strategy-based framework for assessing the flood resilience of cities–A Hamburg case study. *Planning Theory & Practice*, *16*(1), 45–62. https://doi.org/10.1080/14649357.2014.1000950
Rijke, J., Brown, R., Zevenbergen, C., Ashley, R., Farrelly, M., Morison, P., & van Herk, S. (2012). Fit-for-purpose governance: A framework to make adaptive governance operational. *Environmental Science & Policy*, *22*, 73–84. https://doi.org/10.1016/j.envsci.2012.06.010
Roldán, A. M. (2017). Political regime and learning outcomes of stakeholder participation: Cross-national study of 81 biosphere reserves. *Sustainability*, *9*(4), 553. https://doi.org/10.3390/su9040553
Schneider, F., Bonriposi, M., Graefe, O., Herweg, K., Homewood, C., Huss, M., Kauzlaric, M., Liniger, H., Rey, E., Reynard, E., Rist, S., Schädler, B., & Weingartner, R. (2015). Assessing the sustainability of water governance systems: The sustainability wheel. *Journal of Environmental Planning and Management*, *58*(9), 1577–1600. https://doi.org/10.1080/09640568.2014.938804
Scholten, T., Hartmann, T., & Spit, T. (2020). The spatial component of integrative water resources management: Differentiating integration of land and water governance. *International Journal of Water Resources Development*, *36*(5), 800–817. https://doi.org/10.1080/07900627.2019.1566055
Slinger, J., & Schermer, R. (2016). *Improving resilience of urban water management in San Francisco*, Utrecht University.
Suykens, C. (2017). The law of the river. The institutional challenge for transboundary river basin management and multi-level approaches to water quantity management. Doctoral thesis, KU Leuven. https://limo.libis.be/primo-explore/fulldisplay?docid=LIRIAS1839226&context=L&vid=Lirias&search_scope=Lirias&tab=default_tab&fromSitemap=1

Suykens, C. (2018). Critical Success Factors in Transboundary Water Management: A US–EU Comparison. *European Energy and Environmental Law Review*, *27*(1), 2–14. info:eu-repo/dai/nl/343709848.

Suykens, C., Priest, S. J., van Doorn-Hoekveld, W. J., Thuillier, T., & Van Rijswick, M. (2016). Dealing with flood damages: Will prevention, mitigation, and ex post compensation provide for a resilient triangle? *Ecology and Society*, *21*(4). https://doi.org/10.5751/ES-08592-210401

Thaler, T. A., Priest, S. J., & Fuchs, S. (2016). Evolving inter-regional co-operation in flood risk management: Distances and types of partnership approaches in Austria. *Regional Environmental Change*, *16*(3), 841–853. https://doi.org/10.1007/s10113-015-0796-z

United Nations Development Programme (UNDP). (2013). *User's guide on assessing water governance*. United Nations Development Programme Oslo.

Van den Berg, H. H., Hak, A. A., Van Huizen, M. E. R., & Van Naarden, C. C. G. (2015). *Assessing fresh-water supply for agricultural purpose in the Schelde*. Horticultural sector on Zuid-Beveland, Utrecht University.

van Rijswick, H., Buijze, A., Jackson, B., Schmidt, B., Schous, J., Wörner, R., & Makkinje, A. C. (2019). *Mind the gaps in sustainable water governance: Lessons from strategic adaptive management in the InComati river basin.* Iustus förlag.

van Rijswick, H. F., Edelenbos, J., Hellegers, P., Kok, M., & Kuks, S. (2014). Ten building blocks for sustainable water governance: An integrated method to assess the governance of water. *Water International*, *39*(5), 725–742. https://doi.org/10.1080/02508060.2014.951828

Veeren, R. V. D. (2011). *Financing Water Resources Management in the*. RWS Waterdienst.

WFD. (2000). Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. *Official Journal of the European Communities*, *22*(12), 2000. https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A32000L0060

Winkelaar, B., & Benkendorf, R. (2016). *Eco-friendly riverbanks, A policy assessment of the Riverbank Improvement Program of Bangladesh*. Utrecht University.

Wuijts, S. (2020). *Towards more effective water quality governance.* Utrecht University.

Wuijts, S., Beekman, J., van der Wal, B., Suykens, C., Driessen, P. P., & Van Rijswick, H. F. (2019). An ecological perspective on a river's rights: A recipe for more effective water quality governance? *Water International*. *44*(6–7). https://doi.org/10.1080/02508060.2019.1615773

Wuijts, S., Driessen, P. P., & Van Rijswick, H. F. (2018). Governance conditions for improving quality drinking water resources: The need for enhancing connectivity. *Water Resources Management*, *32*(4), 1245–1260. https://doi.org/10.1007/s11269-017-1867-3

Wuijts, S., Friederichs, L., Hin, J. A., Schets, F. M., Van Rijswick, H. F., & Driessen, P. P. (2020). Governance conditions to overcome the challenges of realizing safe urban bathing water sites. *International Journal of Water Resources Development*, 1–25. https://doi.org/10.1080/07900627.2020.1755617

Zombori, B. (2016). *Good drinking water and sanitation governance? The case of Ghana*. Utrecht University.