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The role of governance modes and meta-governance in the transformation towards sustainable water governance

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ABSTRACT

For several decades, water policy reform and the design of governance systems were dominated by simplistic panaceas. This was accompanied by changing preferences for specific types of policy instruments and modes of steering. Such dominance has given way to a more nuanced understanding of requirements for sustainable and integrated water governance capable of addressing the challenges of global and climate change. This paper focusses on the role of governance modes and on meta-governance. Governance mode refers to a certain logic and form through which governance can be realized. The paper uses the distinction between bureaucratic hierarchies, networks and markets to denote different modes of governance. It argues that hybrid governance systems with synergistic interplay between these different governance modes are essential for dealing with complex water management challenges. Furthermore, it argues that the development of such governance systems requires a combination of purposeful design and self-organization. An exploratory comparative analysis of water governance in Germany, the Netherlands, Australia, China and South Africa illustrates the validity and relevance of the conceptual considerations. The paper concludes by highlighting the need for meta-governance as a reflexive process of societal learning to develop, evaluate and adapt governance approaches with the purpose of addressing complex societal challenge.

1. Introduction

Water governance is a theme of major scientific and political interest. For several decades, water policy reform and the design of governance systems were dominated by simplistic panaceas such as privatization or decentralization (Ingram, 2011; Bakker, 2010; Meinzen-Dick, 2007). This dominance has given way to a more nuanced understanding of requirements for sustainable and integrated water governance capable of addressing the challenges of global and climate change. More emphasis is now attributed to the importance of context factors, to diverse and complex governance structures, to the interplay of governance modes and to the trajectories of policy reform (Pahl-Wostl et al., 2012; Pahl-Wostl, 2015b; Araral and Wang, 2013; OECD, 2015).

A diversity of meanings and interpretations is coming along with the increasing popularity of the water governance concept. The original version of a now widely used definition can be attributed to the UN (United Nations, 2002, p. 47): "*The governance of water in particular can be said to be made up of the range of political, social, economic and administrative systems that are in place, which directly or indirectly affect the use, development and management of water resources and the delivery of water services at different levels of society*". This definition highlights that

water governance is a complex multi-actor and multi-level process. The definition has a descriptive rather than analytical focus. Having reviewed a range of definitions on governance in the environmental field, I introduced the following definitions in my recent book (Pahl-Wostl, 2015b, p. 26): "*Water governance is the social function that regulates development and management of water resources and provisions of water services at different levels of society and guiding the resource towards a desirable state and away from an undesirable state. A water governance system is the interconnected ensemble of political, social, economic and administrative elements that performs the function of water governance. These elements embrace institutions as well as actors and their interactions.*" The notion of governance as "*a social function centred on steering human groups toward desired outcomes and away from undesirable outcomes*" introduced by Young (2013, p. 88) highlights the role of governance in a societal context – in particular in contrast to the steering role of government. It also highlights the normative character of governance as a societal function with a certain purpose. This purpose needs or should be negotiated among the various stakeholder groups involved.

It is evident from these definitions that water governance systems are complex. They embrace a whole range of elements and processes and require many instances of negotiation and sense-making. The capacity to govern can be described as a systemic, emergent property that

arises from the interaction of many societal sub-systems operating under quite different logics. Understanding what determines the performance of governance systems and how they can be designed – if at all possible – is a major challenge for science and policy. Learning processes have received considerable attention in recent years (Suškevičs et al., 2017; Gerlak et al., 2017; Siebenhüner et al., 2016; Plummer et al., 2013; Pahl-Wostl et al., 2013a). In comparison, nature and dynamics of the interplay between governance modes, and the role of this interplay in transformative change towards sustainable water governance and management have up to now received little attention.

Governance modes refer to the various forms through which governance can be realized. One common classification, also used in this paper, is the distinction among bureaucratic hierarchies, networks and markets (e.g. Thompson et al., 1991a,b). These modes describe a certain logic of how governance is interpreted. As more and different actors from government, from business, from civil society have become actively involved in water governance the role of different governance modes has also received more attention (Thorelli, 1986; Kooiman, 2000; Thompson, 2003). Markets operate under a different logic than bureaucratic hierarchies. Furthermore, policy design and implementation is increasingly relying on a mix of policy instruments reflecting different governance styles from hierarchical regulation, to economic incentives to voluntary and participatory approaches (Howlett, 2017; Howlett and Rayner, 2007).

Despite the increasing awareness for hybrid governance systems that combine different governance modes, only little attention has been devoted to analysing how such systems come into place, what determines the interplay between governance modes and to which extent hybrid governance system have a higher performance. This paper argues that hybrid governance styles that are characterized by a synergistic interplay between governance modes are needed to deal with complex water management challenges. Such challenges are characterized by complex interdependencies of institutions, actors and feedbacks in the environmental system. Addressing such challenges requires an adaptive governance approach (Pahl-Wostl, 2015b, 2017). The paper argues further that to implement and sustain such an approach requires governance of governance, meta-governance. Meta-governance can be depicted as a reflexive process of societal learning to develop, evaluate and adapt governance approaches with the purpose of addressing complex societal challenge. It embraces elements of both purposeful design and self-organization. Meta-governance is assumed to be essential for avoiding conflicts and for supporting a synergistic interplay between governance modes.

The argument is developed as follows. The next section summarizes the reasoning for the importance of governance modes in understanding governance systems and argues in favour of using the classical distinction between hierarchies, networks and markets. Then pathways towards hybrid governance systems and the role of meta-governance are discussed. An exploratory empirical analysis demonstrates the validity and relevance of the conceptual considerations.

2. Governance modes

2.1. Governance modes – different conceptualizations

Different conceptualizations of governance modes have been put forward in the literature. The various approaches all broach the issues of new modes of coordination and steering and the increasing importance of non-governmental actors. The approaches differ though in the logic selected to delineate governance modes. Furthermore, a stream of literature focuses mainly on governance modes within public administration whereas others analyse governance modes within public policy in general or at an even broader level in domain-specific collective action targeted at dealing with societal problems and achieving collective goals.

An often employed approach makes a distinction between

'Hierarchies', 'Markets' and 'Networks' as conceptualization of idealized governance modes (Thorelli, 1986; Thompson et al., 1991a,b; Thompson, 2003; Lowndes and Skelcher, 1998). Hierarchies, markets and networks denote different ways of coordinating collective action and operate under different logics.

(Kooiman, 2000, 2003) distinguished three governance modes: self, co-, and hierarchical governance which differ mainly in the role of governmental and non-governmental actors. Hierarchical governance refers to the classical mode of governmental steering and top-down control. The other end of the spectrum is represented by self-governance which refers to situations in which actors take care of themselves, outside the realm of governmental control. Co-governance refers to organized forms of governance interaction where different actors (public and private) coordinate and communicate to deal with the issues at stake without a central governing actor. Kooiman argues that most governance-related societal interactions can be expressed by these modes of governance which may often occur in combination. Empirical analyses that were based on this conceptualization provided evidence that governance interactions had indeed become increasingly complex and diverse (Kooiman et al., 2008). This was also confirmed by Arnouts et al. (2012) who introduced a distinction between closed and open co-governance. This extension of Kooiman's categorization allows a finer distinction to be made regarding the role of actors, the distribution of power and interaction rules.

To structure their review of the literature on governance modes, Treib et al. (2007) introduce a broad categorization for conceptions of modes of governance according to the emphasis on state intervention versus societal autonomy. They argue in favour of using the three dimensions of politics (actors and political processes), polity (kind of institutions) and policy (policy content) as point of departure to develop typologies for governance modes. In the politics dimension the main emphasis is on the presence of public versus private actors. In the polity dimension state intervention is associated with hierarchy, a central locus of authority and institutionalized interactions. Conversely, societal autonomy is associated with markets, dispersed loci of authority and non-institutionalized interactions. The policy dimension covers a broader range of different approaches. State intervention relies on legal bindingness, rigid approaches to implementation, the presence of sanctions, material regulation and fixed norms. Treib et al. (2007) have the ambition to provide an analytical rather than a normative framework.

By contrast, Lange et al. (2013) take a normative stance in their conceptualizing of governance modes for the governance of sustainability. They deplore the prevailing lack of conceptual clarity in the field of governance in general and governance modes in particular. They explicitly dismiss using the distinction between 'hierarchy', 'market' and 'network' for the categorization of governance modes since they consider that understanding real-world governance arrangements (and their relationship to sustainable development) means going beyond what they consider highly abstract, aggregated ideal types. As did Treib et al. (2007), they use the distinction between politics, polity and policy which they consider to be particularly useful for analysing the shift from government to governance.

This paper adopts as well a normative approach by arguing that hybrid governance styles characterized by a synergistic interplay of governance modes are needed to deal with complex governance challenges. It adopts an analytical approach by conceptualizing different governance modes as hierarchical, network and market governance. These modes may be understood as ideal types in the Weberian sense. As pointed out in the previous section, arguments were put forward against the usefulness of such abstract, aggregated ideal-types for meaningful analysis and in favour of more detailed and specific conceptualizations (Driessen et al., 2012; Lange et al., 2013; Treib et al., 2007).. However, ideal types constitute very useful points of departure for more refined analyses. Ideal-typical configuration has a strong explanatory power in terms of logical coherence as well as in identifying

and explaining potential conflicts or synergies if governance modes are combined. In reality, an individual mode will rarely occur in complete isolation but in more or less compatible combinations and hybrid forms. Different modes may dominate though, and dominance may change over time.

Tenbensel (2005) discussed the emergence of new modes of governance as alternatives to hierarchies and market approaches. He ended up suggesting four rather than three governance modes by making an explicit distinction between provider-based (professional) and community-based networks. His categorization is derived from differences he perceives in the type of power and knowledge to sustain certain kinds of governance modes. This is an interesting suggestion which might be very relevant to distinguish for example the influence of epistemic communities from the one of local communities. However, I consider these modes as sub-types of a network governance style rather than being at the same conceptual level as hierarchical and market governance modes. Hence for the purposes of this paper the distinction between three modes is retained.

2.2. Operationalizing governance modes – hierarchies, networks and markets

Hierarchical, network and market governance differ markedly along important governance dimensions such as the degree of formality of institutions and the role of state versus non-state actors (Pahl-Wostl, 2015). Table 1 summarizes major differences among the three governance styles. It is based on an assessment by Pahl-Wostl (2015a) on how the characteristics of these governance styles were described in the scientific literature. In bureaucratic hierarchies, regulatory processes are mainly based on formal rules and sanctions. Steering is based on authority, and power derives from the position in a formal hierarchy. Networks are largely governed by informal institutions. Steering is based on trust and voluntary agreements. Power derives from the role in the network. The informality and high flexibility in membership make networks interesting with respect to processes of learning and change. A market governance style is based on a combination of formal and informal institutions. Steering is based on price and economic incentives. The main motive of actors is to increase their material benefit. Power derives from wealth and access to material resources.

The characterization already reveals sources for potential conflicts. For example, in a political context where government typically has a tradition to act in a hierarchical style it will be a challenge to implement governance instruments that operate under a network governance logic (e.g. stakeholder participation and co-decision making) where government is supposed to act as partner. Conflicts arise if management options are developed and ranked in a participatory setting and the final decision is then made by government in a top-down approach largely ignoring preferences expressed by stakeholders (cf. section 5).

These governance styles translate also into different ways how key governance processes, which may also be called governance functions, are realized. Governance functions refer to a set of governance processes (e.g. knowledge generation or conflict resolution) that are considered essential for governance to fulfil its role as a social function ((McGinnis, 2011; Pahl-Wostl et al., 2013b; Pahl-Wostl, 2015b)).

Furthermore, governance functions are assumed to require a particular set of properties to be effective (Pahl-Wostl et al., 2013b; Pahl-Wostl, 2015b). Governance styles differ in how these governance properties are framed. Table 2 summarizes the characteristics of key governance functions and governance properties from the perspective of different governance styles.

Knowledge generation may encompass the collection of new information and/or the integration of available, fragmented evidence from different sources. A key step in this process is the translation of that information into validated and legitimized 'knowledge'. Governance styles differ in this respect and value different kinds of knowledge.

Conflict resolution is essential to water governance given the resource's multiple uses, irreplaceability, unpredictability, and strategic value as a productive resource, a constituent of critical ecosystems, and an anchor of local livelihoods and cultures (Conca, 2006). Governance styles differ in how conflicts are conceptualized and how solutions are framed.

Monitoring and evaluation are essential prerequisites for any adaptive governance and management approach. Governance styles differ in how monitoring is performed, how progress is evaluated and noncompliance with rules or agreements sanctioned.

Legitimacy refers to the validity and broad-based acceptance of the authority of an actor or event or a process. Legitimacy may derive from the way authority was conferred on an event or group (for example, through a democratic, open and inclusive process). In a hierarchical governance style, an assessment of legitimacy focusses on output, on the outcomes achieved by a process. A network governance style attributes more importance on the process, how outcomes are derived. A lack of legitimacy may lead to opposition, resistance, or loss of commitment. Legitimacy is frequently contested in complex, multi-level governance settings given the involvement of a multitude of actors and their often poorly defined roles.

Representativeness refers to the adequate involvement of all relevant stakeholder groups. Governance styles differ in who is considered eligible to have a major role in a governance process. The active involvement of not only powerful actors but also affected stakeholder groups has proven crucial for ensuring that a process is perceived as legitimate and for reducing the likelihood of the process being jeopardized by narrow interests (Plummer et al., 2013). Broader participation may also enhance effectiveness through learning mechanisms or the generation of new information. It is evident that such insights cannot be taken into consideration by retaining a pure hierarchical governance style.

The elaboration on the different governance styles has demonstrated quite clearly that governance styles operate according to different logic. Each style has its strength and weaknesses. The increasing importance of more hybrid governance arrangements reflects attempts to combine strengths of the different styles. However, combining these styles is by no means straightforward. Incompatibilities and contradictions may lead to ineffective and inefficient approaches and even to severe conflicts rather than expected synergies.

Table 1
Selected differences among the three governance styles (modified from Table 5.1 in Pahl-Wostl, 2015a, page 90).

	Hierarchical Style	Network Style	Market Style
Motive of sub-ordinate actor	Fear of punishment	Belonging to group	Material benefit
Roles of government	Government rules society	Government is partner in a network society	Government delivers services to society
Choice of actors	Controlled by written rules	Free, ruled by trust and reciprocity	Free, ruled by price and negotiation
Power	Position in formal hierarchy	Centrality of role in network	Degree of wealth, market share
Steering	Authority	Trust	Price, economic incentives
Roles of knowledge	Expertise for effectiveness of ruling	Knowledge as shared good	Knowledge for competitive advantage
Dominant Actor Type	Government	Civil Society Organizations – NGOs	Business - Companies

Table 2

Selected governance functions and governance properties in the three governance styles (modified from Table 5.2 in Pahl-Wostl, 2015a, page 92).

Governance Functions	Hierarchical Style	Network Style	Market Style
Knowledge Generation	Technocratic focus; Only technical experts involved	Knowledge generation as part of group building process; Different types of knowledge acknowledged; Broad sharing of knowledge	Knowledge serves to increase competitive advantage.
Conflict Resolution	Jurisdiction; Legal procedures	Mediation; Aim for consensus	Survival of the fittest; Compensation payments
Monitoring & Evaluation	Compliance with regulation and quantifiable standards Rigid in terms of learning	Participatory; Reflection on agreed goals Openness to adaptive approaches – change negotiated.	Cost-benefit calculations; Rapid changes in individual strategies if needed to increase profitability.
Governance Properties	**Hierarchical Style**	**Network Style**	**Market Style**
Legitimacy	Legitimacy as representation; Democratic elections of governments; Constitutional rules as the basis for authorities; Output legitimacy.[a]	Legitimacy as participation; Process-based procedural arguments; Input legitimacy.[a]	Profit counts; Input (efficiency) and output (effectiveness) legitimacy combined.[a]
Representativeness	Elected representatives; Technical experts on problem domain.	All voices heard, openness of process; Those affected participate in decision-making.	Access for all market players.

[a] Input and output legitimacy refers to different ways of legitimizing agency. Legitimization by output assesses legitimacy by the product of an action. Legitimization by input assesses legitimacy by the process by which actors acquire particular roles and how an outcome is derived. In a hierarchical style roles and process rules are prescribed.

3. From dominance of one mode towards hybrid governance systems

In the 1960s and 1970s, water policy was characterized by a strong role of central government and central regulation, by a hierarchical top-down command and control approach. In the late 1980s and 1990s, one could observe a shift towards the principles of subsidiarity, decentralization as well as privatization, and markets became key players. The wave of decentralization reform around the turn of the millennium emphasized the superiority of one governance mode, markets, over governmental regulation. However, in particular, in countries with weak formal institutions, decentralization led often to fragmentation and market based approaches often failed to improve the delivery of water services (Pahl-Wostl and Knieper, 2014).

Hybrid governance systems where governance modes are balanced and no mode dominates are typically encountered in countries where formal institutions are effective and governance systems are polycentric (e.g. The Netherlands). Polycentric governance system combine decentralization with coordination of the largely autonomous governance units.(Pahl-Wostl and Knieper, 2014). Such coordination needs some time to evolve. The governance system in the Netherlands for example has evolved over decades, even centuries. If certain characteristics of the current governance system deem desirable can they develop in countries with a very different tradition over a much shorter period of time? And what is required to promote such development?

Increasingly, the argument is made in the scientific literature that government needs to act as meta-governor (Bell and Quiggin, 2008; Grafton et al., 2016; Movik et al., 2016; Theesfeld and Schleyer, 2013; Meuleman, 2008). Meta-governance by the state implies coordination, monitoring and steering of governance arrangements and the interplay between different governance instruments. However, adopting such a role implies considerable capacity of the state and compliance with good governance principles (accountability, transparency, equity, inclusiveness, responsiveness, effectiveness, efficiency). Hence, one has to envisage another kind of meta-governance for governance systems where the capacity of the state to act as meta-governor is weak. Agency of different kind of actors may play an important role in polycentric governance as shown for example by Berardo and Lubell (2016). Their findings support as well the need to combine bottom-up and top-down arrangements as well as the need for effective links between formal and informal institutions. In my recent book I defined '***meta-governance as***

a reflexive process of societal learning to develop, to evaluate and to adapt governance approaches with the purpose of addressing complex societal challenges' (Pahl-Wostl, 2015b, p.96). Government can and should play an important role in such a concept of meta-governance. But it argues in favour of a wider societal process in which the function of meta-governance should be embedded. Meta-governance is thus not only a capacity of the state and of governmental actors but of society.

4. Evidence from cases – an exploratory analysis

An exploratory empirical analysis was undertaken to assess the validity and relevance of the conceptual considerations developed in this paper. The analyses comprise five cases from countries which differ regarding the state of institutional and economic development and the historical development of the political system regarding the dominance of hierarchy, market or network governance. The set comprises the Netherlands, Germany and Australia as developed and China and South Africa as emerging economies.

4.1. Methods

The analyses of governance modes are based on a coding of legal documents and water management implementation plans (primary documents) as well as scientific publications (secondary documents). A list with all documents is provided in the supplementary material. The primary document analysis used a two-step coding process. First, all documents were analysed using the coding scheme in Table 3A. In a second step, all the quotations were linked to governance styles – hierarchy, network or market. The assignment to a governance style was based on the characteristics summarized in Tables 1 and 2. For example all quotations for the code 'Government – Role, responsibilities of government' were extracted. Then each of these quotations was assigned to hierarchy, network and/or market, respectively, based on the characteristics listed in Table 1, row 2. Secondary documents were analysed using the coding scheme in Table 3B. Results are analysed using both a quantitative approach (section 4.2) and qualitative content analysis (chapter 5). The software atlas.ti7 (version 7.5.18) was used for coding and document analysis.

Table 3
Coding schemes document analyses.

A. Coding scheme for primary documents	
Government	Role, responsibilities of government
	Report on specific activities already performed by government
	Nature of organization of government
Knowledge	Kind of knowledge (e.g., technical, local)
	Instruments to produce knowledge (e.g. modelling tools)
	Actors who produce knowledge
	Accessibility of knowledge (and data, information)
Control	Actors who are in charge of control
	Actors who are controlled
	Kind of activities that are controlled
	Instruments used for control
Consultation	Consultation of non-government actors
	Consultation of other governmental actors
	Consultation of the public at large
	Instruments used for consultation
Monitoring	What is monitored?
	Instruments used for monitoring (how is monitoring performed)
	Responsibilities for monitoring (who is involved)
B. Coding scheme for secondary documents	
	Hierarchical Mode
	Market Mode
	Network Mode
	Governance Instrument
	Meta Governance
	Role of Government
	Shift in Governance Mode
	Link between Governance Modes
	Conflict between Governance Modes
	Environmental Consideration

4.2. Hybrid character of governance system with respect to governance modes

For each country, the major national water legislation and a plan at implementation level was coded to identify characteristics of hierarchical, market and network governance styles. Results are displayed in Table 4. The first row shows results for water laws, the second row for implementation plans. For Germany, two pieces of water legislation were included – a national and a provincial law. In Germany, the authority for water governance lies predominantly at the level of the provinces (Bundesländer). Only with the introduction of European Water Legislation has the national level gained influence. Results for each governance mode are given as percentages of the total number of quotations to facilitate comparisons among the different documents. The total number of quotations finally assigned to individual governance modes ranged between 30–160 per document.

One can note that in most countries national legislation has a stronger emphasis on a hierarchical governance mode, whereas implementation has a stronger emphasis on the network mode. China constitutes a notable example in this respect. Regarding the combination of governance modes, one can find notable differences between the different countries.

In The Netherlands one can observe a light dominance of hierarchy over network in the national water law. Little attention is given to a market style. The emphasis shifts towards a network style in the Delta Program implementation plan. Hierarchy and market style are quite balanced. The Netherlands has thus the most pronounced hybrid governance system with respect to a combination of governance modes. It should be noted though that the coding results do not provide any information yet regarding synergies between governance modes. As the performance of the water governance system in the Netherlands is quite high regarding for example adaptability or achievement of water management goals (Pahl-Wostl et al., 2012; OECD, 2014) one can expect synergies rather than conflicts.

In Germany water legislation is characterized by a dominance of a hierarchical style. A market style is completely absent therein. Small consideration of network. More emphasis is given to both market and network style in implementation. The dominance of a hierarchical style in regulation in Germany is consistent with earlier findings of a quite centralized regime despite the federal government (Pahl-Wostl et al., 2013a; Pahl-Wostl and Knieper, 2014).

Australia has the strongest emphasis on market in national legislation of all countries. One can observe a moderate dominance of a hierarchical style in national regulation – but both market and network are equally strongly present. The dominance shifts towards a network style in implementation. Australia confirms its reputation as a country with a more neo-liberal market-oriented policy – like other Anglo-Saxon countries.

Table 4
Results from primary document analyses.

Mode %[a]	NL LE1	DE LE1	DE LE2	AUS LE1	CH LE1	SA LE1	
Hierarchy	56	92	90	59	93	48	
Market	6	0	0	19	5	11	
Network	38	8	10	22	3	42	
TOTAL	100	100	100	100	100	100	
	NL IM1	DE IM1		AUS IM1	CH IM1	SA IM1	SA IM2
Hierarchy	24	60		16	83	55	26
Market	26	20		16	17	11	7
Network	50	20		68	0	34	67
TOTAL	100	100		100	100	100	100

Legal Documents:

NL LE1 – National Water Act 2010.

DE LE1 – National Water Law (Nationales Wasserhaushaltsgesetz) 2009.

DE LE2 – State Water Law (Landeswassergesetz) North Rhine Westphalia 1995 (updated version 2016).

AUS LE1 – National Water Act 2007.

CH LE1 – Water Law of the Peoples Republic of China 2002.

SA LE1 - National Water Act 1998.

Implementation Plans.

NL IM1 – Delta Programme 2017.

DE IM1 – Water Management Plan for the North Rhine-Westphalian sub-basins of the Rhine, Weser, Ems and Maas (Bewirtschaftungsplan NRW) 2016-2021.

AUS IM1 – Murrumbidgee Catchment Action Plan 2013.

CH IM1 –Water Use South-North Diversion Project 2014.

SA IM1 – Olifants Doorn Water Management Area – Strategic Plan 2005.

SA IM2 – Western Cape Sustainable Water Management Plan 2012.

[a] Percentages refer to the fraction of codes that refer to a certain governance mode.

China is characterized by strong dominance of a hierarchical style both in national legislation as well as in the implementation plan. The network mode is almost absent. Some emphasis is given on a market style in implementation. Regulation is very prescriptive. A long list of fines for violations confirm the dominance of a hierarchical governance mode.

South Africa is more balanced between hierarchy and network in both national regulation and implementation plan. A market style is present but weaker. The recent implementation plan of the Western Cape has more emphasis on network. The Western Cape is an innovative province with different political majorities than at national level and in other provinces. Overall, South Africa shows also a distribution of governance modes and could thus be characterized as a hybrid governance system. However, performance of water governance is quite poor regarding the achievement of water management goals (Movik et al., 2016; Schreiner, 2013; Ruiters and Matji, 2015). Hence, one might suspect conflicts rather than synergies among the different governance modes.

To substantiate the insights derived from this first assessment of legal documents, the next section provides a more detailed assessment of the changes in the water governance systems and the role of different governance modes over the past decades. It is primarily based on the analyses of secondary documents. Evidence from the analyses of primary documents is included as appropriate.

5. The role of governance modes in the water governance system in the different countries

For each country, a narrative will be provided that summarizes overall development over the past decades, discusses selected examples of conflicts and synergies between governance modes and elaborates on meta-governance and the role of government. Results are based on the coding of recent scientific literature and further results from the coding of the legal documents (cf. supplementary material for a list with all sources). Results from the coding of scientific literature are paraphrased and summarized rather than providing all relevant quotes.

5.1. Netherlands

The present water governance system of the Netherlands can be characterized as hybrid regarding governance styles. This is the result of a long evolution of an initially technocratic and top-down approach that failed in dealing with complex governance challenges. Change was often triggered by crises such as major flood events (Pahl-Wostl et al., 2013a). Innovations were driven by successful networking by policy entrepreneurs who did not come from within the established governmental hierarchical structure (Huitema et al., 2009). Informal networks have been well connected to formal policy processes by for example individuals or by advisory commissions with representatives from policy, science, and business (Pahl-Wostl et al., 2013a; Nooteboom, 2006).

Water management shifted from a command-and control approach focusing on hard infrastructure measures towards embracing more environmental considerations to the present integrated and adaptive approach. The room for the River program has been a revolutionary change in flood policy and risk governance and management (Huitema et al., 2009; van Dijk et al., 2011; Pahl-Wostl et al., 2013a; van Dijk, 2008). Involving stakeholders was driven by the insight that a program as complex and ambitious as the room for the river program cannot be realized in a technocratic expert mode (Roth and Warner, 2007).

But even in the Netherlands with a long consensus culture, such a change was not straightforward. There have been conflicts between the hierarchical and the network governance modes. One example are the calamity polders (Roth and Warner, 2007; Chan and Protzen, 2018). To protect urban areas downstream, certain more rural areas were designated as flooding zones without involving the inhabitants concerned

(hierarchical governance mode). This raised major protests. Legitimacy of the process (= input legitimacy) was not accepted by the concerned villages (network governance mode). Furthermore, they provided counter-expertise, not only unsubstantiated opposition (Roth and Warner, 2007). Another example where conflicts between governance modes needed to be overcome is the instrument of 'Water Assessments' (WA). WA support coordination between spatial planning and water management. They prescribe a flexible procedure to involve water managers in any spatial planning decision (van Dijk et al., 2011; van Dijk, 2008). WA can be characterized as hybrid instruments combining hierarchical and network governance styles. However, in urban spatial development economic interests and a market-dominated governance style may be in conflict with WA-derived considerations such as restricted land-use options due to high water-related risks (van Dijk et al., 2011; van Dijk, 2008). In such situations, water boards may have to act more strategically and engage in power plays since a more consensus-based or a legal approach to conflict resolution may not be effective (cf. Table 2 on different modes for conflict resolution). Despite such challenges WA seem to be a remarkably successful hybrid instruments that achieves flexible cross-sectoral coordination. van Dijk (2008) compared different assessment instruments supporting cross-sectoral coordination from the perspective of metagovernance. She uses metagovernance as umbrella concept for finding the most effective and efficient way of steering with an instrument by reflecting on all three modes (hierarchy, network, market) of coordination to find the most suitable mix to fit the situation (van Dijk, 2008. p. 71, 244). Her analyses show that WA – despite being based on a network governance logic - was explicitly designed as hybrid instrument to support a flexible use of different modes of coordination.

In the Netherlands, government and state actors seem to have played quite an active and beneficial role in meta-governance to resolve conflicts and generate synergies between governance modes (Silveira and Richards, 2013; Pahl-Wostl et al., 2013a; van Dijk, 2008). The new policy for integrated spatial planning argues explicitly in favour of more cooperation between government and citizens. Instruments to link different parts of government and stakeholders from different sectors (such as WA linking spatial planning and water management) rely on cooperation and trust, not on hierarchy (van Dijk et al., 2011; van Dijk, 2008). This supports a learning approach to meta-governance. Without giving up entirely the possibility of hierarchical intervention if needed. The role of government seems to be rather flexible and pragmatic and responsive to expectations associated with a certain governance style (c.f. Table 1).

5.2. Germany

Germany is characterized by a more hierarchical governance style compared to the Netherlands. Changes in water governance style are mainly triggered by higher-level legislation. The shift in flood management from security first to more risk-based approaches has been mainly imposed by the European Flood Directive (Becker, 2009; Newig et al., 2016). The European Water Framework Directive also imposed a shift towards more network governance styles into the traditionally hierarchical and technocratic German water management (Hüesker and Moss, 2015). However, moving towards more network governance seems to encounter serious obstacles in German authorities with a tradition of a hierarchical governance style. Does this imply that Germany is performing worse than the Netherlands in dealing with complex water management challenges? Without doubt the Netherlands are far more advanced in implementing a transformation toward integrated and adaptive flood management (Pahl-Wostl et al., 2013a). A comparison of urban flood management in Rotterdam and Hamburg suggest that the dominance of a hierarchical governance style can still be effective as long as no major conflicts arise and flood management does not aim for radical innovations (Mees et al., 2014). Rotterdam is far more advanced in the implementation of public-private partnerships,

which results as well in a higher overall legitimacy across all steps of the management process (as might be expected from a hybrid governance style c.f. Table 2). However, flood management in Hamburg has still a high output legitimacy, i.e. citizens are satisfied with the measures of flood management and seem to be less concerned with procedural aspects. Conflicts between governance styles may arise though if measures are more controversial.

In 1982 France and Germany agreed to improve flood-safety standards along the Rhine. Baden-Württemberg (a German Bundesland), responsible for the implementation decided to combine ecological restoration and improvements of flood safety by implementing permanent polders as retention areas for flood management. The implementation of such polders has encountered severe local opposition (Pahl-Wostl et al., 2013a). Implementation was conducted in a hierarchical governance mode. Stakeholders were not involved in the planning processes until the final step of the legally prescribed consultation process of construction plans. Stakeholder coalitions formed that often mobilized counter-expertise. In such a situation input-legitimacy gains in importance.

Similarly, public involvement as required by the European Water Framework Directive has in most cases been limited to information or at most consultation (Theesfeld and Schleyer, 2013). Such an approach is not conducive to dealing with persistent problems such as nitrate pollution of groundwater caused by intensive agriculture (Pahl-Wostl, 2017). Both hierarchical (regulation) and network (voluntary agreements between water suppliers and farmers) governance styles failed in dealing with the nitrate problem. Agriculture has been using its lobbying power to influence policy and the WFD implementation operating in a market logic against hierarchy and network (Hüesker and Moss, 2015; Mees et al., 2014). Government seems to be largely absent as meta-governor to design processes that could deal with the different and irreconcilable logics of the different governance styles. To the contrary, a national legislation subsidizing renewable energy production provided strong economic incentives for increased biogas production that rendered ineffective voluntary agreements and compensation payments between water suppliers and farmers (Pahl-Wostl, 2017).

Theesfeld and Schleyer (2013) undertook a critical reflection on what they refer to as "IWRM Light" implementation of the WFD. Their recommendations constitute a claim for more meta-governance to overcome institutional inertia and path dependency due to the strong hierarchical and regulatory based tradition of German water governance and management. The situation in flood risk management and the implementation of the EU Flood Directive is similar. It is unclear how decisions to use participatory planning are made, and a more systematic design of such processes by competent authorities seems to be warranted (Newig et al., 2016). Furthermore, German authorities are very reluctant to engage with adaptive management and experimentation which constitutes an obstacle to change and innovation (Newig et al., 2016; Pahl-Wostl et al., 2013a). The hierarchical tradition prevents government from adopting an active role in a learning approach to meta-governance. Such engagement would require a network governance style and a more flexible and situational approach by government to adopting different roles.

5.3. Australia

Among the five cases chosen, Australia has the strongest emphasis on market mechanisms for the governance of water. Regarding hierarchy and network governance, water legislation is characterized by a dominance of a hierarchical governance style, whereas implementation has a clear dominance of network governance (cf. Table 3). These findings suggest a considerable dynamics and flexibility regarding the role of the different governance modes at different levels and different phases of the policy cycle.

In the late 1990s, severe droughts triggered a shift towards toward market governance that had already started earlier (Hussey and Dovers, 2006). Water was converted to a tradable commodity, and water licences were decoupled from land tenure (Alston et al., 2016). The National Water Initiative (2004) had an emphasis on improving efficiency and effectiveness of water management and introduced as principles cost-recovery and consumption-based pricing but also environmental water allocations. Coordination among states was achieved by a competitive scheme set up by the federal government to reward reform efforts (Doolan and Hart, 2017; Cooper and Crase, 2016). The New South Wales Water Management Act (2000) was characterized as well by increasing decentralization and a shift away from hierarchical toward more network- and market-based governance (Bell and Park, 2006). But another severe drought, the so-called millennium drought (1997–2009), triggered a shift back towards more hierarchical control as documented in the Water Act 2007 (Marshall et al., 2013). With the Water Act 2007, the national government interfered in the management of the Murray-Darling Basin as the states proved to be incapable of coming to an agreement regarding the allocation of scarce water resources and environmental targets were not reached (Crase and Cooper, 2015; Alston et al., 2016). The Water Act 2007 strengthened water management at the basin scale by attributing more power to the Murray-Darling basin authority. In contrast, the Murray-Darling Basin Commission that was in place before depended on unanimous approval of all the individual states. The Water Act 2007 aimed as well at harmonizing the approaches to water markets and property rights regimes to improve the effectiveness of market-based governance. A variety of conflicts have arisen between the different governance modes.

The Murray-Darling Basin Plan was developed with strong stakeholder involvement but implemented in a hierarchical top-down fashion. This eroded the trust of some stakeholders who did not consider the process to be fair and transparent (Alston et al., 2016). Conflicts arose between hierarchical and network governance when options in consultative processes were predetermined by prior policy choices (Crase and Cooper, 2015).

Conflicts have also been identified between market and network (and hierarchy) governance styles. The dominance of a market logic and transactional approaches, sole emphasis on benefits and natural assets may undermine the willingness of stakeholders to cooperate and to take into account long-term and system-wide implications (Bell and Quiggin, 2008; Connell, 2014). The government buys water entitlements on the market to comply with environmental water allocations without explicit discussions on environmental functions and their value to society.

Experience from Australia shows that water markets require an involvement of the government as meta-governor (Bell and Quiggin, 2008; Connell, 2014). Already the introduction of a property rights regime has to be initiated by the government and constitutes a crucial step to set the trajectory for further developments. In 2007, the government (as meta-governor one could say) interfered in the market scheme and introduced the environment into the market (Kiem, 2013). Water markets cannot operate in a pure market fashion but require strong involvement of the government, in particular to assure environmental and social objectives (Bell and Park, 2006; Bell and Quiggin, 2008). Furthermore, during conditions of extreme water scarcity markets have their limitations as allocation priorities have to be set by other criteria than purchasing power (e.g. assuring drinking water supply). This requires hierarchical interference in the market scheme. Acting as meta-governor in such situations is a challenge.

Conflict may arise as well between hierarchical and network governance style when the government acts as "meta-governor". Legitimacy is based on procedural aspects in network governance. The choice whom to involve in negotiation and decision making processes is a key decision, which may undermine legitimacy as perceived by stakeholders (Bell and Park, 2006). There was strong stakeholder involvement in the Murray-Darling Basin plan development – but the government continued to operate in a market and hierarchical mode, which undermined the willingness of stakeholders to cooperate (Connell,

2014). So, on the one hand meta-governance is needed. On the other hand, the role of government has to be clearly defined, rules for decision-making need to be transparent and negotiable to do justice to both governance styles and to avoid that stakeholders with high lobbying power try to gain too much influence. Such conclusions are supported by findings by Marshall et al. (2013) who argue that "*At least for the Murray-Darling Basin, therefore, our case study highlights the importance of governments augmenting their limited capacities to control the direction of cross-border integration efforts by setting in place governance arrangements capable of catalysing (e.g., by fostering conditions favourable for fruitful competitive rivalry or informal collaborations) the kinds of self-organising dynamics through which they and other enterprises may come to manage water resources with greater regard for the interdependence of their efforts*" (ibid, p 214). This is an argument in favour of meta-governance even if the authors do not use this term.

5.4. China

The governance system in China is characterized by strong emphasis on control and hierarchical decision making by the government. If consultation is undertaken, then among governmental units at different levels (e.g. local governments, authorities) rather than including stakeholder groups. A recurring theme is the division of power between central and local levels of government. Provinces have considerable financial autonomy. Silveira and Richards (2013) suggest that the Chinese system is a hybrid between a centralized, coordinated system operating in a hierarchical mode and a decentralized fragmented system operating in a market mode (fiscal decentralization). This causes some tensions as provinces have more incentives to pursue economic objectives and short-term profit maximization than environmental and social objectives and long-term sustainability.

The hierarchical governance style is also reflected in a commend-control approach to water management. Traditionally, water management in China has been characterized by large-scale infrastructure development such as the quite contested Three Gorges Dam (entered into operation 2008). The main purposes of the dam construction have been flood management and furthermore energy production. Despite such megaprojects, one could observe over the past decade the advent of more "soft" and ecologically based approaches in flood management (Xia and Pahl-Wostl, 2012b; Moore, 2017; Pittock and Xu, 2011). The implementation of ecologically based approaches follows an authoritarian way where thousands of people are simply relocated to make space for flood retention areas. Adaptive management has been introduced in the "Chinese way" which embraces an iterative development and implementation of policies based on pilots and policy experimentation tightly controlled by the central government. Such experimentation has been the hallmark of Chinese economic development. By using policy experimentation under hierarchy, the central government has tried to control economic development to avoid conflicts between the prevailing hierarchical governance style and market-based liberalization (Heilmann, 2008). However, such controlled experimentation does not develop social capital and commitment to environmental policy objectives at lower levels (Xia and Pahl-Wostl, 2012a, 2012b). Hence it cannot be compared to concepts of adaptive management that advocate and promote a network governance style and the development of a more polycentric regime (Pahl-Wostl, 2015b).

The conflict between hierarchy, market (fiscal decentralization – more financial autonomy to provinces) and network (efforts of central government towards participation and integrated measures) governance styles prevail and are most significant in urban flood management. Large-scale infrastructure projects have largely ignored the needs of cities and smaller rivers in the periphery of major waterways (Moore, 2017). Different levels of government – all rather hierarchical and authoritarian – are not working in line. Coordination across levels of government does not work well. Moore (2017) argues in favour of a new role of the central government – required as meta-governor using dedicated policy instruments to foster coordination. The question remains open if such coordination could indeed be achieved in a hierarchical governance mode.

Attempts to use Western models of stakeholder participation in formal policy processes are in conflict with traditional Chinese hierarchical governance style. This has also impacted the effectiveness of introducing water user associations to improve the allocation of scarce water resources. Informal vertical social networks among prosperous village leaders and governmental officials (Guanxi) developed where decisions on water allocations were made. These vertical relations were more in conflict with formal institutions that aimed at increasing the effectiveness and sustainability of water use (Yu et al., 2016). This is a sign of a more general tendency in China where corruption and "network governance" at local level undermines jurisdiction (Young et al., 2015; Dai, 2015). However, in irrigation management also other tendencies could be observed where villagers without access to economic resources developed horizontal social networks to develop more equitable approaches to sharing water resources (Yu et al., 2016). The government seems to have been largely absent in facilitating the development of the latter kind of networks.

Similar challenges have arisen when the Chinese government has tried to introduce water markets and trading schemes. Hierarchical control and the legacy of administrative water allocation interfere with a market-based governance style (Moore, 2015). Water resources are allocated in a top-down fashion across several levels of government, and trading schemes represent more a transfer of water usage entitlements allocated to administrative entities than trading among actors who hold individual water rights. Such constellations are susceptible to the development of vertical social networks and corruption.

The preference for large-scale infrastructure projects is also prevalent in dealing with water scarcity. Despite efforts towards decentralization of irrigation management and the introduction of trading schemes, the South-North Transfer constitutes a water transfer project of unprecedented dimensions. The central government showed quite some flexibility in realizing this project by using a persuasive strategy carefully combined with the traditional coercive strategy to implement the resettlement of many thousands of people (Moore, 2014).

Overall, one can conclude that Chinese water governance is still dominated by a hierarchical governance style. Market or network-based approaches are adapted to fit a hierarchical paradigm. The realization of large-scale infrastructure projects such as the Three Gorges Dam or the South-North Transfer proceed in parallel to the government's promotion of new paradigms, such as water saving society or living in harmony with nature (Moore, 2014; Xia and Pahl-Wostl, 2012a, 2012b). Government has traditionally a strong and dominant role. One could argue about the presence of meta-governance by government which continues largely to act in a hierarchical governance style and in the role of ruling society. There is little evidence of supporting a balance between governance modes and more learning based approach to meta-governance.

5.5. South Africa

Water governance in South Africa encountered a major transformation after the breakdown of Apartheid (Herrfahrdt-Pähle and Pahl-Wostl, 2012; Nastar and Ramasar, 2012; Kapfudzaruwa and Sowman, 2009). South African water legislation is often praised as being exemplary on an international scale. However, it has encountered serious challenges in implementation (Schreiner, 2013).

Reform in water legislation after the end of the Apartheid regime represented a move towards more network governance, towards more participation and social justice consideration in water legislation – National Water Act, 1998 and Water Services Act, 1997 (Kapfudzaruwa and Sowman, 2009). The initial shift from hierarchy towards more network governance – socially oriented – was later replaced by a more market-oriented strategy (Movik, 2011). The NWA introduced

decentralization and the implementation of Catchment Management Agencies (CMAs). CMAs can be established upon proposal coming from communities in the respective established water institutions, like irrigation boards or water user associations, in the proposed CMA's water management area (Meissner et al., 2016). But the national government has still considerable power. The Minister of Water and Sanitation must appoint all responsible persons and has also the authority to interfere in the daily work and even disassemble a structure if considered to be ineffective. Due to administrative water rights, the government has also discretionary power to decide on water allocations (relative shares determine what is considered reasonable) (Movik, 2011). The considerable power of the Minister begs the question whether decentralisation, as enshrined in the NWA, is only a principle on paper or something that can truly be implemented at catchment level with considerable less interference from the Minister. In other words, is it possible to truly decentralise water governance and management with a strong national department in place (Meissner, 2016)?

To date, only two of the initially planned 19 CMAs are operational. In 2012, the Minister of Water and Sanitation reduced the number of CMAs to nine, due to the problems in implementation. Most recently the Department of Water and Sanitation (DWS) published of formal proposal to implement only one CMA (Department of Water and Sanitation, 2017). As the failure of policy can largely be attributed to a failure of government, it is questionable if this shift back to a hierarchical governance style will really be effective.

Two kinds of conflicts rather than synergies between governance styles have been quite prevalent: neo-liberal thinking against hierarchical regulation towards environmental and social sustainability (Schreiner, 2013) and the traditional engineering technocratic control approach against people-centred and inclusive management (Movik et al., 2016).

The implementation of CMAs could not overcome deep power imbalances (Movik et al., 2016). A move towards more equitable and sustainable management was further jeopardized by a shift towards more neo-liberal thinking and market-driven reforms (Movik et al., 2016; Mazengia, 2005) as well as a decline in accountability of governmental officials (Schreiner, 2013). The responsibility for the delivery of water services was delegated to municipalities by the Constitution and the Water Services Act (Nastar and Ramasar, 2012). However, these encountered problems to raise sufficient revenue to subsidize water services for the poor and to guarantee the free access to 25 litres of water per person and day as prescribed by national legislation. Cost recovery of basic services proved not to be possible – even with cross-subsidization (Mazengia, 2005).

A combination of hierarchical, network and market style as envisaged by the South African water policy requires a role of the government as meta-governor. Unfortunately, the government in South Africa proved to be weak. The combination of hierarchical and market governance led rather to informal vertical networks and increasing corruption. The establishment of substitutive networks at local scale is partly impeded by the power of the government to make major decisions that influence the local level. The most recent and dramatic example is the severe water crisis in Cape Town that risks to run out of water in May 2018. After a warning issued in 2007 by the Department of Water Affairs (Muller, 2017), the municipal government has undertaken precautionary measures for years to develop resilience against an extreme drought. At provincial level the national Department of Water and Sanitation (DWS) is responsible for water allocation. Instead of saving, scarce water resources have been over-allocated to agriculture and other large users (Zille, 2017; Olivier, 2017). At the same time, the DWS did not grant credits for infrastructure development applied for by the municipal government. Politics seems to be one reason behind the crisis, as Cape Town and the Western Cape is the only province of the country ruled the by the major opposition party, Democratic Alliance, whereas national and other provincial governments are in the hand of the African National Congress. However, such dominance of politics

suggests as well a failure of bureaucratic structures. A most recent report highlighted that the DWS is in a dire state with lack of capacity, huge debts and in many instances where money to be dedicated to infrastructure investment disappeared (SAWC DWS Task Team, 2017). Regulation is not enforced and compliance is not monitored. The capacity of government and governmental authorities to govern is low.

Overall one can conclude that water policy in South Africa aims at a balanced combination between hierarchical and network governance with some consideration of market-based approaches. The capacity of government to govern and to act as meta-governor is weak. This leads in the end to more conflicts than synergies between governance modes and quite a poor performance of water management.

6. Discussion and conclusion

The case analyses have shown that the increasing complexity and interdependencies of modern societies and the need for more coordination of and collaboration among societal actors to address complex governance problems has led to the emergence of new and diverse forms of governance. Indeed, it seems that hybrid forms of governance are essential to address complex water management problems and to support transformative change. The analyses have also shown that an effective combination of different governance styles (strengthening synergies and avoiding conflicts) is a decisive factor in the success of governance reform and the evolution of polycentric and hybrid governance systems. Some kind of meta-governance seems to be of importance in this respect. However, the analyses suggest as well that such meta-governance is largely absent. Patterns of interplay between governance modes seem to be a product of chance and politics rather than of purposeful design and/or reflection and deliberation among the stakeholders involved. Lack of capacity of government to govern has been identified as one plausible factor to explain a weak role of government in meta-governance. South Africa is an example where governmental capacity to govern is low in general. Principles of good governance (e.g. transparency, accountability, following the rule of law) are often violated. But also in countries such as Germany with a high capacity of the state to govern in general such capacity does not translate automatically in a strong role of government in meta-governance. A lack of understanding governance and management as learning process is another key factor to explain a lack of appreciation of the importance of meta-governance.

The classical distinction between hierarchies, networks and markets as ideal-typical governance modes has proven to be very useful for analysing complex and hybrid governance settings. As substantiated by Grande (2012), the universe of discourse of governance research more or less embraces the interface between hierarchical governmental control, self-organization of civil society and competitive markets. Opinions diverge as to the extent to which the interactions at this interface can be influenced by purposeful design and if any kind of design principles can be derived. Meuleman (2008), for example, explicitly argues in favour of purposeful design – at least in public administration. He recommends the development of tool boxes which allow public authorities to act as "meta-governors" combining instruments of hierarchical, network or market governance styles, respectively, as required by particular governance problems and process-specific conditions. Kooiman and Jentoft (2009) promote a less instrumental understanding of meta-governance. For them meta-governance, the governance of governance, refers to reflection on values, norms and principles which pertain to governance system issues, for instance, their institutional design. This is in line with an understanding of meta-governance as a reflexive process of societal learning (c.f. chapter 3). Furthermore, in many countries government is weak. In such cases, one cannot expect government to act as meta-governor in processes of governance reform. One may put more hope in bottom-up processes sensu Elinor Ostrom that develop capacities at least at a local scale.

Requirements for developing societal capacities for such reflexive

governance and discourse are not well understood neither in developed nor in developing countries. There is only little empirical knowledge on the performance of different governance arrangements and the role of combinations of governance modes. There is a clear need for more comparative work. Science should give high priority to closing this knowledge gap and to developing diagnostic approaches that support context-sensitive analysis and a transferability of insights among similar classes of problems and contexts to support processes of governance reform.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.envsci.2018.10.008.

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