

Collaborative Water Resource Management: What makes up a supportive governance system?

Cheryl de Boer,^{1*} Joanne Vinke-de Kruijf,² Gül Özerol¹ and Hans Bressers¹

¹*University of Twente, The Netherlands*

²*University of Osnabrück, Germany*

ABSTRACT

Collaboration is increasingly seen as an important aspect of successful water management, and yet it remains insufficiently understood. This paper examines how collaboration is influenced by the governance system that guides and organizes the related actions and interactions. Building upon an existing governance assessment tool, this paper provides the basis for predicting how supportive (or restrictive) a governance system will be towards collaboration, according to eight different governance system classes. The validity of this framework is reflected upon in case studies from five countries: Mexico, the Netherlands, Canada, Romania and Turkey. The collaborative processes in Mexico, Romania and Turkey are embedded in restrictive governance systems and show low levels of collaboration. The governance system in the Canadian case is assessed as neutral and shows a medium level of collaboration, whereas the governance system in the Netherlands shows high levels of collaboration and is assessed as supportive. The results are encouraging, as the case studies demonstrate the predicted influences of a governance system on collaboration. Yet, the case studies also highlight the potential importance of characteristics of the collaborative process and collaborating actors. Copyright © 2016 John Wiley & Sons, Ltd and ERP Environment

Received 8 April 2015; revised 4 December 2015; accepted 6 December 2015

Keywords: collaboration; comparative analysis; diagnostic analysis; governance assessment; water governance; water resource management

Introduction

THE CONCEPT OF 'GOVERNANCE' IS WIDELY USED, BOTH IN PRACTICE AND IN POLICY SCIENCE, WITH A GREAT VARIETY OF meanings (Rhodes, 1996; Bressers and Kuks, 2003; Reed and Bruyneel, 2010). Challenges remain in moving from theory to praxis and advancements in this area are required to address urgent environmental problems associated with the Anthropocene (Young, 2013). Diagnostic approaches, which embrace the complexity of natural resource governance and avoid simplifications by tailoring solutions to the contextual realities, need to be developed for analysing environmental problems (Young, 2002; Ostrom *et al.*, 2007; Cox, 2011). Such a diagnostic approach crucially depends on productive interactions between practitioners with context-specific knowledge and analysts who can provide broader pictures (Young, 2013). The theoretical framework and methodology employed in this

*Correspondence to: Cheryl de Boer, University of Twente, Hengelosestraat 99, Enschede 7514 AE, The Netherlands.
E-mail: c.deboer@utwente.nl

paper support and improve the integration of analysis and practice. While the theoretical and empirical focus is on the governance of water resources, our conceptualization of governance is generic and is anticipated to further current research on diagnostic approaches in governance studies in general.

We adopt a concept of governance with roots in policy science literature, where governance is seen as ‘beyond the government’ (De Boer, 2013). Governance takes place at multiple levels and scales, with various instruments and resources, and involves multiple actors (Bressers and Kuks, 2004; Driessen *et al.*, 2012). The function of governance in a given spatial or policy context is performed by a governance system consisting of elements that exist inside and outside of government institutions. A water governance system is defined here as *the context that guides and organizes the actions and interactions of actors involved in the management of water resources* (Pahl-Wostl, 2009; Bressers *et al.*, 2013).

This paper identifies links between governance systems and collaborative water resource management. Collaboration is considered by many to be an important aspect of successful water management (Kallis *et al.*, 2009; Owens *et al.*, 2013). We define collaboration as *the interactions that occur when actors work together on a shared purpose or common goals* (cf. O’Leary *et al.*, 2006; Gajda and Koliba, 2007). While the potential benefits of collaboration are clear, there is much to learn about the pattern of complex causal mechanisms that may drive or enable it (Young, 2013). Existing literature focuses on micro-level collaboration, whereas we address the interaction between this micro-level collaboration and its governance system (meso–macro level). Doing so provides new insights into how a governance system may influence collaboration. Collaborating actors determine, to a large extent, how they make use of policies and programmes (Jones and Jenkins-Smith, 2009) and how they interact with each other (Ostrom *et al.*, 2007; Bressers, and Kuks, 2004). The governance system encourages and discourages these collaborative actions in various ways.

What kind of governance system is supportive of collaborative water resource management? Building on an existing governance assessment tool, we assert that the supportiveness of a governance system for collaborative water resource management can be understood by how it exhibits the qualities of coherence, flexibility and intensity (De Boer, 2012; Bressers *et al.*, 2013). This hypothesis is reflected upon in five case studies from: Mexico, the Netherlands, Canada, Romania and Turkey. Comparing the experiences of these cases provides new insights into how different governance systems influence collaboration. In addition, we respond to the call for systemic comparison in the analyses of water governance (Pahl-Wostl *et al.*, 2010).

In this paper, we first elaborate upon the employed theoretical concepts of governance and collaboration and outline how different governance system classes may support or restrict collaboration. Next, we present five case studies and compare and discuss the combinations of governance qualities. These are contrasted with the outcomes for collaboration. To conclude, we comment on the presence of a relationship between governance and collaboration and provide suggestions for future research.

Governance Systems and Collaborative Water Resources Management

This research is designed to uncover connections between the governance system and how actors collaborate in water resource management. Various patterns or, at best, a complex sort of causality may be present in this relationship (Young, 2013). Before outlining the different classes of governance systems, we provide an introduction to collaboration and governance.

Collaboration as Actor–Interaction Process

Contemporary water management practices involve various sectors and actors in decision-making processes. Collaboration may be initiated for different reasons, can take diverse forms and may lead to diverse outcomes. Collaboration can be a strategy for dealing with conflict or a way of responding to changing conditions in a networked society (Innes and Booher, 1999). Outcomes include an increase in social, intellectual or political capital (Innes *et al.*, 2007) and can incorporate concerns and knowledge from multiple actors (Mollinga, 2008). Collaboration may occur, for example, within the context of a formal working group (Muro and Jeffrey, 2012), a group model process (Pahl-Wostl and Hare, 2004), or an informal planning process (Innes *et al.*, 2007).

While collaboration in water resource management provides many benefits, it also provides new challenges. The actors involved have their own goals, resources and frames of reference. Water management thus partially becomes a challenge of realizing collaboration. The shared purposes to be realized via collaboration can range from an acknowledged overlap between different, but not necessarily contradictory, goals to a deliberate search for win–win opportunities. Working together thus involves jointly going through the ‘cycle of inquiry’. This cycle includes collective dialogue, decision-making on measures, actions implementing such measures and evaluation of performance. The higher the degree to which each of these aspects is collectively addressed, the greater the degree of collaboration (Gajda and Koliba, 2007; Owens *et al.*, 2013).

Governance System: Elements and Qualities

Various methods have been developed for assessing water governance in various sectors and at various levels (Jacobson *et al.*, 2013). Without diminishing the importance of widely recognized principles of good governance (e.g. transparency and accountability) and performance, this assessment focuses on the degree to which the governance system is supportive (i.e. effectively organizes and guides) of the actors’ structural interactions. The governance system provides key opportunities and constraints in collaborative water resource management. We draw on a model of governance as developed by Bressers and Kuks (2003, 2004). In this model, a governance system is formed by multiple scales and levels (element 1), and by actors and networks (element 2). These actors have diverse problem perspectives and ambitions (element 3), can employ multiple and diverse strategies and instruments (element 4), and have diverse and multiple resources and responsibilities (element 5). A governance system at a particular place and time can be described as using these five elements. Actors’ interactions can be both part of the governance system and influenced by it. The actions that relate to the collaborative processes are short-term and goal-orientated. Once these actions become patterns, they become part of the governance system. The governance model is complemented with three quality criteria: coherence, flexibility and intensity. These criteria explain how a governance system enables or restricts interactions. These qualities are defined as (adapted from Bressers *et al.*, 2013)¹:

- a. coherence: governance elements reinforce rather than contradict each other;
- b. flexibility: multiple roads to goal achievement are permitted and/or supported;
- c. intensity: strong support and a sense of urgency exists across governance elements for achieving relevant changes.

The governance qualities form the core of a Governance Assessment Tool, a matrix with evaluative questions (Table 1). These questions enable analysis and practice to meet when employed as part of a co-creative process with practitioners and researchers.²

Governance Systems and Collaboration

De Boer (2012) developed eight combinations of governance system qualities (classes), which can be used to evaluate the influence of a governance system on collaborative water resource management. These classes enable an optimum governance system for a particular local or regional collaborative process to be conceptualized. They also provide a basis for comparison across cases of collaborative water resource management.

Coherence, flexibility and intensity are neither entirely present nor non-existent. They are generalized as being mostly supportive or restrictive to enable comparison across cases and for understanding their contribution to the collaborative processes. A system with supportive coherence, flexibility and intensity is, by definition, expected to be highly supportive of collaborative processes. Alternatively, a system with restrictive coherence, flexibility and intensity qualities will be highly restrictive for collaborative processes. In many cases, there will be a mix of supportive and restrictive qualities and each does not equally affect collaboration. Given the focus on collaborative processes, flexibility is considered a key quality related to successful collaboration. Collaboration often occurs when

¹Previous applications of the Governance Assessment Tool include the extent of the governance system as a fourth quality. The extent is determined by how adequately the available instruments govern the different uses of a resource. We consider this to be a base requirement of a governance system and do not include it in this assessment.

²For other examples see Bressers (2015).

Governance dimension	Quality of the governance system		
	Coherence	Flexibility	Intensity
Levels and scales	Do levels work together, trust each other? Is the mutual dependence among levels recognized?	Is it possible to up-scale or down-scale the issue at stake?	Is there a strong push towards behavioural change or management reform?
Actors and networks	Do the stakeholders have experience in working together? Do they trust and respect each other?	Can new actors be included or can the lead shift from one actor to another? Do actors share in 'social capital' and support each other's tasks?	Is there a strong pressure from an actor or actor coalition towards behavioural change or management reform?
Problem perspectives and goal ambitions	Do the various perspectives and goals support each other, or are they in competition or conflict?	Are there opportunities to re-assess or integrate goals?	How different are the goal ambitions from the status quo or business as usual?
Strategies and instruments	Is the incentive system based on synergy? Are trade-offs in cost benefits and distributional effects considered? Are there overlaps or conflicts of incentives?	Are there opportunities to combine or make use of different types of instruments?	How strongly do the instruments require behavioural deviation and enforce this?
Responsibilities and resources	Do the assigned responsibilities create competence struggles or cooperation? Are they considered legitimate by the main stakeholders?	Is it possible to pool the assigned responsibilities and resources?	Is the amount of allocated resources sufficient to implement the measures needed for the intended change?

Table 1. Selected evaluative questions of the governance assessment tool (source: Bressers *et al.*, 2013)

business-as-usual practices are insufficient to achieve desired results. Combining resources from different sources requires flexibility in the current system to avoid well-known issues related to top-down policy implementation (Pressman and Wildavsky, 1973). A system with low flexibility is thus predicted to be restrictive of collaboration, even if it has high intensity and coherence. Having only high flexibility, however, is neutral because it is a necessary but not sufficient quality for supporting collaboration. The impact of intensity emphasizes the impact of the flexibility in either a positive or a negative feedback loop (True, 1999). Where both flexibility and intensity are supportive, they can overcome incoherence. Where there is low flexibility and high intensity, the system will be restrictive regardless of the presence of coherence. While coherence is supportive of collaboration it is a passive quality and does not significantly influence the support provided for collaborative processes. The eight combinations of governance qualities and a detailed explanation of their hypothesized influence on collaboration processes are summarized in Table 2 and are elaborated upon below (adapted from De Boer, 2012: 56–58). The relationships predicted to occur in these classes are derived from an understanding of the institutional interplay (Young, 2002, 2013) between deliberate and broader consequences of governance regimes (Underdal, and Young, 2004). This interplay is explained via the three governance qualities of coherence, flexibility and intensity.

Class 1. Coherent, Flexible and Intense: this combination forms the theoretically ideal case where the governance system supports the efforts of actors towards achieving a shared outcome. A clear goal-orientated vision is provided by leaders to help actors understand mutual interests. Flexibility is given to policy implementation processes designed to manage case-specific contexts. The necessary tools and resources are provided by higher levels of government.

Combination type	Coherence	Flexibility	Intensity	Predicted influence on collaboration
1	+	+	+	Highly supportive
2	-	+	+	Supportive
3	+	-	+	Restrictive
4	-	-	+	Restrictive
5	+	+	-	Supportive
6	-	+	-	Neutral
7	+	-	-	Neutral
8	-	-	-	Highly restrictive

Table 2. Predicted influence of the combinations of coherence, flexibility and intensity on collaboration

- Class 2. Incoherent, Flexible and Intense: the major drawbacks of incoherence are minimized through the supportiveness of other qualities. Actors are not forced to abide by policy tools and instruments that are not in line with the goals of the governance system. Providing this combination requires less effort from higher levels of government in terms of administrative burden, and provides the local actors with the authority and resources to address their own issues.
- Class 3. Coherent, Inflexible and Intense: this combination forces change through pre-dictating the processes that are followed to achieve the desired results of the upper governmental levels. This combination may have the perception of high efficiency and accountability although, in practice, this will depend on the manner in which the requirements fit with capacities of the actors and other factors, for instance geographical circumstances.
- Class 4. Incoherent, Inflexible and Intense: this is an extremely inefficient combination for actors attempting to collaborate. Upper levels can use strict, inflexible instruments to appear to be in control and to have a high commitment to accountability to the public for achieving selected goals. These goals may not be compatible with shared local values, as they are often designed to meet fragmented, sector-specific needs.
- Class 5. Coherent, Flexible and Weak: when this combination exists, actors must seek out the support required to achieve their goals. Actors are not confronted with pressure or given strong incentives from higher government levels. They must be self-motivated and understand the collaborative process goals and insert them into their plans. The government develops coherence across the policies and sectors, provides clear goals and enables management that fits the local context. This may be weak in terms of accountability and is unlikely to work where goals cannot be easily reconciled or when resources cannot be adequately mobilized at the local level.
- Class 6. Incoherent, Flexible and Weak: this combination can arise when there is limited governance capacity. Flexibility is given to lower-level actors to enable them to overcome issues associated with incoherence. However, because the governance system is also weak, opportunities will exist where incoherence can lead to undesired (and unnoticed) defections from the intended goals.
- Class 7. Coherent, Inflexible and Weak: collaboration is supported that is based directly on its stated goals, yet little emphasis is given to enforcement. Such a combination is unlikely to support collaboration, except in the presence of highly skilled and highly motivated actors.
- Class 8. Incoherent, Inflexible and Weak: in this combination, the governance system is considered to have developed into the worst-case scenario. It is unlikely to support collaboration and only reduces the ability of lower-level actors to achieve their own goals. Additional resistance could be triggered.

Methods and Results

The presented insights about how governance qualities may be supportive (or restrictive) of collaborative water resource management are reflected upon via a meta-inquiry into five different case studies. We synthesize these case studies and classify them according to the criteria stated above. As part of this theory-building exercise, we include several comments about the process in the concluding statements. In each case study, there is a

collaborative process (average length of several years), which is embedded within a particular governance system. The analysis is based on secondary data from five extensive case studies (see Table 3 for an overview). Datasets were collected over a period of several years using a mix of qualitative methods including: document analysis, interviews and observations. These case studies were selected for further analysis and comparison because they represent diverse collaborative processes in different regions, and data were collected and analysed according to similar theoretical frameworks in the original texts.

The following sections include summaries of the relevant collaborative processes and the qualities of their governance system. The questions in Table 1 were used to assess the governance systems. A supportive score is given when a governance system scores highly on the majority (three or more) of dimensions. A lower score is given when a governance system scores low on the majority (three or more) of dimensions. Successful collaboration is associated with high degrees of collective dialogue, decision-making on measures, actions implementing such measures and evaluation of performance (Gajda and Koliba, 2007; Owens *et al.*, 2013). The results are presented in terms of observed correlations found in the complex relationship between the levels of collaboration observed in the cases and the class of governance system in which they operate.

Mexico: Guadalupe Basin

The Guadalupe river basin is located in the northern part of Mexico City, although it belongs to the State of Mexico. The Guadalupe River Basin Commission was created in 2006 under the National Water Law as an auxiliary organization of the Council of Valle de Mexico river basin after instances of mass fish mortality. Although the committee became a broad multi-stakeholder platform and agreed on a joint plan, implementation and results were produced relatively slowly and were contested by the different parties.

The Guadalupe River Basin Commission was created by various divergent interests. Their ability to reach consensus on an integrated plan can be regarded as successful in terms of the first part of the cycle of inquiry: collective dialogue. While they were able to develop a plan collaboratively, further steps in the implementation phase lacked important legal and financial resources. This resulted in each measure requiring further collaboration with separate local authorities, which proved to be a very difficult (and relatively unsuccessful) process. The upper levels of governments were, in principle, included but, in practice, their participation in the process was limited. Moreover, while potential instruments and resources were available in the governance system the committee lacked access to them. However, the gradual inclusion of additional viewpoints into the deliberations and plan was a success.

The Commission's own planning process is highly integrated and depends on various authorities with different outlooks for realization of the joint plan. Several issues were observed to negatively influence the coherence of the governance context. The linkages between government levels and between the public and private domain are not clear for the societal representatives on the committee. The federal vision is integrated, but is not directly applicable at lower levels and there is much fragmentation.

This fragmentation of the governance system has consequences for the degree of flexibility. Support can only be obtained for certain objectives, which are not necessarily supportive of the integrated management of the Guadalupe River Basin. In the planning process, there are many degrees of freedom, while in implementation a high dependency on outside support turns such flexibility into a source of coincidental and unpredictable results.

Region	Collaborative process	Data collection	Literature sources
Mexico	River basin management	2010–2012	Franco-García <i>et al.</i> (2013)
Netherlands	River restoration	2008–2011	De Boer and Bressers (2011), De Boer (2012)
Canada	Stewardship action planning	2008–2011	De Boer (2012)
Romania	Integrated water management project	2008–2011	Vinke-de Kruijf (2012), Vinke-de Kruijf <i>et al.</i> (2009, 2013, 2014)
Turkey	Participatory irrigation management	2006–2011	Özerol (2010, 2013), Özerol <i>et al.</i> (2012)

Table 3. Overview of the case studies

Apart from the planning phase there is little political support for an integrated approach. The committee has no legal or financial resources of its own for implementation. Support can only be obtained from local and higher authorities for specific objectives, which are not necessarily supportive of the integrated management of the Guadalupe River Basin.

Netherlands: The Regge River

The Netherlands has a history of addressing flood concerns through infrastructure such as canals and dikes that move water quickly from threatened areas towards the sea. In the Twente region, the local water authority (Waterschap Regge en Dinkel – WRD) initiated a collaborative approach that combined the use of canals and dikes with building to increase resilience and natural storage capacity for the Regge River. The programme consists of multifunctional renaturalization projects that include benefits for flood management. The projects made proactive use of synergies across various domains (tourism, nature protection, recreation, water storage and transportation) and combined them into a coherent project.

The programme's vision was produced by a consultant for the water authority, based on dialogue sessions with different organizations. To enable local-level solutions, this vision was kept broad and implementation flexible. All projects were multi-stakeholder and required contributions from different sectors and groups. These collaborative local projects gradually achieved renaturalization of a large portion of the river. Stable collaborative relationships and trust were built up during the process. An event celebrating its collaborative nature was organized upon formal completion in 2014.

The deliberate actions of the WRD to increase the multi-functionality of the projects resulted in the wide involvement of various sectors. Many classes of instruments and resources were available for support although, near the end of the programme, important instruments linked to stream restoration were eliminated due to government cut-backs on nature funding.

The relevant ministries generally operated separately, and most efforts at integration were taken at the local level. There was an increasing existence of instruments that incorporated incentives for a linear planning approach. These were found to be incoherent with the voluntary agreements that were used to implement projects. The problem in perceptions and ambitions of the different levels became less supportive of each other due to there being more sector-based accountability measures. The responsibilities for land-use development belong to the Province. Coherent goal ambitions at this scale led to high levels of cooperation and sharing of resources.

The overall flexibility provided was high. There was power to make and implement policies and programmes according to local conditions. Resources could be pooled into integrated programmes to serve joint goals. This quality is, however, being reduced due to more sectorally responsible instruments and reduced leeway for purchasing land without direct intent by the Province.

A high level of resources was available to achieve the goals related to the project in its early stages. Both provincial and WRD administrators were openly in favour of the value of such programmes, and interventionist instruments were available to encourage compliance with restoration goals. Available resources decreased in the final phase of the project owing to increased sectoral accountability measures and short-term budget constraints.

Canada: Spencer Creek Watershed

In the Province of Ontario, Conservation Authorities manage watershed issues related to flooding, ecosystem and nature. In the Spencer Creek Watershed, the Hamilton Conservation Authority took a comprehensive approach to flood management in their attempts to restore the natural resilience of the watershed. Their process of Stewardship Action planning systematically assessed and addressed the various issues relating to poor individual and structural practices. This process brought a wide range of stakeholders into a collaborative process to increase coherence and reduce overlap with other projects in the area. The policy sphere in Ontario is dense due to the strong influence of three levels of government (Federal, Provincial and Municipal). Many regulations come from these sectors and influence efforts aimed at stream restoration. In addition to the government agencies, there is a flourishing environmental activist community at the local and provincial levels.

The major collaborative elements arose due to the requirements of environmental impact assessments (EIAs) and the stakeholder-supported nature of the Hamilton Conservation Authority. The EIAs provided the infrastructure for an open

dialogue about the projects. Different concerns were raised and incorporated into the final projects. Implementation was generally done by one or two actors or organizations, but no evidence of collective evaluation of performance has been found.

Many instruments and resources were available, but due to insufficient clarity in the problem perceptions and goal ambitions provided by higher levels of government, some concerns exist regarding how fully the governance system covers the different issues. The relevant ministries generally operate in a segregated manner, although substantial efforts were made at the provincial level to reduce the impact of the incoherencies through local official plans. The available resources are derived from sources that often have different goals to those of stream restoration. This quality is quite mixed, although it is slightly supportive as the EIAs require an integrated approach for designing local projects.

Higher level policies generally aim to control management processes as opposed to outcomes. Grants are provided to local groups to implement the various Ministerial goals. The Conservation Authority depends on others for funding and has limited flexibility in the implementation of projects. Opportunities exist to use different resources for joint purposes, but only according to plans submitted to a particular programme.

Some government policies acknowledge the benefits of the ecosystem approach to water management. Their direct involvement is limited to ensuring it is implemented and the required resources are not made directly available. The initiative comes from the lower levels, based on their belief in the value of water management.

Romania: Tecucel River Basin

In September 2007, a flash flood on the Tecucel river (a small river of around 25 km) caused three deaths and economic damage of around €6 million in the city of Tecuci and several neighbouring communities (Zaharia *et al.*, 2008). This prompted the Dutch-funded project 'Integrated Water Management for the Tecucel River Basin'. The project was meant to develop an integrated master plan (for drinking water, wastewater and flood risks) and establish a basis for the implementation of concrete measures. Dutch experts collaborated with a Romanian team of representatives from three municipalities, a water authority, a drinking and wastewater company, and a consultancy company. The project actors engaged in dialogue during eight mutual exchange visits and meetings over 3 years. The teams decided that the completion of two other regional master plans (one for flood risk management and one for drinking water and wastewater) made the development of another master plan redundant. The Dutch team decided to shift attention towards the identification and development of concrete measures. Two measures were prioritized but were never implemented because higher level authorities gave priority to other measures. The support and resources of the higher level authorities were indispensable and these authorities were invited from the beginning but were unwilling to become involved in the collaborative process. As a result, collaboration was limited to collective dialogue and some collective decision-making. Thus, the actual level of collaboration was low.

National-level authorities are increasingly aware that development and implementation of policies requires the inclusion of actors from various sectors and levels. For example, the recent national strategy for flood risk management explicitly acknowledges that such a strategy can only be realized through collaboration between actors from various ministries, agencies, regional and local authorities, and citizens. Authorities at various levels are involved, with roles and responsibilities clearly divided between them.

While the coherence of governance is improving on paper, few arrangements exist that promote interactions between actors. Those that are in place, such as river basin organizations, are not very effective. Cooperation beyond sectoral boundaries is uncommon. For example, most Romanian team members had not previously cooperated because they worked in different organizations at the same or on another governance level.

Romania is working towards bringing its water infrastructure in line with European guidelines. Improvements are made based on master plans under supervision of the national level. In the relevant region, the responsible branch of Romanian Waters prepared a master plan for flood risk management. In 2010, the provision of water services was taken over by a regional water authority, which was preparing a water services regional master plan. Financing was provided based on these sectoral master plans with no incentive or possibility of pooling resources across sectors or downscaling.

Since 1989 and the fall of the communist regime, Romanian authorities have shown a strong desire to become a member state of the European Union (EU). Following their accession in 2007, authorities have been urgently looking for ways to comply with EU guidelines. Major investments have been planned and

made by water management authorities (to reduce flood risks) and water companies (to improve the provision of water services). While there is strong pressure to absorb financial resources to improve water resources provision and management, the focus is on achieving goals and implementing well-known technical measures with limited attention towards cooperation, integrated solutions, changing behaviour or management practices.

Turkey: Harran Plain

The Harran Plain of south-eastern Turkey has been undergoing agro-environmental change since the 1990s: shifting from small-scale irrigated agriculture with groundwater to large-scale irrigated agriculture with surface water (see also Kadirbeyoglu and Özertan, 2015). The investments for large-scale irrigation were made within the scope of GAP (*Güneydoğu Anadolu Projesi*, South-eastern Anatolia Project), Turkey's largest regional development programme. In the 1990s, the public water agency (DSI – *Devlet Su İşleri*, State Hydraulic Works) started to implement participatory irrigation management. This involved transferring the responsibility of irrigation system operations and maintenance to local water user organizations.

Large-scale irrigation caused the spread of environmental problems, such as waterlogging and soil salinization. Since the 2000s, several solutions have been introduced, such as financial incentives to diffuse water-saving irrigation methods, extension projects for farmers and the construction of on-farm drainage systems. Successful implementation of these instruments depends largely upon the collaboration of agricultural water management actors such as farmers, water user organizations, DSI and the Ministry of Agriculture. These actors were already interacting within the context of irrigation management. However, as these solutions target different aspects of the problem, an integrated approach was required to ensure incorporation of all essential measures.

The environmental impacts of irrigated agriculture in the Harran Plain span many sectors, including water, agriculture, rural development, environment, land use and energy. Cross-sectoral governance implies the involvement of numerous actors in the decision-making processes. This blurs the lines of responsibility and authority among different actors and levels. For instance, the water user organizations take no responsibility for actions taken on the local level regarding water and soil sustainability, even though they are the major actors involved in irrigation management.

The instruments for alleviating the negative environmental impact of large-scale irrigation are proposed by different actors, such as DSI and the Ministry of Agriculture. A low level of coherence is observed as these actors adopt separate strategies that neither reinforce each other nor create synergies for effective implementation. As most actors have insufficient personnel and technological infrastructures, they focus more on fulfilling their individual tasks than on recognizing and responding to each other's needs.

National laws often do not incorporate local-level social and ecological conditions. For instance, the previous legislation of the irrigation associations (the only type of water user organizations in the Harran Plain) obstructed the effective involvement and fair representation of farmers. Previously, irrigation associations had the legal status of local administration unions. Legislation required their members to be the representatives of local administration units (villages and towns) or elected council members, and did not allow for direct farmer representation. The hierarchical and heterogeneous social structure of Harran Plain often resulted in the exclusion of disadvantaged farmers, such as smallholders and landless peasants, from the decision-making processes. Through the enactment of a specific law in 2011, all farmers are, at least on paper, given the right to vote individually and directly influence decision-making processes.

The changes taking place in Turkey towards more participatory water management often occur via top-down impositions by the government and through international actors such as the EU and the World Bank. These impositions constitute a major part of the developmental agenda, particularly for the irrigation sub-sector. Developing water resources and expanding the irrigated areas are considered investments for socio-economic development. However, decreasing the administrative and financial burden of irrigation on the public sector has been preached continually since the 1970s. As a result, national actors strive to obtain a strong position in the irrigation sector and allocate resources to implement the instruments.

Results and Discussion

The previous section illustrates five cases where actors clearly *tried* to collaborate to achieve a shared purpose. The cases show different levels of collaboration that were embedded in different governance systems. Table 4 summarizes the main findings: two governance systems (Mexico and Romania) are predicted to be highly restrictive of collaboration, one restrictive (Turkey), one neutral (Canada) and one supportive (Netherlands). This largely corresponds with the observed level of success of collaboration. In the cases with restrictive governance systems, collaboration was low, whereas in the others collaboration was medium or high. The results conform to the predicted relationship between a supportive governance system, according to the three governance qualities, and the potential for successful collaboration. One limitation of this study is that the simplified and binary scoring of the qualities meant that several artificial distinctions had to be made to classify the particular governance system according to the three qualities. This enables comparison across cases in a way that is over-arching, yet may overlook important intricacies that could also explain the resulting collaborative process.

The Mexican case shows a governance system that is only supportive in principle. It does not adequately equip organizations such as the basin commission with sufficient support for its integrated ambitions for the basin nor give them the legal rights to collect resources themselves. Instead, the commission depends on mid-level governments that view each project from the perspective of how it addresses their own policies and are only partially committed to the process. While river basin management and public participation are largely realized in a productive way within the commission, integration of the commission's process into the mainstream policy process is on-going. The observed collaboration closely matches the expectations for this combination of governance qualities. Collaboration is unlikely to work when there is a lack of shared purpose (Gajda and Koliba, 2007) or local resources cannot easily be obtained. Apart from the multi-stakeholder process of developing visions and plans, an extra process of negotiations for support had to be added. In this process the initial coherence was lost and the flexibility enabled local preferences to prevail over the integrated planning (True, 1999) as was predicted for a Class 8 governance system.

The Netherlands has the most supportive governance system of the cases studied. It is assessed as incoherent, flexible and intense. This is logical because collaborative water management is engrained in the historical development of the country, and governance patterns have probably developed to support this. Coherence was considered restrictive due to the fragmented and conflicting nature of a few policy areas. The high level of flexibility and intensity in supporting collaborative local solutions overcomes this passive restriction of the Class 2 governance system. Here, collaboration was used as a strategy to respond to the changing conditions of the increasingly fragmented governance system (Innes and Booher, 1999).

The Canadian governance system (Class 7) is assessed as coherent, inflexible and weak. Implementation occurs according to goals determined by higher levels of government, yet low levels of political will were exerted to ensure achievement. More priority is given to designing integrated procedures and processes, than providing lower levels with the flexibility and resources needed to achieve various goals. Here, there are highly skilled and motivated citizens (perhaps as a remnant from times where more resources and political will in the region existed) and so progress was seen with the collaborating actors taking advantage of the lack of strict enforcement and making use of opportunities (Jones and Jenkins-Smith, 2009) in the development of collaborative processes (the Stewardship Action Plans).

Case	Coherence	Flexibility	Intensity	Combination type	Predicted influence on collaboration	Observed success level of collaboration
Mexico	Restrictive	Restrictive	Restrictive	8	Highly restrictive	Low
Netherlands	Restrictive	Supportive	Supportive	2	Supportive	High
Canada	Supportive	Restrictive	Restrictive	7	Neutral	Medium
Romania	Restrictive	Restrictive	Restrictive	8	Highly restrictive	Low
Turkey	Restrictive	Restrictive	Supportive	4	Restrictive	Low

Table 4. Overview of assessments of governance qualities in the case studies

The Romanian collaborative process brought together local and regional actors to reduce water problems using an integrated approach. Collaboration, however, remained at the level of dialogue without moving forward to implementation. This accords with the predicted influence of a governance system that is incoherent, inflexible and weak (Class 8). Regional actors have access to resources for realizing sector-specific objectives, but have no incentives to collaborate with actors from other sectors. Local authorities have access to funds for implementing integrated measures, but these programmes do not facilitate integration within the water sector. The integrated and bottom-up approach to reducing water management problems was an attractive option for local and regional actors. However, the approach clashed with how the Romanian governance system is organized. The lack of involvement from national actors meant that collaboration took the form of an informal process that was insufficiently connected to formal policy processes (Edelenbos *et al.*, 2008; Pahl-Wostl *et al.*, 2010).

In the Turkish case, the collaborative processes occur in a governance system that has a low degree of coherence and flexibility and a high degree of intensity. This class 4 governance system is predicted to be restrictive for collaboration. The collaborative interaction among the actors is limited to collective dialogue and hence is quite low (Gajda and Koliba, 2007; Owens *et al.*, 2013). The observed level of success of collaboration was low. This restrictive influence of the governance system on collaboration is attributed to the fact that the power and resources mostly lie in the higher-level actors and there is limited opportunity for collaboration between the water user organizations and other local actors, in particular actors from other relevant policy sectors.

Conclusions and Outlook

This paper addresses the relationship between governance systems and collaborative water resource management. We introduce a framework that links a conceptual model of collaboration to the presence and combination of governance system qualities (coherence, flexibility and intensity). Five case studies of collaborative water management are characterized according to eight distinct classes of governance systems. We compare the actual success of the collaborative processes with the class of governance system influence that was predicted. From this comparison, we draw two main conclusions.

First, in all five cases the governance system qualities could be assessed and the resulting performance, in terms of collaborative water resource management, was found to correlate with the predicted influence of the governance system class. While this is not a particularly rigorous test, it is worth continuing to explore this pathway to enrich our understanding of what makes a supportive governance system for collaborative water resource management. Other case studies would be beneficial to determine how the classes could be improved and better operationalized for improved reproducibility of results.

Secondly, the cases both confirm the proposed relationship between a governance system and collaboration, and show that characteristics of the collaborative process and collaborating actors play an active role. For example, in the Canadian case – where the governance system is considered neutral – the specific characteristics of the actors enable collaboration. In the Romanian case, external experts promoted an integrated, bottom-up approach, which led to a collective dialogue but produced impracticable results. Thus, the governance system can partially explain collaboration, suggesting that the proposed model could be revisited to include how the characteristics of the collaborative process and the collaborating actors can determine their own destinies.

References

- Bressers H, de Boer C, Lordkipanidze M, Özerol G, Vinke-De Kruijff J, Furusho C, Lajeunesse I, Larrue C, Ramos MH, Kampa E, Stein U, Tröltzsch J, Vidaurre R, Browne A. 2013. Water governance assessment tool: with an elaboration for drought resilience. *Report to the DROP Project*. CSTM University of Twente: Enschede
- Bressers H, Kuks S. 2003. What does governance mean? From concept to elaboration. In *Achieving Sustainable Development: the Challenge of Governance Across Social Scales*, Bressers H, Rosenbaum WA (eds). Praeger Publications: New York; 65–88.
- Bressers H, Kuks S (eds). 2004. *Integrated Governance and Water Basin Management: Conditions for Regime Change Towards Sustainability*. Kluwer Academic Publishers: Dordrecht.

- Bressers N. 2015. Benefit of Governance in DRought AdaPtation – Practice Measures Example Book Benefit of Governance in DRought AdaPtation. available at <http://www.dropproject.eu> [accessed 29 May 2015].
- Cox M. 2011. Advancing the diagnostic analysis of environmental problems. *International Journal of the Commons* 5(2): 346–363. [10.18352/ijc.273](https://doi.org/10.18352/ijc.273).
- De Boer C. 2012. Contextual Water Management. University of Twente: Enschede available: at <http://doc.utwente.nl/81724/> [Open Access: 15 March 2016].
- De Boer C, Bressers H. 2011. Complex and dynamic implementation processes: analyzing the renaturalization of the Dutch Regge river. University of Twente and Dutch Water Governance Centre: Enschede and The Hague available: at <http://doc.utwente.nl/77862/> [Open Access: 15 March 2016].
- De Boer C, Vinke-de Kruijf J, Özerol G, Bressers H (eds). 2013. Water Governance, Policy and Knowledge Transfer: International Studies on Contextual Water Management. Earthscan/Routledge: Oxford/New York
- Driessen PJJ, Dieperink C, Laerhoven F, Runhaar HAC, Vermeulen WJV. 2012. Towards a conceptual framework for the study of shifts in modes of environmental governance—experiences from the Netherlands. *Environmental Policy and Governance* 22(3): 143–160. [DOI:10.1002/eet.1580].
- Edelenbos J, Klok P-J, van Tatenhove J. 2008. The institutional embedding of interactive policy making: insights from a comparative research based on eight interactive projects in the Netherlands. *The American Review of Public Administration* 39(2): 125–148. [DOI:10.1177/0275074008317157].
- Franco-García ML, Tan LH, Gutiérrez-Díaz LC, Casiano C, Bressers H. 2013. Institutional innovation of water governance in Mexico: the case of Guadalupe basin near Mexico City. In Water Governance, Policy and Knowledge Transfer: International Studies on Contextual Water Management, de Boer C, Vinke-de Kruijf J, Özerol G, Bressers HTA (eds). Earthscan/Routledge: Oxford/New York; 188–204.
- Gajda R, Koliba C. 2007. Evaluating the imperative of intraorganizational collaboration: a school improvement perspective. *American Journal of Evaluation* 28(1): 26–44. [DOI:10.1177/1098214006296198].
- Innes JE, Booher DE. 1999. Consensus building and complex adaptive systems: a framework for evaluating collaborative planning. *Journal of the American Planning Association* 65(4): 412–423. [DOI:10.1080/01944369908976071].
- Innes JE, Connick S, Booher D. 2007. Informality as a planning strategy: collaborative water management in the CALFED Bay-Delta Program. *Journal of the American Planning Association* 73(2): 195–210. [DOI:10.1080/01944360708976153].
- Jacobson M, Meyer F, Oia I, Reddy P, Tropp H. 2013. User's Guide on Assessing Water Governance. Stockholm: United Nations Development Programme (UNDP).
- Jones MD, Jenkins-Smith HC. 2009. "Trans-Subsystem Dynamics: Policy Topography, Mass Opinion, and Policy Change." *Policy Studies Journal* 37(1): 37–58
- Kadirbeyoglu Z, Özertan G. 2015. Power in the governance of common-pool resources: a comparative analysis of irrigation management decentralization in Turkey. *Environmental Policy and Governance* 25(3): 157–171.
- Kallis G, Kiparsky M, Norgaard R. 2009. Collaborative governance and adaptive management: lessons from California's CALFED water program. *Environmental Science and Policy* 12(6): 631–643. [DOI:10.1016/j.envsci.2009.07.002].
- Mollinga PP. 2008. Water policy – water politics: Social engineering and strategic action in water sector reform. In Water Politics and Development Cooperation – Local Power Plays and Global Governance, Scheumann W, Neubert S, Kipping M (eds). Springer: Berlin; 1–29.
- Muro M, Jeffrey P. 2012. Time to talk? How the structure of dialog processes shapes stakeholder learning in participatory water resources management. *Ecology and Society* 17(1): 3. [DOI: 10.5751/ES-04476-170103].
- O'Leary R, Gerard C, Bingham LB. 2006. Introduction to the symposium on collaborative public management. *Public Administration Review* 66 (S1): 6–9. [DOI:10.1111/j.1540-6210.2006.00661.x].
- Ostrom E, Janssen MA, Anderies JM. 2007. Going beyond panaceas. *Proceedings of the National Academy of Sciences of the United States of America* 104(39): 15176–15178. [DOI:10.1073/pnas.0701886104] [PubMed: 17881583].
- Owens K, Hughes M, Skoczinski E. 2013. Testing the contextual interaction theory in the evaluation of cooperation and collaboration of water management projects in India. In Water Governance, Policy and Knowledge Transfer: International Studies on Contextual Water Management, de Boer C, Vinke-de Kruijf J, Özerol G, Bressers HTA (eds). Earthscan/Routledge: Oxford/New York; 76–91.
- Özerol G. 2010. An Action Plan to Improve the Organisational Capacity of the Irrigation Associations in Şanlıurfa, Turkey. *CSTM Studies and Reports no. 363*. University of Twente: Enschede.
- Özerol G. 2013. Aligning the multiplicities in natural resource governance: a study on the governance of water and land resources in irrigated agriculture. PhD thesis, University of Twente.
- Özerol G, Bressers H, Coenen F. 2012. Irrigated agriculture and environmental sustainability: an alignment perspective. *Environmental Science and Policy* 23: 57–67. DOI:10.1016/j.envsci.2012.07.015.
- Pahl-Wostl C. 2009. A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change* 19(3): 354–365. [DOI:10.1016/j.gloenvcha.2009.06.001].
- Pahl-Wostl C, Hare M. 2004. Processes of social learning in integrated resources management. *Journal of Community and Applied Social Psychology* 14(3): 193–206. [DOI:10.1002/casp.774].
- Pahl-Wostl C, Holtz G, Kastens B, Knieper C. 2010. Analyzing complex water governance regimes: the management and transition framework. *Environmental Science and Policy* 13(7): 571–581. [DOI:10.1016/j.envsci.2010.08.006].
- Pressman JL, Wildavsky A. 1973. Implementation: How Great Expectations in Washington Are Dashed in Oakland. University of California Press: San Francisco.
- Reed MG, Bruyneel S. 2010. Rescaling environmental governance, rethinking the state: a three-dimensional review. *Progress in Human Geography* 34(5): 646–653. [DOI:10.1177/0309132509354836].

- Rhodes RAW. 1996. The new governance: governing without government. *Political Studies* 44(4): 652–667. [DOI:10.1111/j.1467-9248.1996.tb01747.x].
- True H. 1999. On the Theory of Nonlinear Dynamics and its Applications in Vehicle Systems Dynamics, Vehicle System Dynamics, Swets & Zeitlinger Publishers, 31 ISSN 0042-3114 pp. 393–4211
- Underdal A, Young O. 2004. Regime Consequences: Methodological Challenges and Research Strategies. Springer: Dordrecht.
- Vinke-de Kruijf J. 2012. The Role of Dutch Expertise in Romanian Water Projects: Case Study 'Integrated Water Management in the Tecucel River Basin' (CE&M Research Report 2012R-001/WEM-001). University of Twente: Enschede available: at <http://doc.utwente.nl/80901/> [open access: 15 March 2016].
- Vinke-de Kruijf J. 2013. Transferring water management knowledge: How actors, interaction and context influence the effectiveness of Dutch-funded projects in Romania. PhD thesis, University of Twente: Enschede available: at <http://doc.utwente.nl/85809/> [open access:].
- Vinke-de Kruijf J, Dinica V, Augustijn DCM. 2009. Reorganization of water and wastewater management in Romania: from local to regional water governance. *Journal of Environmental Engineering and Management* 8(5): 1061–1071.
- Vinke-de Kruijf J, Bressers H, Augustijn D. C. M. 2014. How social learning influences further collaboration: experiences from an international collaborative water project. *Ecology and Society* 19(2): 61. <http://dx.doi.org/10.5751/ES-06540-190261>
- Vinke-de Kruijf J, Kuks SMM, Augustijn DCM. 2013. Connective capacity in a dynamic context: changing water governance structures in Romania. In Water Governance as Connective Capacity, Edelenbos J, Bressers N, Scholten P (eds) (eds). Ashgate Publications: Farnham; 49–67.
- Young OR. 2002. The Institutional Dimensions of Environmental Change: Fit, Interplay, and Scale. MIT Press: Cambridge, MA.
- Young OR. 2013. Sugaring off: enduring insights from long-term research on environmental governance. *International Environmental Agreements: Politics, Law and Economics* 13(1): 87–105. [DOI:10.1007/s10784-012-9204-z].
- Zaharia L, Simona C, Craciun E, Toroimac G. 2008. Flood vulnerability of Tecuci city: the role of natural and socio-economic factors. *Revista Riscuri si catastrofe* VII(5): 130–140.