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Perspectives of Complexity in Water Governance: Local Experiences of Global Trends

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ABSTRACT: Those responsible for water governance face great complexity. However, the conceptualisations of what comprises that complexity have been broad and inconsistent. When efforts are made to address the complexity in water governance, it is unclear whether the problems and the related solutions will be understood across the actors and institutions involved. This paper provides a review of the literature focused on global water governance to discern core themes that commonly characterise discussions of complexity. It then considers how the consequences of these issues are manifested at the local scale through an examination of empirical research of the Murray-Darling Basin Authority and the Prachinburi River Basin Committee. The results demonstrate that a history of a technical, depoliticised discourse is often perceived to contribute to complexity. The consequence is that when a severe ecological disturbance occurs within a river basin with poorly understood causes, few tools are available to support river basin organisations to address the political nature of these challenges. Additionally, a lack of clear authority structures has been recognised globally, but locally this can contribute to conflict amongst the 'governors' of water. Finally, a range of contested definitions and governance frameworks exists that contributes to complexity, but confronting the diversity of perspectives can lead to ethical dilemmas given that the decisions will affect the health and livelihoods of basin communities.

KEYWORDS: Global, local, water governance, Murray-Darling, Prachinburi, complexity

INTRODUCTION

A common refrain used by both scholars and practitioners alike to describe the seemingly intractable challenges in water governance is that the current circumstances are 'complex' (e.g. De Loë, 2009; Pahl-Wostl et al., 2010; Schnurr, 2006; Teisman and Edelenbos, 2011; Tropp, 2007; Wallis and Ison, 2011). Yet, attempts to describe which challenges are complex as opposed to merely being complicated and what precisely comprises the complexity are rare. For instance, Schnurr (2006 : 107) takes for granted the idea that a shared understanding exists when she simply states: "[t]hat water policy is a field of high ecological, social, and economical complexity does not need to be mentioned". Similarly, Tropp (2007: 25) refers only to "the multifunctional nature of water for societies and environment" when discussing the increasing complexity of water governance. Therefore, these authors are not discounting the complexity, but these references provide little insight into what complexity entails.

Other authors do articulate specific factors to explain the complexity, but these factors vary depending on the author. For example, Wallis and Ison (2011: 4082) describe the complexity of water governance as involving the uncertainty, interconnectivity with other issues, and the range of perspectives, all of which are "highly resistant to traditional problem-solving methodologies, especially technological fixes". The authors also emphasise that complexity arises "in the relational dynamics between people and a situation, not in the situation itself" (Wallis and Ison, 2011: 4082). Hirsch (2006) refers to the multiple scales, stakeholder interests, and competing agendas as contributing to the complexity. Pahl-Wostl et al. (2010) attempt to classify the components of the complex challenges, and include ecosystems, social systems, technical infrastructure, and action arenas, and the interactions

among these components as critical to complex challenges. Still others describe water quality, scarcity, and the uncertainty posed by climate change as the source of complexity. Thus, a cohesive articulation of the numerous elements that contribute to complexity that may need to be considered by those responsible for water governance is lacking, despite a growing agreement that indeed, complexity is *the* challenge that needs to be addressed.

Many scholars have suggested that solutions to complex challenges will involve action across multiple, overlapping scales (e.g. Abrahamson and Rosenkopf, 1997; Lebel et al., 2005; Mollinga, 2008; Moss and Newig, 2010; Norman and Bakker, 2009; Teisman and Edelenbos, 2011). However, integration across scales of governance and prioritisation of issues will be problematic if a shared understanding of the challenges that are most complex does not exist. This research explores which challenges are perceived as complex at the global and local scale specifically. Similarities in the understanding of complexity across these two scales could be expected for multiple reasons. Firstly, if the different scales are focused on achieving a similar overall goal – to maintain or improve water governance – some similar challenges and opportunities could be expected in trying to achieve that shared goal that, in turn, shapes those perspectives of complexity. Secondly, research has previously demonstrated that activity at the global scale can and does have an impact on water governance activity at the basin scale (Conca, 2005; Mollinga, 2008; Varady and Iles-Shih, 2009). Thus, the interactions that contribute to the impact may lead to similar understandings of the complex nature of water governance issues.

Finally, several water-related global organisations have articulated their mandates and missions as being focused on building knowledge, mobilising resources and developing general rules and operating principles that support organisations working across all levels and scales of water governance. For example, the Global Water Partnership (2010, para. 1) states that its mission is to "support the sustainable development and management of water resources at all levels" and advocates coordinated management of water, land, and related resources, which refers to tangible, on-the-ground activities that occur within basins, not just at the global scale. The World Water Development Reports provided by the UN's World Water Assessment Programme (2012, para. 8) explicitly states that this programme targets professionals involved in the formulation of water policy at all levels. Moreover, as Tropp (2007: 23) states: "an important part of the work of bilateral and multilateral organisations has been supporting the enhancement of capacities to strengthen national and local water agendas and policies, investment priorities and providing useful examples for scaling-up of activities". The implication is that rather than focusing on only the global scale, some global organisations intentionally focus on supporting policies and practices that tend to occur at national and local scales. Therefore, global organisations are expected to understand the challenges in those other scales, if they expect to provide support.

Yet, long-standing critiques of the global scale being disconnected from the local, or being seemingly out of touch with the practical, operational realities at watershed scales have existed (e.g. Moore, 1996; Swatuk and Motsholapheko, 2008). Based on these critiques, it could be inferred that individuals engaged in water governance at one scale may perceive complexity differently than those engaged at another level of water governance and that these differences could be problematic when attempting to work across scales.

Given that the portrayal of complexity in water governance lacks analytical specificity, and that multiple scales exist in water governance that may perceive this complexity either similarly or differently, a clearer characterisation of the challenges deemed complex in water governance is needed. The paper has two objectives. Firstly, it will dismantle the concept of complexity as it is represented in discussions of *global* water governance in order to better describe the factors contributing to such a state for water governance. It will be shown that the literature emphasises issues relating to authority, norms or normative frameworks, and the impacts of different perspectives or definitions as the source of complexity for water governance. Secondly, empirical evidence of the

perspectives from two river basin organisations (or *local* scales) will demonstrate the conditions in which a challenge is perceived as complex, and the implications for the authority, norms and normative frameworks described in the literature. It will be shown that challenges associated with complexity at the river basin scale involve three characteristics: a severe ecological disturbance, conflict among those responsible for decision-making and inherent moral or ethical dilemmas. Together, these arguments begin to build a more rigorous conceptualisation of complexity across two scales of water governance.

Before moving into the next section, a clarification of terms is required. Throughout this paper, the term 'local' will be used interchangeably with the river basin or watershed simply to juxtapose the scale to the term 'global'. In both cases (global and local), the terms do not refer to a precise biophysical boundary. Alternatives to local, such as regional, may be more correct in terms of biophysical boundaries, but are used less frequently for comparison purposes than the more commonly used 'local-global' discourse.

BACKGROUND AND METHODS

This paper draws on data and analyses conducted as part of a broader research project on global-local interactions between transnational actors and river basin organisations. The analysis draws upon a literature review for the global perspectives and primary data collected on the Murray-Darling Basin Authority (MDBA, Australia) and the Prachinburi River Basin Committee (Thailand) for the local perspectives. Comparing primary data with a literature review has limitations, given that a level of nuance, depth, and experience is more difficult to obtain through a literature review. However, collecting primary data from both the global and basin scales was not feasible within the scope of this project. Future research that compares and contrasts primary data collected at different scales would greatly strengthen conclusions about patterns suggested here.

Literature review

The parameters for this review included examining reports by global agencies such as, *inter alia*, the Global Water Partnership (GWP), Food and Agriculture Organization of the United Nations (FAO), United Nations Development Programme (UNDP), and the United Nations Educational, Scientific and Cultural Organization (UNESCO), which are intended to support capacity building in water governance or analyse the problems of water governance and provide recommended solutions. Additionally, the review included global water governance literature, which as a body of scholarship primarily focuses on international and transnational actors, institutional structures and governance processes and the dynamic interactions between each of these elements. While global water governance scholars may examine issues or case studies that occur at any level, in general the work is anchored in the relationship with the global level (Schnurr, 2006). Both the global organisation reports and the scholarship place an emphasis on being practitioner-centric, focusing analyses and recommendations on the people and practices that shape governance in river basins.

The latter part of this literature includes diverse perspectives from a variety of disciplines and schools of thought engaged in debates about water governance. For instance, according to one group of scholars, water governance is a complex adaptive system with elements of self-organisation and non-linearity (e.g. Engle and Lemos, 2010; Pahl-Wostl et al., 2010; Sendzimir et al., 2010; Teisman and Edelenbos, 2011). Studies from this school examine governance arrangements for policy experiments, social learning, and other indications that water governance as a system can learn and adapt to significant changes in the natural and social environment. This research largely stems from interests in water governance in the European Union (EU) where political shifts are occurring because of the supranational Water Framework Directive.

Other scholars from international relations, political ecology and development studies explore the deeply divisive politics in water issues, such as how access to water can be embedded within power

structures (e.g. Molle, 2008; Mollinga, 2006; Swyngedouw, 1997). These studies often rely on case studies from the Global South. A sample of issues that may be included are: the politics of infrastructure development, water shortages and sanitation concerns, corruption and the impact that international development actors have when they shape both decisions and the processes in which the decisions are made.

Local case studies

Given the exploratory nature of the research and the interest in building a generalised understanding of the experiences of complexity within the local and global scales, this study used cases that would each contribute to an overall understanding of those experiences. The difference is that in selecting cases, the focus was not on watersheds that were hydrologically similar or on similar political contexts as would be expected in a comparative study. Two main criteria for case selection were used. Firstly, the river basin organisation was well-established and recognised at the global level as a 'best practice' of this particular model of water governance, since one could assume that each basin was not simply experiencing challenges of being a brand new organisation, but could substantively discuss which of the problems in the watershed were most complex. Secondly, the river basin organisations were domestic, non-transboundary basins, since the focus was on 'local' perspectives in comparison with the literature on global perspectives.

The Murray-Darling Basin covers more than 1 million km², including parts of the states of Queensland, New South Wales, Victoria, and South Australia and the entire Australian Capital Territory (ACT), and supports approximately 3 million people (CSIRO, 2008). Since 1997, the Murray-Darling Basin has experienced extreme low rainfall periods and severe droughts. The low rainfall conditions combined with consumptive use have led to conditions where run-off in 2006 was less than half the long-term average in some areas (CSIRO, 2008).

The MDBA is a federal government agency that is responsible for the Murray-Darling Basin. This arrangement is unique within Australia as the jurisdiction for the governance of all other water bodies (surface water and groundwater) in Australia resides with the State governments. Prior to 2007, the Murray-Darling Basin was governed by the Murray-Darling Basin Commission (MDBC), which consisted of two Commissioners from each of the relevant states and operated solely on a consensus-based decision-making model. These practices and the structure of the Commission itself were often held up as reasons that the Murray-Darling was a 'textbook' example or a best practice in water governance by organisations such as the World Bank, the International Water Management Institute (IWMI) or the Global Water Partnership (Bhat, 2008; Shah et al., 1999). However, in 2006 at the height of a drought, and with discontent about the state of water availability and water quality spreading throughout the basin, the federal government began to negotiate authority for the basin, and then created the MDBA, in accordance with the 2007 Water Act.

The Prachinburi Basin covers approximately 10,000 km². It begins in the mountainous north-eastern region of Thailand, crosses the provinces of Nakhon Nayok and Prachinburi, before converging with the Bang Pakong River and drains into the Gulf of Thailand. The basin is a tidal river basin, with brackish water from the Gulf of Thailand reaching approximately 170 km upstream during the dry season (Molle et al., 2009). This has been a primary area for development of Thailand's export industry. Due to both the industrial activity and the small-scale economic development activity, pollution from wastewater has become a severe issue in the basin, and in 2006, a massive fish kill took place, with more than 100 different aquatic species affected (Molle et al., 2009).

The Prachinburi River Basin Committee (PRBC) was established in 2001, as part of the Bang Pakong-Prachinburi River Basin Committee. The Bang Pakong and Prachinburi separated into two distinct river basin committees in 2009. The National Department of Water Resources (DWR) provides secretariat support for the PRBC, which consists of multiple stakeholders, including representatives from different

national and provincial agencies, local administration bodies, irrigation groups, other agricultural sectors, and environmental NGOs. The Committee advises the regional and national government agencies that have authority on water, but the agencies are limited in their own regulatory powers.

Mixed methods were used for the primary data collection and analysis, but the core concepts presented in this paper are based upon a grounded theory approach, aligned most closely with the interpretation and practices recommended by Strauss and Corbin (1990a, 1990b). Semi-structured interviews were conducted with 34 participants in the Murray-Darling Basin and 17 participants in the Prachinburi Basin. The interviews were conducted initially with river basin organisation staff but then targeted staff from other organisations described as important to governance within the watershed. Within the Murray-Darling Basin, participants ranged across professional positions within the river basin organisation, including planners, hydrologists, geographers, ecologists, engineers, communication and stakeholder engagement specialists, and social scientists. Beyond the river basin organisation, participants included academics, researchers based at Centres for Excellence (similar to think tanks), staff from international organisations, consultants (frequently contracted by the river basin organisation), directors of local NGOs and local chapters of international NGOs, and junior and senior staff from other government agencies with an overlapping interest and mandate for water. Within the PRBC, participants also ranged across professional positions and water user groups, since the committee consists of multiple stakeholder representatives. These interviewees included senior government staff from headquarters and regional offices, representatives of the private sectors within the basin, including aquaculture and rice farmers, and representatives from local NGOs and local community leaders of river restoration projects. The identity of participants is protected in this paper with quotes being attributed to only the organisation or a professional category (e.g. scientist). Data were also collected through document analysis, site visits (Prachinburi), and participant-observation at community information sessions (Murray-Darling).

CONCEPTUALISING COMPLEXITY

The next three sections of this paper compare and contrast patterns in the discussions of complexity at the global scale revealing that the complex challenges most closely associated with governing water can be summarised into three categories: 1) a historical tendency for a scientific, technical approach to solving water problems and a corresponding preference to depoliticise water research and discussions, 2) a lack of a clear authority for governance, and 3) competing definitions and perspectives about water. The perspectives of the participants from the two case study river basins are interwoven throughout, which at times, challenge and inform the assumptions underlying the global-scale literature. The findings illustrate the nature of complex problems, the conflict that stems from the very authority issues highlighted in the literature, and the ethical challenges arising as a direct consequence of the multiple norm and normative frameworks that emerge at both the global and local scales.

History of depoliticization

Water has long been considered a resource to be developed. Historically in OECD countries, and currently in developing nations, water management has been largely conducted by engineers with an emphasis on a supply-side approach and technical solutions to challenges (Barraqué et al., 2008; White, 1998). Consequently, policies, funds, research and practices have long been driven towards building infrastructure for water services for irrigation, industrial and domestic use. This mentality has been dubbed the 'hydraulic mission' (Allan, 2006; Swatuk, 2008).

In addition to traditional engineering approaches, Molle (2009b) contends that several other factors converged to contribute to setting the conditions for perpetuating this 'hydraulic mission' of pumps, pipes and dams for water development, and arguably, these factors continue to perpetuate the prominence of this approach in international development circles today. Firstly, assistance for large-

scale international development projects rose dramatically following World War II and the period of decolonisation, when industrial and agricultural development prioritised technical solutions (Molle, 2009b). Secondly, large-scale infrastructure projects have long been viewed as an effective means for politicians to gain votes because they create employment opportunities and provide visible, and therefore, tangible public benefits (ibid). Thirdly, the agencies within governments responsible for technical projects and the private actors who were often contracted all need a steady flow of work opportunities to ensure budgets are maintained or grown (ibid). Fourthly, the projects and approaches to managing water through the hydraulic mission approach have long fitted within the dominant culture for Western, scientific, rational thinking (Ingram and Fraser, 2006).

The emphasis on the hydraulic mission as the primary 'solution' for any water problem has been widely critiqued (see Wester et al., 2009; Zetland, 2009). However, the need for additional sources of clean water for humans, agricultural operations and for hydropower and consistent energy supplies, particularly in the Global South means that technical solutions and supply-side approaches continue to be prioritised. Perhaps this argument is best illustrated by the United Nation's establishment of the Millennium Development Goals (MDGs), particularly MDG 7 with its target to halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation. This goal is laudable, but one that is operationalised through the hydraulic mission to develop water for human use. When the World Health Organization (WHO) named 2008 as the International Year of Sanitation, it reinforced the supply-side development of water even further. The flow of development aid has accordingly followed, with more than three quarters of the aid to the water sector generally being allocated to water supply and sanitation (UNDP and IFAD, 2006).

The implications of this deep-seated scientific, technical approach highlighted throughout the literature of global water governance and in the ongoing missions and mandates of international development organisations can be understood to be twofold. One result is that the governance context becomes 'opaque' (Dorado, 2005); that is, decisions on water services, infrastructure, sharing, and more, are all considered within a technical, supply-side approach so highly institutionalised that introducing novel solutions and gaining access to resources to support them become nearly impossible. An opaque context contributes to the complexity of water governance when the normative framework – provided by the engineering profession and hydraulic mission – which acts as an umbrella under which most research, debate, and decisions take place, is not widely acknowledged or understood.

When an approach that favours technical solutions to all problems becomes so entrenched that water governance cannot be imagined differently, a rigidity trap is created, whereby there is strong resistance to change and novelty (e.g. Butler and Goldstein, 2010; Gunderson and Holling, 2002). Research has shown that a deep, evolutionary basis exists that explains humans' tendency to 'lock in' to certain viewpoints and to resist change (Scheffer and Westley, 2007), but undoubtedly it also negates the efforts of those trying to create innovative approaches and solutions needed for most complex problems of water. Recently, scholars have begun to try to build awareness about the dominant, scientific views and their consequences for water policy and governance procedures, arguing that the knowledge being used to frame governance directives has a significant impact on the practices that are eventually enabled (Steyart and Ollivier, 2007).

The second result of the scientific, technical approach highlighted by scholars in global water governance is that water research and many 'best practice' recommendations have often been depoliticised; that is, research and the development of policy frameworks have been constructed in a manner that ignores the need to better understand the social, political and institutional dimensions to decisions about water (Conca, 2005; Franks and Cleaver, 2007; Furlong, 2006; Molle, 2009b). For instance, Molle (2009a, 2009b) and Mollinga (2006) have argued that the current governance solutions put forward under the banner of Integrated Water Resources Management (IWRM) promise that efficiency, equity and environmental sustainability can be achieved with expert knowledge and sound science – as though good information is the only ingredient for multiple stakeholders to come together,

cooperate, and reconcile differences in the interest of a common good. Their critiques point to the reality that understanding and addressing the multiple dimensions of any water governance challenge will require more than expert knowledge, and more than an assumption that all actors involved in decisions about water will tend towards altruistic cooperation with others. Instead, working towards these aims demands that the underlying contestations of water issues should be addressed (Mollinga, 2009), such as the conflicts between upstream and downstream, or the challenges with prioritising different types of uses during droughts or climate change-related shortages (e.g. is drinking water more important than water for agriculture?). Furthermore, the promise of efficiency, equity and sustainability also negates the fact that these principles or outcomes may be inconsistent with one another (Lautze et al., 2011).

However, due to the depoliticised nature of the subject area, substantive theorisation and practical advice have been lacking for issues commonly considered by scholarship on governance, such as the type of power, authority, and legitimacy that different actors may have in the water sector that may affect issues of efficiency, equity and sustainability (Franks and Cleaver, 2007). Scholarship in the past five years has attempted to address the gap (e.g. Molle et al., 2008; Mollinga, 2008; Norman and Bakker, 2009; Pahl-Wostl et al., 2008; Tortajada, 2010), but thus far research is limited in terms of the policy areas of inquiry and the number of contributors. Neglecting to understand the effects that a depoliticised discourse may have on a deeply political issue adds further to the complexity and could leave those responsible for water governance unable to 'see' that complexity.

However, while scholarship may have been presented as depoliticised in the past, the findings from the MDBA and PRBC highlighted that those responsible for water governance 'on the ground' within watersheds may be far more aware of the social and political dimensions of their work than is recognised in the literature. For example, participants in the Murray-Darling Basin acknowledged that the watershed planning process being undertaken to create the Murray-Darling Basin Plan was a political process:

The MDB Agreement still remains the agreement between the State governments. So even if the Basin Plan or the Water Act has to be amended this is purely a political process to be negotiated. (MDBA staff)

So it (the Basin Plan) is a political tool to, you know, reinforce their power (MDBA staff).

Moreover, participants in both basins acknowledged the tangled nature of social, political, and ecological issues in their watersheds when they described specific ecological disturbances in their watersheds as drivers of governance reforms, social evolution, change, and awareness:

It's the drought imperative – it drove all major [water] reforms... (MDBA staff).

Post war, drought drove economic and immigration reforms, infrastructure spending... drought drove a social evolution (MDBA staff).

Part of this [increased information exchange among actors] was due to flooding – every time one occurs, people recognize it's still a problem (NGO representative, PRBC).

Every time we have a drought in this country we get a whole bunch of water reforms (MDBA staff).

Thus, it appears that despite the technocratic discourse that dominated water-related research and policies in past decades, the depoliticization of water governance in practice did not follow suit. But without substantive research and theorisation, it is difficult to find suitable frameworks and analytical tools to describe and address the social-political-ecological challenges in water governance that are considered the most complex. The findings in this study indicate that the politicised nature of water governance challenges mattered the most with certain types of challenges – specifically those challenges that result from an ecological issue that occurs with such severity that it creates confusion and uncertainty about the clear causes. The confusion and uncertainty created by severe ecological

issues lead people to struggle to make sense of the circumstances. For instance, a severe drought combined with over-allocation of water and high levels of development in the Murray-Darling Basin had significant social, political, economic, and ecological consequences, many of which had not been experienced before by the people in the basin. In the Prachinburi Basin, a fish kill on the scale of the 2006 incident was viewed as unprecedented. When each of these issues emerged, people within the basin struggled to make sense of why the issue had occurred. Who or what killed the fish? Was it the industrial users polluting the water or was it one specific type of farming – fish farmers or rice farmers? What was causing the severity of water shortages in the Murray-Darling Basin? Was it just drought, or was it because someone upstream was using too much? Was it the farmers' fault or the demands placed upon the river by urban users? Later, after studies have been conducted, the causes of the problems will be better understood. For example, the ecological degradation in the Murray-Darling Basin is explained by one participant:

So we know from a whole range of independent expert assessments that the lower part of the Murray-Darling is severely compromised, 60-70% of River Red Gums are, you know, either dying or dead. You've got the Coorong Lower Lakes system totally compromised, you've got acid sulphate soils generating high levels of acidity, you've got a whole range of problems that are throughout the basin, but particularly the lower part. These have been catalogued now for 15 years and they aren't going away. In fact, they are getting worse (MDBA staff).

Similarly, in the Prachinburi River Basin, the villagers immediately blamed the upstream factories for the fish kill. But it was later discovered that while the effluent from factories had magnified the problems, the root of the problem was more complicated. Multiple users were drawing down the water and had reduced flows, but this coincided with the annual dry season when the tidal sea reverses the flow of the direction of the river in the lower reaches. The combination of lower volumes of water combined with the impacts of effluent and agricultural run-off and saline tidal flows, collectively led to stagnation and lower dissolved oxygen in the streams. Furthermore, regulations for effluent standards already existed and in this case, the factories had met those standards, according to some individuals within industry and government. Thus, the fish kills also demonstrated to the people within the basin that simply setting regulations is insufficient to prevent degradation of the watershed as they are neither stringent enough, nor do they ensure that water management practices are adaptive to existing watershed conditions, rather than predicted or expected conditions. But the immediate impact was a politicization of a range of decisions and activities in the watershed. Unable to explain the ecological disturbance, residents within the basin focused on blaming and contesting one another's uses of water. However, the understanding of the severe disturbance came only after exercises in sense-making had occurred, whether through a detailed analysis of water quality measurements, or through public dialogues, such as the Bang Pakong-Prachinburi Dialogues hosted by the former Bang Pakong-Prachinburi River Basin Committee.

Relating the experiences of the participants to the literature and findings about the global scale, the findings demonstrate that a consequence of the historical tendency to depoliticise water research and policy approaches is a lack of precision in understanding what is complex about water governance. In this study, complexity was related to the nature of the challenges faced within a watershed, with those considered most complex characterised by disorienting, severe, and unpredicted ecological challenges. However, the research results also indicate that if a capacity to undertake sense-making exercises exists within the watershed, this level of complexity can be managed.

But questions then arise about who holds that capacity and who has authority to exercise decision-making on how to manage this complexity.

Who has the authority to govern?

State and sub-state governments have the official authority to govern water in the majority of watersheds throughout the world, although they may choose to delegate, rescind, or even neglect that authority. However, the global water governance literature indicates that the complexity of water governance relates to the fact that, at the organisational level, the authority for steering the water agenda is lacking.

At the global scale, a single regime for governing water does not exist (Conca, 2005). However, in the past two decades, institutions in the global domain have begun to proliferate, and include agencies such as the World Water Council, UN-Water, and the Global Water Partnership. But other organisations at the international level, such as the World Bank, the FAO, and the UNDP, also have an enormous impact on water development projects and the governing conditions that surround these projects. Yet, these institutions are not by any means intended to be the lead agency for global water governance, nor are they solely focused on a water mandate.

Moreover, other regional and national agencies have been heavily involved in shaping water governance for many countries and for many river basins. For example, a policy group known as the Stockholm International Water Institute (SIWI), houses the Water Governance Facility – a joint initiative between the UNDP and the Swedish International Development Agency (SIDA). SIWI and the Water Governance Facility articulate their goals as providing support to developing countries for water governance reform through the provision of technical and policy support, advocating improved water resources management, and participating in global and regional water monitoring (Water Governance Facility, 2011). Furthermore, SIWI has formalised many other partnerships, including with the Global Water Partnership, UN-Water, the International Water Association, and the Water Integrity Network hosted by Transparency International.

SIWI has become involved in many of the global-level activities for water governance, including hosting the annual World Water Week, being an active contributor to the agenda of the World Water Forum and initiating new dialogues and pilot projects aimed at reducing corruption in the water sector, a topic historically not considered in water policy debates. Yet, limited analysis is available that acknowledges SIWI as a stakeholder or authority figure in water governance, and little, if any work has been completed to track its influence in water governance. This point is not intended to criticise SIWI's efforts; rather, it is simply one example that can be used to highlight the lack of clarity over which organisations or individuals at the global level are understood to hold authority, power, or influence in water governance.

Another example of the difficulty in determining who and what is governing water is illuminated from observations of the 5th World Water Forum. The World Water Forum is the world's largest water policy event and is hosted once every three years by the World Water Council. At the fifth Forum, held in Istanbul in 2009, more than five thematic sessions and side panel events were dedicated to examining the right to water and sanitation. Within those sessions, very little debate took place between participants about the idea of a right to water (personal observation). Instead, presentations and discussions focused on sharing experiences of implementing the right to water and the benefits that the legal framework can provide for some areas.

The discussions of the Forum were conducted separately from the Forum's ministerial meetings and parts of the political process, which were initially open to participants, though later moved to another off-site location making them less accessible. At the end of the Forum, the Istanbul Declaration stated that water was a 'basic human need' rather than a basic human right (Ministry of Foreign Affairs Turkey and World Water Council, 2009). Following its release, the Declaration's incongruence on the human right issue was widely critiqued by the blogging community (e.g. Hattam, 2009; Pigeon, 2009) and was officially challenged by more than 20 countries (see Council of Canadians, 2009).

The discordant tone between the Declaration and the actual Forum discussion shows how difficult it is to capture who governs water. Are the water-sector professionals from the private, public, non-state, and academic arenas that are sharing knowledge and creating a discourse through which water governance challenges are debated and using these lessons to inform their decision-making about water allocations, standards for quality, or the protection of the watershed the ones governing? Or, is the declaration, a striking contrast to the above knowledge, discourse, and lessons for decisions, but made by, in many cases, democratically elected representatives, the influential framework for water governance? The observed disconnect shows that even in a single event, the governance context that emerges can be opaque.

Without knowing who contributes to the governance of water, addressing its challenges becomes nearly impossible. However, while this lack of clarity about who has the authority to govern is a concern at the global scale, how this affects relationships amongst those responsible for water governance within individual watersheds at the local scale is particularly problematic.

Within the two case study watersheds, river basin organisation members did acknowledge that a lack of clarity does exist around water governance authority, citing issues such as 'information silos' and overlapping authorities across multiple agencies, and the ensuing confusion this can create for roles and responsibilities. At times, these challenges were perceived as part of the everyday, ongoing issues that affected operations and the implementation of governance decisions. However, it was found that once a severe, unexpected ecological disturbance occurs (as described earlier), the lack of clarity led to conflicts among those with some responsibility for governing.

Avant et al. (2010) suggest that any external shock can lead to internal change in any area of governance if it leads to tensions about the sources of authority, cooperation or conflict among 'governors' or those with an interest in governance, or if it uncovers a poor or incompetent performance by those responsible for governing. Indeed, the impacts of the drought in the Murray-Darling led to tensions among federal and state-level governments, indigenous nations, stakeholders and user groups and between upstream and downstream users. For instance, more than 16 wetlands in the basin are listed as internationally important under the 1971 Ramsar Convention on Wetlands. Environmentalist groups preferred the wetlands to be protected as a priority for water use, but irrigators contested the fact that their livelihoods will be destroyed by their inability to farm if huge volumes of water are diverted for watering wetlands rather than for irrigation. The water users of South Australia (a downstream state) are frustrated as well that they face more severe impacts than upstream users, even though they believe they have already taken extreme measures to conserve as much water as possible.

Conflicts among user groups, particularly between upstream and downstream groups, is a common concern in water governance (Fischhendler and Feitelson, 2003; Lebel et al., 2005; e.g. Wolf, 1999). But in the Murray-Darling Basin, the conflict became manifested in the tension surrounding the authority of the previous river basin organisation – the Murray-Darling Basin Commission. As one participant suggests, the drought challenged that authority and to adapt and resolve the tension, a new river basin organisation was created: "[t]he Authority came about because of a perceived failure of governance. The States ultimately represented their own interests and then those downstream say they were not getting cooperation" (Senior Scientist). The conflict meant that a basin-wide approach to governing water became too difficult to accomplish with that particular organisational model. As two senior staffers explain:

I think what this crisis [the drought] brought about in governance terms is the realization that the governance model that we had before, which was a consensus-based approach between the Federal and State governments, wasn't working... (MDBA staff).

There were too many political agendas playing out in it. The State governments were only going to look at their own interests and not look at the whole of the basin, and so what was left to do was all the leftovers

that either the States thought was too hard to do, or that they weren't prepared to do themselves, or that weren't valuable enough to spend enough attention to (MDBA staff).

As Avant et al. (2010) point out, internal change is often driven by conflict occurring between actual 'governors', which in the Murray-Darling Basin was previously the State governments, and is now a single Commonwealth agency. But the conflict should not be interpreted as being negative for water governance. Instead, the conflict combined with the ecological disturbance served a pivotal tipping point, in which the water governance system within the Murray-Darling Basin responded, adapted, and transformed itself – a demonstration of its capacity to be resilient (see Gunderson and Holling, 2002).

In the Prachinburi Basin, the river basin committee or the 'governors' comprise various user groups and interests. Therefore, ecological disturbances, such as severe water shortages or fish kills, can create conflicts among committee members as they represent shrimp aquaculture groups, irrigators for rice farming, and government authorities who have approved industrial expansion and factory development within the basin. One consequence was that some committee members undertook projects within their sector, not on behalf of the PRBC, but just as their own organisation. That is, a committee member continued to develop projects with communities rather than working to reach an agreement or shared resolution and strategy within the PRBC. As one NGO representative from the Committee claimed: "I felt like it wasn't going fast enough in the Committee... if we wait for government and the committee system, it is too slow! It moves faster when I work on the ground" (NGO representative, PRBC). But others worked to try to reform the Committee and resolve the conflicts. For example, one member claimed:

I want unity for each of the sub-committees, because each implements water-related regulations and policies so differently now. No one has been cooperating and it creates complications. It would be better if they acted on the same page. I proposed that the mayor of the Province should look at the plans and regulations and then have representatives for each sector of the government look at how to translate the laws in the same way. But this idea did not receive a good response (PRBC Committee member).

Therefore, the conflicts among 'governors' in the Prachinburi Basin led to variable responses, with some members working to develop proposals for better unity, and others moving to work outside of the river basin committee system. But collectively, the experiences across river basin organisations adds to the understanding developed within the literature on global water governance by showing that the lack of clarity on authority for water governance occurs at both global and local scales, but at local scales this lack of clarity itself is not just adding to complexity; rather, it is experienced as a conflict during certain types of complex challenges.

Contributing further to the complexity is the lack of clarity about both what water means to everyone within a given watershed and the frameworks used to shape decision-making by those responsible for water governance.

Competing definitions and frameworks

A third factor contributing to the complexity of water governance that emerges from a review of the literature focused on the global scale relates to the definitions of water and governance that become important for building agreement for decision-making. Much of the global water governance literature adopts a definition of governance initially provided by the Global Water Partnership, which refers to "the range of political, social, economic and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels in society" (Rogers and Hall, 2003: 7). Despite the fact that many scholars and practitioners focusing on water refer to this definition (Cleaver et al., 2005; Pahl-Wostl et al., 2010; Tropp, 2007) debate remains about what the generic definition means in more tangible terms.

In global governance, the term governance denotes a shift from government to governance, recognising that, in the global sphere, hierarchical government is not the only factor that contributes to how we govern. Governance may also involve an array of governmental and non-governmental actors, the construction of norms and ideas, and the institutional structures that privilege certain practices over others (Rosenau and Czempiel, 1992). For instance, the Commission on Global Governance (1995: 2) included multiple spheres of influence when the following definition was adopted: "Governance is the sum of the many ways individuals and institutions, public and private, manage their common affairs. It is a continuing process through which conflicting or diverse interests may be accommodated and co-operative action may be taken". The UNDP (1997: 4) describes governance as an "exercise of economic, political and administrative authority to manage affairs at all levels. It comprises mechanisms, processes and institutions, through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations, and mediate their differences". Within the global governance literature, Ba and Hoffman (2005: 6) contend that the term is used to signal that managing problems is "more complex and dynamic than previous conceptions of traditional approaches". Continuing, the authors claim that governance involves both structures (e.g. control, government, norms, social arrangements, laws, rules) and process (how governing proceeds), which may be both formal and informal (Ba and Hoffman, 2005).

Despite the significant efforts to clarify terminology, at times, the global water governance literature uses governance to indicate a shift from water management to governance, rather than from government to governance. The inherent assumption in the shift from management to governance is that water management now just involves more actors than government (e.g. Memon et al., 2011). Additionally, many of the documents by international organisations and transnational NGOs have tended, as Castro (2007) claims, to conflate governance as a strategy to achieving better water management (e.g. UNDP, 2004). In these cases, governance is viewed as a means to enable or complement the traditional engineering approaches to water management (Turton et al., 2007).

The use of the term governance in water scholarship is also often used in relation to a specific challenge, such as, *inter alia*, irrigation issues, resource sharing between two or more nations, or corruption in the water services sector (Falkenmark, 1998; UNDP, 2004; UNDP and IFAD, 2006). In this context, governance is often discussed as a means to resolve these issues. That is, governance is equated to 'good governance' as though it were a product or end point that could be reached, with solutions involving accountability mechanisms or participatory processes. Lautze et al. (2011) argue that the focus on governance as an outcome or an end point in water is the result of the issue being subsumed under the IWRM banner, whereby governance becomes one component or 'principle' in achieving IWRM, along with other outcomes such as 'effectiveness' and 'participation'.

In addition to the debates on a definition or interpretation of governance, a range of perspectives exists on the definition and interpretation of water and therefore, what is being governed. For some, water is a resource to be managed and exploited for agriculture, energy, or for industrial development. For others, water is a basic necessity for human life – one to which approximately 1.1 billion people do not have access (UNESCO, 1997). For still others, water is a central component of an aquatic ecosystem with a range of species and habitats, interconnected to numerous other ecosystems and critical to the well-being of the planet. Each perspective is linked to different ideas and norms about how humans can or should govern water.

As a result of the different ideas about how water should be governed, divergent normative frameworks for water governance have been advocated at the global scale, which directly compete with one another. For instance, in the past decade, and especially in the last five years, the 'human right to water' has been a governance framework that has increasingly been promoted. The human right to water is a value-based legal approach to governing one aspect of water, with the right for humans to have access to water becoming enshrined within international law and national constitutions (Sacher and Windfuhr, 2008). The legal approach is intended to address some of the corruption and inequity

found at the core of the alleged governance crisis in the first place. Agencies, from non-state actors to international organisations, began dedicating efforts to having the right to water for all accepted as a universal norm, with the idea gaining significant traction when the UN Committee on Human Rights adopted the Right to Water in 2002 (Dellapenna and Gupta, 2008). The efforts reached a new milestone in July 2010 when the UN General Assembly passed a resolution that recognised access to water and sanitation as a fundamental human right, although several nations, including Canada and the USA, originally abstained from the vote (UN General Assembly, 2010).

A second example of the frameworks promoted by scholars and practitioners focused on global water governance involves IWRM (Biswas, 2004; Mollinga et al., 2006). IWRM is based upon the idea that water management is significantly affected by other resource management decisions, whether related to agriculture and forestry, or by economic development, and thus, stresses the importance of integrating water management with these aspects. However, the framework also emphasises balancing the economic benefits from water and the other resources with the value of the environment and social considerations (e.g. Mitchell, 2006; Molle, 2009a; Mollinga et al., 2006).

In part, the human right to water and IWRM frameworks send opposing signals. The human right to water takes an anthropocentric approach – placing the legal right to access water for 'basic' human needs as a priority above all else whereas IWRM focuses on balancing human needs with environmental, social, and economic needs, and does not necessarily favour humans over the environment. Yet, these two frameworks are advocated by agencies within the same large organisation; that is, UNDP devotes resources and staff to establishing the human right to water in nations throughout the world, while the United Nations Environment Programme (UNEP) has long worked to promote IWRM. Having different viewpoints and optional frameworks is neither unusual nor problematic. Additionally, the flexibility and diversity of approaches may have positive impacts over the long term. However, the different signals contribute to the nature of the complex circumstances in which water governance takes place. The creation of new and different perspectives and frameworks can further add to the potential for 'silos'. Without well-designed processes that support those responsible for water governance to learn, contextualise, and make sense of the various perspectives, a shared understanding of the complexity will not exist and may pose a barrier to integrating water governance efforts across scales.

In examining how these different interests, perspectives, and ideas for water governance are articulated in practice in the Murray-Darling and Prachinburi watersheds, the findings of this study reveal that these differences not only contribute to potential conflicts amongst governors, as explained earlier, but also create challenging ethical dilemmas for those involved in water governance. In particular, these moral or ethical dilemmas surround the choices about priority uses for water, and how the benefits that one water user may gain from the river basin can create inequity among other users. For instance, when a private corporation is permitted to release effluent that will inevitably contribute to pollution of the Prachinburi River, it not only causes environmental degradation, but also harms the small-scale fishers, aquaculturists, and rice farmers who rely on the river. The harm comes from the impacts on both the livelihoods within the watershed and human health, as one participant explains:

One of the main health problems in Prachinburi is diarrhoea. There are many illness-causing microorganisms in the river. Because of a lack of treatment and waste recycling plants for all sectors – both farming and factories – we don't have good quality water in the river system. Even in the upstream areas, they have illness-causing microorganisms (PRBC member).

In the Murray-Darling Basin, the MDBA was preparing to release its official Basin Plan in October 2010 in accordance with the requirements prescribed by the 2007 Water Act. Debates on the Basin Plan have often been framed as though the MDBA is mainly confronting the issue of environmental protection versus the economy. Specifically, the discussion on the Basin Plan juxtaposes agriculture and irrigation with the protection of ecological assets. Yet, underlying the discussion is the recognition of a moral

dilemma – that the decisions facing water governors are not abstract economic or environmental values but those that directly affect individuals and communities. As one citizen states in his comments on a draft of the Basin Plan: "taking water from rural communities has the same effect as taking electricity from the city" (Taylor, 2010). Moreover, members of the MDBA are sensitive that the communities at the lower reaches of the river have already suffered enormously through the drought: "I'm sure you've heard what happened at the Lower Lakes and Coorong – it is quite emotive for them, the degradation" (MDBA Staff). The social and economic impacts of the current drought and existing water allocation system were raised by farmers from the downstream area in the MDBA at observed community information sessions, where they cited depression and isolation due to the loss of their livelihood and well-being. One MDBA staff member reflected: "[w]e're playing with people's livelihoods, and we've got to keep that in mind"! But this sensitivity is pitted against a competing moral imperative to protect the environment.

For some river basin organisation members, the sense of responsibility is related to the difficulties of needing to make decisions and judgements at the science-policy interface. As one senior scientist from the MDBA stated: "the science can inform the policy, but the policy is about judgments. And you need to delineate the boundaries rather than blur them to know where the science and the policy start and stop. But all the science can tell you are the options". Needing to make difficult judgements reminded those working in the river basin organisations of their individual responsibilities as professionals and the potential consequences or moral dilemmas that certain governance decisions may pose, which may be criticised by other people in the river basin. As one senior staff member in the MDBA explained:

I think people working on the Basin Plan know that it is going to create a lot of animosity and I think they are struggling with what it includes or doesn't include. Don't get me wrong, people have worked very hard on it and they are doing the very best they can. But they know it is going to cause conflict...

In Wapner and Matthew's (2010) discussion of ethics in environmental politics, they insightfully claim that while environmental ethics have traditionally focused on the harm that humans cause to the environment as the 'wrong' (e.g. Abbey, 1968; Leopold, 1949), consideration must also be given to the fact that humans can mistreat each other and use nature as the medium. Wapner and Matthew's (2010) characterisation of the ethical dilemma is reflected in the perspectives of the two river basin organisations, where moral concerns are raised because some groups suffer or perceive themselves to be unfairly treated as a consequence of the way that others have used water or made decisions on water in the basin. Furthermore, these ethical dilemmas contribute to the overall perception of complexity when discussing the challenges within the different basins for the principal reason that resolving any ethical dilemma is rarely straightforward.

Therefore, while a review of the reports, discussions, and missions of various global organisations and scholarship demonstrate a variety of definitions and frameworks, each of which may present competing ideas and norms, the results of this study take this further. While the diversity could be perceived as 'complex' itself, it is the practice of needing to manage that diversity, and the moral or ethical challenge it can present that contributes to the sense that water governance is complex. Thus, while it is important that scholars and practitioners continue to debate and develop various frameworks that may help with sense-making processes, it is equally important to recognise that the most difficult part is not related to semantics or even philosophical viewpoints. Instead, it is the dilemma that we, as humans, face when trying to respect others' viewpoints but still provide advice that comfortably aligns with our professional opinions.

CONCLUSIONS

The challenges of water governance are frequently referred to as being increasingly complex and governance arrangements are expected to address that complexity. But the different perspectives

across scales about the sources of that complexity have not been previously described in the literature. That is, authors either do not describe the factors comprising the complexity or they independently cite a diversity of factors, without reference to previous work. Furthermore, scale is understood to be an important component of water governance, with any 'good governance' regime expected to involve the interaction of activities across multiple scales.

However, existing literature is unclear on whether the increasing complexity is understood to involve the same issues across different scales. Therefore, an identification of the perspectives within different scales is needed. The purpose of the paper is not to indicate that the perspectives need to be the same across scales; rather, a shared understanding of the differences must exist considering that each of these issues will need to be addressed in any integrated, multiple-scale governance model.

The findings of this study revealed that within the scholarship primarily focused on global water governance the term complexity is used as a catch-all to describe the current governance system and the range of water quality and quantity issues that may be faced by those responsible for governing. But at least three thematic variables help to explain the similarities and differences surrounding the perspectives of complexity at global and local scales. Firstly, scholars and practitioners focused on the global scale have emphasised that there has been a historical tendency to neglect the 'political' within water research and governance practices that provide an opaque governing context today. But for those working within river basin organisations, the political aspects of their work can be obvious at times, and not all challenges are complex just because there is a political component to them. Rather, those challenges considered as 'complex' or 'wicked' arise when severe ecological challenges serve as disturbances in a watershed that are, at least temporarily, difficult to understand, resolve, or prevent. These ecological challenges remind people of the tenuous links between the 'social' and 'ecological' that exist in any watershed, and the experience required of people to go through sense-making and meaning-making exercises to understand the factors that contribute to the challenge. Secondly, the fact that the diverse constellation of actors and organisations lacking clear authority or leadership for water governance, yet have influence to shape policy agendas is recognised at the global scale as contributing to complexity. But local perspectives have demonstrated that the 'fuzziness' of roles and responsibilities may not contribute to insurmountable challenges on a day-to-day basis. Rather, perceptions of complexity were related to the times when severe ecological challenges occurred without clear cause-effect relationships, which in turn posed a challenge to the existing governance authority. Thus, the lack of clarity highlighted in the literature potentially creates conflict among those responsible for governing at the local scale.

Thirdly, in trying to address some of the challenges in water governance, the global scale has contributed to the development and advocacy of competing definitions and uncoordinated governance frameworks, which create fragmentation. Perspectives from the local scale demonstrate that the diversity of frameworks, ideas, interests, and values are similar to those discussed at the global scale, but the true challenge is the moral and ethical dilemmas posed by confronting this diversity and making decisions. The fact that human-created degradation not only harms the environment but can harm other humans, including their health and livelihoods, makes ascertaining concrete solutions difficult thereby further creating a perceived sense of complexity

This research concludes that assessing complexity is not as simple as stating the global-scale perspective is different from, or the same as, the local-scale perspective. Rather, the findings from this study demonstrate that while the global-scale literature captures broad patterns about complexity, the local perspectives lend nuance and a precision to understanding the type of challenges that comprise the complexity and how those are experienced within a watershed. What becomes clear is that, especially at the local scale, complexity itself is not necessarily problematic. In fact, in the case of both river basin organisations, complex challenges served as a critical juncture in which the organisations demonstrated a capacity to adapt, respond, and transform how water was to be governed. But the fact

that complexity can contribute to a pivotal tipping point demonstrates the urgency and need to better understand the characteristics of such complexity.

Moreover, if global organisations intend to maintain their support for river basin organisations, then incorporating such insights about how water governance challenges are perceived by river basin organisations could inform the tools, models, and advice that can be shared. For instance, one of the frameworks advocated by global organisations – IWRM – places a significant emphasis on an integrated approach. While this could still provide a meaningful starting point, such a framework neglects the need that local river basin organisations may have for adaptability or resilience. Thus, future research may consider whether different kinds of frameworks may better support local capacity to respond to complexity. Finally, as stated previously, given that many scholars and practitioners have suggested that resolving complex challenges will require effort across multiple levels and scales, a shared understanding of complexity could assist in establishing the priorities that need to be tackled first.

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