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Water Governance Research in a Messy World: A Review

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ABSTRACT: Water governance research is confronted with a messy world that is difficult to make sense of. Mainstream policy approaches tend to simplify and standardise this messiness in ways that obscure complexity, power and politics. As a result, these approaches not only promise more than they can deliver but often end up reproducing unequal and iniquitous governance dynamics. A wealth of critical scholarship has attempted to address these limitations but with little impact. This review takes this dilemma as its central concern. The aim is to understand different ways that water governance scholarship has engaged with the messiness of the world, laying the groundwork for more fruitful dialogue with mainstream approaches. Firstly, the article recounts policy attempts to 'mainstream messiness' at the level of discourse. It notes salient features of these discourses, including integration, combination, and participation. Three sections follow that concern themselves with ways that critical water governance research has engaged with messiness. The first is messiness as 'scalar complexity'. A distinction is made between research that assumes that scales are fixed and pre-given and literature examining the politics and performativity of scale. Next, the review focuses on 'institutional diversity' and strands of literature that do a different job of articulating messy water governance arrangements, including neo-institutionalism, legal pluralism, and critical institutionalism. The third way of engaging with messiness is through the 'multiple meanings and practices' of water users and governance actors. The strands of literature reviewed are culture, values, and beliefs; narratives and discourse; and water ontologies. The penultimate section of the article proposes three broad interdisciplinary approaches that attempt to manage messiness by bringing together scalar complexity, institutional diversity, and multiple meanings and practices. The article concludes by revisiting the dilemma noted above: the failure of much critical water governance research to influence mainstream policy and practice.

KEYWORDS: Water governance, messiness, scale, institutions, meaning, practices

INTRODUCTION

The term 'messy' is increasingly employed in the social sciences,[1] perhaps reflecting a growing awareness of the complexity and uncertainty that characterises contemporary social and human-environment dynamics. In the case of water governance research, this messiness relates in part to the variegated geographies, ecologies, and societies that governance arrangements must contend with. From the late twentieth century onwards, it also reflects the shift from government and the hydraulic mission to governance in a world of wicked water problems (de Loe et al., 2009; Fallon et al., 2021; Kirschke et al., 2017; Lach et al., 2005; Termeer et al., 2015). This purported shift[2] infers the dispersal of water

[1] A search for the term 'messy' in Scopus reveals its increasing popularity over the past three decades. In 2021, 'messy' appeared in 455 articles as compared to 208 articles in 2011, 64 articles in 2001, and 17 articles in 1991.

[2] Several authors have argued that the shift from government to governance is not as clear-cut as often suggested (Molle et al., 2009; Warner et al., 2017).

governance arrangements across scales and levels, the inclusion of private and civil society actors alongside public bureaucracies and administrations, attempts to integrate different sectors, and the recognition of a range of interlocking water issues (OECD, 2009; Tropp, 2007).

Much mainstream policy and practice simplifies and standardises real-world messiness, promoting uniformity in the face of diversity. While simplification and abstraction are necessary features of all attempts to comprehend a complex world (Jessop, 1997; Sayer, 1992), critiques of mainstream water governance approaches point to the undesirable effects this produces. In this regard, critical water scholarship has consistently argued that mainstream approaches produce silences and blind spots and that this process is inherently political, rather than innocent or neutral (Conca, 2005; Zwarteveen et al., 2017). Much water governance scholarship has been concerned with making these blind spots visible. Yet the considerable amount of research undertaken in this vein appears to have had little impact on mainstream approaches. This dilemma constitutes the central concern of the review. The aim is to understand different ways that water governance scholarship has engaged with the messiness of the world, laying the groundwork for more fruitful dialogue with mainstream approaches and their limitations.

Water governance is a broad concept and is associated with a large volume of research. This article does not attempt an exhaustive review of this literature.[3] Rather, it is structured in relation to three common features of many definitions of water governance:[4] scales and levels; institutions; and meanings and practices (Hassenforder and Barone, 2019; Lautze et al., 2014; OECD, 2009; Rogers and Hall, 2003; Tropp, 2007; van Buuren, 2013). In Section 3, water governance literature that deals with questions of scales and levels is reviewed. Here messiness is constituted as 'scalar complexity'. Section 4 reviews the literature on institutions, with messiness taking the form of 'institutional diversity'. In Section 5, messiness is explored by reviewing literature concerned with the 'multiple meanings and practices' of water users and governance actors. Section 6 then proposes three broad interdisciplinary approaches that in different ways attempt to articulate and manage messiness by combining treatments of scale, institutions, meanings and practices. The article concludes by returning to the question of why critical scholarship has largely failed to influence mainstream policy approaches. First, Section 2 considers the nature of these mainstream approaches and related critiques in more detail.

MAINSTREAMING MESSINESS

In recent times, several water governance approaches have dominated global and national agendas, while serving as the grist for much water governance research. These approaches often overlap or include each other, in part because they have emerged within a shared historical and geopolitical context (Conca and Weinthal, 2018; Woodhouse and Muller, 2017). They can be understood as policy attempts to order and address the messiness highlighted in the introduction, to more effectively manage the challenges, functions, and competing interests associated with the distribution and use of water. This section considers how these dominant approaches set out to 'mainstream messiness'. At the level of discourse, key features include mainstreaming as integration, as combination, and as participation. The section also notes two central critiques of mainstream approaches, namely their failure to substantively engage with questions of power and complexity.

Mainstream approaches have increasingly acknowledged that water governance takes place in a messy world. One popular process for dealing with this messiness is integration. For example, the influential concept of Integrated Water Resources Management (IWRM) advocates for the integration of

[3] For other reviews of the water governance literature see Araral and Wang (2013), Bakker and Morinville (2013), Brisbois and de Loë, (2016), Hassenforder and Barone (2019), Woodhouse and Muller (2017).

[4] Water governance is a concept that is variously interpreted, with several authors arguing that it lacks sufficient definition (Castro, 2007; Lautze et al., 2014; Sehring, 2009a).

otherwise fragmented and siloed approaches. The most commonly cited definition of IWRM is "a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (GWP, 2000: 22). More recently, and with the legitimacy of IWRM increasingly challenged, new discourses championing integration have emerged. Prominent among these are the water-energy-food nexus and the green economy (Benson, 2015; Wichelns, 2017).

At the same time, mainstreaming messiness involves recognising the importance of a range of normative principles that are then combined under a given approach. In the case of IWRM, core tenets of sustainable development are combined through the win-win-win solutions of economic efficiency, social equity, and ecological integrity – otherwise known as the '3Es' of efficiency, equity, and environment (Mehta and Movik, 2014; Meran et al., 2021). This combinatorial approach is also evident in the concept of good water governance, which comprises ideal-type lists of principles considered necessary or desirable for water governance to be effective and fair (Lautze et al., 2014). Common combinations of principles include: open, transparent, participatory, accountable, effective, coherent, efficient, communicative, equitable, integrative, sustainable, and ethical (Rogers, 2002).

Finally, mainstreaming messiness involves the discourse of participation, which is deployed to better incorporate the diverse interests and perspectives of water users and governance actors (Goldin, 2013; Jager et al., 2016; Sultana, 2015). While participation may refer to the inclusion of any non-state actor at any level, in policy terms it most concretely implies the involvement of water users themselves in water management and governance processes. The most exemplary policy model for operationalising participatory water governance is Community Based Management, typically through the formation of local water user committees or associations (Manor, 2004; Mansuri and Rao, 2013). Noted above, mainstream approaches often overlap and include each other. Thus, for example, participation is championed as a vehicle for achieving integration (UNEP, 2014). It is also a common element on lists of good governance principles.

A range of critiques have been levelled at the real-world effects of these mainstream approaches. Common to many of them is that they tend to mask or obscure the practices and power relations that animate water governance arrangements and outcomes (Boelens et al., 2018; Franks and Cleaver, 2007; Harris et al., 2013; Joy et al., 2014; Norman et al., 2015; Suhardiman et al., 2017; Wilson et al., 2019; Zwarteveen et al., 2017). As a result, they not only promise more than they can deliver but often end up reproducing unequal and unjust governance dynamics. In the case of good water governance and IWRM, for example, inherent tensions exist between their different attributes. Equity and efficiency may often be incompatible, while high levels of participation can lead to decisions that result in unsustainable water use (Lautze et al., 2011). Another critique posits that mainstreaming messiness fails to adequately account for the complexity of interacting social and ecological dynamics (Folke, 2003; Moberg and Galaz, 2005; Olsson et al., 2006).

These and other critiques have led Molle (2008) to designate "attractive yet woolly consensual" terms such as IWRM and good water governance as 'nirvana concepts'. Seemingly desirable but extremely difficult (if not impossible) to achieve, nirvana concepts obscure complexity and the political nature of water governance and management. Moreover, their vagueness means they can stand for many things. The sections that follow review attempts of critical water governance research to make the obscurations of these mainstream approaches visible. In the first of these sections, messiness is explored through the lens of scalar complexity.

MESSINESS AS SCALAR COMPLEXITY

This section is concerned with messiness as it relates to questions of scale in water governance research. Mainstream approaches increasingly recognise that governing water across scales and levels is a messy

business. However, they tend to assume that these scales and levels are pre-given and 'natural'. The implication is that the world is fixed and ordered in a certain way, rather than evolving and always in flux. This leads to seemingly straightforward proposals to, for example, "manage water at the appropriate scale(s) within integrated basin governance systems to reflect local conditions, and foster coordination between the different scales" (OECD, 2021). In this section, two broad strands of literature are demarcated that articulate different forms of scalar complexity, calling into question the feasibility of policy statements such as these. The concept of scale itself refers to "the spatial, temporal, quantitative, or analytical dimensions used to measure, or rank, and study any phenomenon", while levels are "the units of analysis that are located at different positions on a scale" (Dore and Lebel, 2010: 62). Scales of relevance in water governance research include the administrative, hydrological, ecosystem, and economic (ibid).

As with mainstream governance approaches, the first strand of literature has a tendency to treat scales and levels as if they were fixed. However, they also challenge mainstream proposals that are based on this understanding of scale. Prominent in this regard is adaptive water governance. Operationalised through the concept of adaptive co-management, adaptive water governance highlights the scalar complexity associated with coupled social-ecological systems (Folke, 2003; Huitema et al., 2009; Pahl-Wostl et al., 2012). This complexity arises from the multiplicity of pre-given scales and governance levels in existence, and the system dynamics that play out within and across them. Nykvist et al. (2017) highlight these complex dynamics in their study of adaptive multilevel water governance in Sweden (see also Armitage et al., 2009; Berkes, 2007; Liu et al., 2007). The challenge from a water governance perspective is to develop ways of accounting for and working with complex and dynamic system properties that integrate social and ecological scales (Akamani, 2016; Huitema et al., 2009; Islam and Susskind, 2018). A focus on integration chimes with mainstream policy approaches (see Section 2). However, authors writing in this tradition reject what they see as a tendency for policymakers to minimise, or even ignore, the irreducible complexity and uncertainty associated with integration (Holling and Meffet, 1996). Instead, they point to social and ecological processes characterised by unpredictable non-equilibrium dynamics as well as spatial and temporal variation (Gunderson and Holling, 2002; Scoones, 1999). They also point to governance processes comprising multiple and sometimes overlapping centres of decision-making in 'polycentric' arrangements (Ostrom, 2010; Rouillard et al., 2013; Schlager and Blomquist, 2000). The resultant complexity, they argue, requires an approach that embraces change and uncertainty, rather than attempting to minimise it as mainstream approaches often do.

The focus on polycentric arrangements in adaptive water governance research draws attention to diverse state and non-state actors in networks that span scales and levels (Olsson et al., 2006 for a multi-country assessment of cross-scale adaptive water governance arrangements; see also Woodhouse and Muller, 2017). At these different levels, water governance actors hold diverse forms of knowledge which is required to deal with the complexity of social-ecological systems. For example, Green et al. (2013) discuss the importance of integrating local knowledge into complex multilevel transboundary arrangements for governing water in the Okavango River Basin (see also Akamani, 2016 and Section 5). Researchers on the European project HarmoniCOP (Harmonizing COllaborative Planning) argue that the adaptive capacity of multilevel networked and polycentric water governance arrangements depends crucially on how diverse actors account for and learn from feedback in the system (Pahl-Wostl et al., 2007). This draws attention to different levels of social learning that take place in adaptive water governance, commonly referred to as single loop, double loop, and triple loop learning (Medema et al., 2014). The presence or absence of these levels of learning result in varying degrees of adaptive capacity within water governance systems. More fundamental forms of social learning (double and triple loop) generate new knowledge and solidify linkages between actors across different scales, in turn building trust and promoting collaboration for greater system resilience (Berkes, 2009).

An assumption of the fixity of territory and the givenness of scale is not the purview of adaptive water governance research alone. Much research grounded in geography, political science, economics, and

sociology has concerned itself with a treatment of scales and levels as fixed, static, and hierarchical aspects of water governance. Given the dominance of IWRM as a global discourse and policy prescription, a good deal of this work has taken aim at the assertion that the primary governance unit can or should be the river basin.[5] Thus, Moss (2012) examines the implementation of the European Union's (EU's) Water Framework Directive (WFD). He discusses how scalar complexity emerges because bioregional units such as the river basin seldom align with political and administrative boundaries, economic networks, and social and cultural groupings. This gives rise to messy challenges of scalar fit and interplay (see also Moss and Newig, 2010). The assertion that the river basin should be the basic governance unit is further troubled by water-related processes that include inter-basin transfers, groundwater extraction, tidal barriers, desalination, and virtual water trade (Cohen and Davidson, 2011; Dore and Lebel, 2010). Moreover, the forms of participation and collaboration that IWRM calls for within a river basin are typically structured by broader societal power imbalances (Brisbois and de Loë, 2016). In their study of wetlands governance in Alberta, Canada, Clare et al. (2013) show how accounting for this dynamic requires an examination of scales, and the complex interplay of scales, beyond the immediate arena of concern.

Spatial misfits and the resulting scalar complexity that emerges from the implementation of a river basin management approach has been well documented in case studies that include the EU's WFD (Borowski et al., 2008; Moss, 2003; Watson, 2014), IWRM in South Africa (Mehta et al., 2014; Merrey, 2008; Pollard and du Toit, 2011), and water governance in the Mekong River Basin (Hirsch, 2006; Plengsaeng et al., 2014; Varis et al., 2006). These and other studies highlight different categories of 'fit' beyond the alignment (or lack thereof) of hydrological boundaries with governance arrangements. This includes boundaries imposed by water service infrastructure (functional fit) and the impacts of climate change (dynamic fit) (Borowski et al., 2008; Valdés-Pineda et al., 2014). In a practical sense, reconciling different scalar 'misfits' is often extremely difficult or impossible. This draws attention to the importance of interplay between scales and levels if appropriate forms of water governance and management are to be achieved (Moss, 2003).

Developing a cross-scale and multilevel analysis is also of fundamental importance because water management functions are themselves typically diverse. As a result, they require action at different scales and levels that are determined by the nature of the challenge in question (Mollinga, 2020; Muller, 2019). For example, collaborative forms of governance and management may favour the local level where it is easier for interpersonal multiparty processes to occur (Grigg, 2015). At the same time, higher levels such as the national and even global level are often more appropriate for broad agenda setting; devising and enforcing laws and policies, the coordination of coalitions and a broad range of relevant interests; the sharing of knowledge, responsibilities, and risk; and for addressing water-related conflicts that elude local- or basin-level approaches (Pahl-Wostl et al., 2013).

Yet the appropriate governance scale and level is not easy to deduce. In implementing the EU WFD in England, for example, the first cycle of River Basin Management Plans (2009 – 2015) depended upon a River Basin Approach that operated at too broad a scale, was too inflexible at the local level, and limited stakeholder involvement (Starkey and Parkin, 2015). In response, England's Environment Agency revised the scale of the approach from 10 River Basin Districts to 93 individual catchments (Robins et al., 2017). This example points to a solutions-oriented agenda, consistent with much of the literature that assumes the givenness of scale, whereby complex questions of fit and interplay may find at least partial resolution by developing ways of working across scales and levels. At the same time, that England's 93 catchments were created in pursuit of this resolution suggests that scales and levels are not pre-given or fixed. This insight underpins the second strand of literature examined in this section, which centres on the politics of scale.

[5] Although it has not always been the case, IWRM now adopts the water basin as the primary governance unit and promotes collaboration among the different stakeholders and interests within this unit (Hooper, 2003).

The politics of scale literature is also interested in how water governance systems function within and across scales. It is mostly conducted in critique mode (Mollinga 2020) and examines how these governance scales are socially constructed, historically contingent, relational, and politically contested (Norman et al., 2012). The purported 'naturalness' of a bioregional unit such as the river basin is critically scrutinized and found to be wanting. Instead, processes for deciding upon an appropriate water governance scale, often framed as a technical exercise, are highly contested, power-laden, and interest-driven (Cohen and Bakker, 2014; Cohen and Davidson, 2011). They invariably function to serve particular agendas (Lebel et al., 2005). This point is illustrated by Swyngedouw (2004a) in the case of Spain's history from the late 1700s onwards. Here the author charts the modernising aspirations of a group of 'regeneracionists' who were pitted against a reactionary group of traditionalists – a contest with a scalar politics of water at its heart. As Swyngedouw observes:

> Capturing the scale of the river basin as the geographical basis for exercising control and power over the organisation, planning, and re-construction of the hydraulic sphere was one of the central arenas through which the power of traditionalists (and the scales over which they exercised control) was challenged. River basins became the scale par excellence through which the modernizers tried to erode the powers of the more traditional provincial or national state bodies, while traditional elites held to the existing administrative territorial structure of power.

Scale from this perspective is understood as a medium, object, and product of social conflicts and negotiations (Moss and Newig, 2010). This conceptual and theoretical framing casts the scalar reforms to water governance over the past few decades – decentralisation, devolution, collaboration, participation – in a different light. Researchers who embrace a politics of scale approach to water governance are certainly not alone in highlighting the role of power and politics. However, their analyses move beyond the observation that water governance is political by providing one way of specifying *how* it is political. For example, in their analysis of water governance in the Mekong region, Lebel et al. (2005) identify four strategies that generate the diverse pathways along which a politics of scale unfolds: telling stories, building alliances, deliberating alternatives, and controlling technologies. The result is the elucidation of complex scalar dynamics that reveal how scaling and rescaling processes are not socially or politically neutral "but express and reconstitute physical, social, cultural, economic or political power relations" (Swyngedouw, 2007: 10).

As a relational and co-constitutive framing, the politics of scale approach generates important insights into the socio-political processes through which complexity arises in water governance. A good example is the different identities of water governance actors, which instead of being fixed are co-produced during rescaling processes. Thus, Norman (2012) examines how leaders of Indigenous groups in the Pacific Northwest formed a Coastal Salish Aboriginal Council to push back against the effects of political fragmentation on water management caused by the US-Canada border. In the process, a shared Indigenous cultural identity was constructed, shifting from more localised kin-based communities to a unified identity that incorporated Indigenous peoples from both the USA and Canada. These actions represent a form of strategic essentialism that counteracted the narrative of a bordered geography and different national identities (US and Canadian citizens), emphasising instead the cross-border connectedness of different Indigenous communities. This example sheds light on the networks that emerge and evolve as part of a scalar politics of water governance, which is also evident in Hoogesteger et al.'s (2016) study of the multi-scalar struggles of water users in Ecuador's highlands. As coalitions and contested arrangements of people, organisations and 'things', these cross-scale networks embody and articulate power relations (Norman et al., 2012).

MESSINESS AS INSTITUTIONAL DIVERSITY

Institutions in mainstream definitions of water governance typically refer to 'things' in the form of administrations, departments, or organisations. These institutions in turn make up part of a broad

'institutional environment'. Compared to mainstream definitions, a good deal of academic research adopts a quite different conception of the nature and functioning of institutions. For example, institutions are often conceived of as systems of rules, norms and values that shape human behaviour and thought (Fleetwood, 2008; Hodgson, 2006). This makes it possible to distinguish between the generic term 'institution', which encompasses a broad range of phenomena, and the term 'organisation', which is a specific *type* of institution.[6] Here three strands of literature are reviewed that in different ways move beyond mainstream conceptions by analysing diverse, hybrid and socially embedded water governance institutions. They also move beyond a tendency that Ostrom (2010) observes in some of the academic literature to order institutional arrangements into neat categories, such as 'market' or 'state', and to analyse or advocate for them in isolation.

The first strand of literature adopts a neo-institutional approach to analyse water governance. Several developments have influenced this literature. Perhaps most dominant is a methodological and analytical framing grounded in political science and microeconomics (North, 1990), predicated upon individualism and the conscious and deliberate behaviour of rational or boundedly rational water governance actors. Institutional diversity from this perspective presents as systems of context-specific formal and informal norms, rules, and laws (McGinnis, 2011; Ostrom, 1990, 2005). These 'rules-in-use' structure water governance arrangements and incentivise individuals to behave in ways that promote or impede collective action and desired water policy outcomes (Imperial, 1999). Water governance arrangements are typically conceived of in nested and legalistic terms, which researchers employ to order and analyse diverse settings and governance dynamics. One way of approaching institutional diversity is to examine the bundles of property rights that structure the behaviour of water governance actors and water users in 'action arenas' that are linked across different levels of analysis (Schlager and Ostrom, 1992). These rule-structured situations are often nested within other sets of rules that stipulate how rules in the situation of interest can be changed (Kiser and Ostrom, 1982).

The concept of action arenas operating at different governance levels was developed as part of the Institutional Analysis and Development (IAD) Framework, a multi-purpose diagnostic tool for analysing governance arrangements (Blomquist and DeLeon, 2011; Ostrom, 2005, 2011). Water governance researchers have used the IAD Framework to combine an analysis of rules with other sets of exogenous variables (attributes of the community and of the biophysical and material world). Nigussie et al. (2018) employ the IAD Framework to analyse institutions for soil and water conservation in northwestern Ethiopia. Villamayor-Tomas et al. (2019) apply the Framework to irrigation case studies in Spain, Germany, Kenya, and India, focusing on the role of institutions in mediating environmental outcomes associated with the water-food-energy nexus (see also Ching and Mukherjee, 2015; Molenveld and van Buuren, 2019; Snell et al., 2013). The IAD Framework has been further developed into the Social Ecological Systems (SES) Framework (McGinnis and Ostrom, 2014; Ostrom, 2009). The SES Framework unpacks and elaborates the biophysical, material, and ecological dimensions of the original IAD Framework, as well as broader social, economic, and political settings. These dimensions and settings are analysed together to examine the ways in which they shape the performance of diverse water governance institutions, as Montenegro and Hack (2020) demonstrate in their study of multilevel water governance in Nicaragua (see also Meinzen-Dick, 2007).

The conception of institutional diversity provided by rational choice neo-institutionalism appears important for understanding some of the challenges water governance systems face. In the case of the Murray-Darling Basin in Australia, for example, Wallis and Ison (2011) analyse the changing institutional landscape for governing and managing water. Their analysis reveals how policy paradigms that include decentralisation, participation, and water markets overlap with new institutions at national and state

[6] Hodgson (2006: 13) defines institutions as "durable systems of established and embedded social rules that structure social interactions". Examples provided include language, money, law, systems of weights and measures, table manners and organisations.

levels. These new institutions have been introduced ostensibly to achieve integration and reduce system complexity. In practice, however, the effect has been to "increase complexity by adding to the existing mix of institutional arrangements" (p. 4081), inhibiting the effectiveness of water management organisations.

Taken together, rational choice neo-institutional literature draws attention to institutional diversity in water governance through an economistic lens, privileging methodological individualism and economic relations. The promise of this approach for analysing water governance institutions is that it draws attention to diverse micro-dynamics in particular contexts. Several authors have suggested, however, that it also leads to a form of groupthink whereby diagnostic toolkits and sets of 'design principles' become checklists that are adopted and applied uncritically (Cleaver, 1998; Saunders, 2014).

Other neo-institutional research has instead focused on the role of history for understanding water governance. Diversity across different governance contexts is explained in part by path dependence, often through the influence of variables that are difficult or slow to change and that constrain and enable how water governance arrangements evolve (Hassenforder and Barone, 2019). Particularly salient are the inertial effects of water policies and water infrastructure on said arrangements, as Bukowski (2007) discusses in relation to the evolution of water policy in Spain and Ingram and Fraser (2006) discuss with regards to water governance in California. Other authors have combined aspects of neo-institutionalism with a more substantive treatment of power, political economy and discourse. Schoderer et al. (2021) do this to analyse obstacles to water protection legislation in relation to mining in Mongolia. Whaley and Weatherhead (2015) do so to analyse farming and collaborative water governance in the UK. Finally, research has combined a neo-institutional approach with thicker sociocultural explanations of water governance processes based on long-term ethnographic research. For example, Schnegg and Linke (2015) employ this approach to investigate intricate sharing and sanctioning principles for water use among pastoral communities in Namibia.

The second strand of literature reviewed here centres on contested water rights and legal pluralism – defined as multiple sources and systems of rules that apply to the same situation or jurisdiction (Bavinck and Gupta, 2014; Griffiths, 1986). Law and dynamic property rights are the central focus. The emphasis is on the messy ambiguity generated by the multiplicity of overlapping and interacting legal systems that apply to water governance in everyday life (Roth et al., 2015). Research has investigated dynamic water governance contexts involving the interplay of two or more systems that may include state law, customary law, religious law, project law, local law, as well as legal systems applying to other domains such as land governance. For example, Maganga (2003) examines the incorporation of customary laws into the process for implementing IWRM in the Rufiji River Basin, Tanzania (see also Meinzen-Dick and Pradhan, 2001; Meinzen-Dick, 2014; Merrey, 2009). With its focus on property rights, this literature shares common ground with neo-institutional approaches while often explicitly distancing itself from them (Boelens and Seemann, 2014; Roth et al., 2015). Many water governance researchers working in the field of legal pluralism examine the barriers faced by less powerful or marginalised groups when they try to assert claims to water within unjust legal systems and given the imbalance of power. They typically focus on ways in which multiple legal systems provide different actors with opportunities to further their own agendas. One mechanism that scholars highlight is 'forum shopping' (Nchanji and Bellwood-Howard, 2018; von Benda-Beckmann, 1981). Here individuals and groups exert control by recourse to laws and legal systems that favour their interests, for example in relation to water allocation decisions (Meinzen-Dick and Pradhan, 2001).

As Nchanji and Bellwood-Howard (2018) argue, the plural institutional processes that characterise water governance are always shaped by the agency and power of different actors. A case in point is water governance in South Africa, which has received attention from scholars who adopt a legal pluralism approach (Bavinck et al., 2014; Clark, 2017; van Koppen et al., 2005; van Koppen and Jha, 2005; Wilson, 2000). Post-apartheid South Africa has witnessed major water reforms that include the introduction of a water permit system, decentralisation, participation, and IWRM (Schreiner, 2013; Swatuk, 2008; van

Koppen et al., 2007). Within this plural institutional landscape, research has examined the ways in which a history of settler colonialism and apartheid continue to configure post-apartheid water governance dynamics along racial lines (Kemerink et al., 2011; van Koppen and Jha, 2005). A prominent example of this is the power that white commercial farmers have to shape the institutional environment in ways that favour their water interests at the expense of black farmers and communities – reproducing and entrenching racial inequalities that are reflected in wider society (Kemerink et al., 2013).

Other research that adopts a legal pluralism framing has examined opportunities for marginalised groups to challenge the predominance of unjust water governance arrangements. This may involve these groups establishing alternative governance structures that articulate their own water laws. For example, Curran (2019) discusses how First Nations in Canada have re-politicised decisions about water to contest state institutions that attempt to depoliticise decision-making processes while reinforcing settler colonial dynamics. To do this, Indigenous groups draw upon the UN Declaration on the Rights of Indigenous Peoples and its concept of free, prior, and informed consent. This has allowed these groups to circumvent state systems while creating their own water governance frameworks based on Indigenous legal traditions. In a different example, Charpleix (2018) charts recent developments in New Zealand through which a plural legal governance structure has evolved. This structure includes the Maori of the Whanganui River and the New Zealand state. The author takes as a point of departure the 1840 Treaty of Waitangi, made between Maori chiefs and British colonisers, as the basis of future governance in New Zealand. Charpleix shows how this agreement gave rise to two interpretations of the law based on differences between the Maori and English versions of the Treaty. One result has been plural and conflicting expectations regarding the constitution and administration of water laws. Generations of Maori activists have voiced their grievances with the dominant legal system, leading to the recognition of the 'legal personhood' of the Whanganui River in 2017. The shift troubles the foundations of the dominant settler colonial legal system, opening it up to the possibility of creating a more hybrid and just framework.

The third strand of literature reviewed here is critical institutionalism (Cleaver, 2012; Cleaver and de Koning, 2015; Hall et al., 2014; Whaley, 2018). This school of thought, grounded in sociology, anthropology, history, and development studies, employs critical theoretical insights about the interplay of structure and agency, power, and the complex-embeddedness of water governance institutions in cultural and social life. Diversity is reflected in the different histories, political economies, and systems of meaning out of which messy institutional arrangements for governing water emerge and evolve (Cleaver, 2000; Cleaver et al., 2021; Mosse, 1997; Schnegg, 2016). A key concept employed by researchers working in this tradition is institutional bricolage. This term attempts to capture how people both consciously and non-consciously patch together institutional arrangements for governing and managing water from the social, cultural, and material resources available to them (Cleaver, 2001; cf Douglas, 1986). For example, Cleaver (1995, 2000) uses an institutional bricolage lens to analyse the local institutional arrangement in place to manage water access and use in the Zimbabwean village of Eguqeni, Nkayi district. Her research situates this system of water rules and norms in relation to people's everyday practices, social relationships, identities, and systems of meaning; within the wider political economy of the district and country; in history; and in reciprocal relationship with the biophysical and material world. In doing so, Cleaver develops an understanding of water governance arrangements that attempts to reflect the diversity and embeddedness of real-life institutions. Such an approach is notably different in how it deals with messiness compared to the neo-institutional literature reviewed at the beginning of this section.

A focus of many critical institutional studies of water governance is the translation of mainstream policies into practice. Most common in this regard is the policy of user participation or community management. This policy often applies to irrigation and domestic water supply, where there is a prescription to form local water user associations or committees (Haapala et al., 2016; Haapala and White, 2018; Sakketa, 2018; Wong, 2016). By attending to the everyday politics of these policy processes, critical institutional research reveals how diverse water governance arrangements are generated from

standardised policy templates through messy institutional processes that foreground the workings of power and meaning. For example, Whaley et al.'s (2021) study of community management of rural groundwater supply in Ethiopia, Malawi, and Uganda revealed that water user committees as prescribed in policy almost never existed in practice. Instead, diverse local institutional arrangements either comprised skeleton crews of key individuals or fleshed out arrangements made up of a water point committee working in conjunction with other local actors and institutions. Critical institutional research thus explains the form and functioning of governance arrangements by embedding them in their institutional, cultural, biophysical, and technological landscape at the local level, while also locating them in broader multilevel governance arrangements and political economies (Abers and Keck, 2013; Chhotray, 2004, 2007; Jones, 2015; Sehring, 2009b; Whaley and Cleaver, 2017). The result, according to these authors, is a better understanding of how water institutions work in practice (Cleaver, 2012). This includes the potential for local elites to capture the benefits of decentralisation and participatory processes (Rusca and Schwartz, 2014; Wilder, 2010; Wong, 2010, 2013).

MESSINESS AS MULTIPLE MEANINGS AND PRACTICES

Academic research has focused on the meanings and practices that animate, legitimise and challenge water governance arrangements and the outcomes that result. In this section, three interrelated strands of literature are reviewed that explore messiness from this perspective. Despite the focus on 'integration', it is a perspective that mainstream governance approaches have not adequately accounted for. As a result, water governance processes and policy outcomes struggle to reflect the multiplicity of meanings, interpretations and practices that the inclusion of multiple actors infers (Brugnach and Ingram, 2011; Feldman and Ingram, 2009).

The first strand examines water governance through the lens of cultural diversity and concomitant differences in worldviews, knowledge, values and beliefs (Akamani, 2016; Arsenault et al., 2018; Gibbs, 2009; Levin-Keitel, 2014; Perreault, 2014; Reis, 2019; van Buuren, 2013; Von Der Porten and de Loë, 2013a). One source of diversity is the multitude of interpretations water users and governance actors have of the same concept or issue. This reveals how these concepts and issues, which are often taken for granted in global policy discourses, are themselves culturally and ideologically situated (Cornwall and Brock, 2005). In Saskatchewan, Canada, for example, the western scientific conception of 'water security', with its focus on the material value of water for human uses, is troubled by the interpretations of different Indigenous perspectives (Awume et al., 2020). These perspectives highlight, instead, how water security goes beyond the narrowly material and instrumental. They encompass water as a life form, water and the spirit world, women as water-keepers, water and human ethics, and water in Indigenous culture. Anthropologists have also explored how water itself has multiple meanings and is important for a range of cultural practices that form and inform customs and beliefs (Alley, 2002; Mosse, 2008; Orlove, 2002; Strang, 2004).

The messiness that emerges from differences in meaning and interpretation is highly relevant to the mainstream water governance approaches outlined in Section 2. Echoing these approaches, some of the water governance literature calls for greater participation and integration of cultural knowledge systems, values, and beliefs (Bark et. al.; 2012; Berkes et al., 2007; Ricart et al., 2019; van Buuren, 2013; Von Der Porten et al., 2016). Salient in this regard is the integration of 'Western scientific' approaches with 'local' and 'Indigenous' knowledge (Berkes, 2017; Ostovar, 2019). Williams et al. (2019) argue that integration of this sort requires an approach characterised by (1) respect, (2) recognition, (3) representation, and (4) responsibility and self-determination. These four points emerged out of a study that explored the cultural importance of water to the Aboriginal people of the Snowy Mountains in New South Wales and Victoria, Australia. It rests on the idea that "more inclusive and participatory management models will allow a range of views to be expressed, listened to, discussed and considered" (Williams et al., 2019: 270). Other water governance studies focus on differences in culture, knowledge and values in a much more critical

light. This research draws attention to some of the dangers of integration. Authors highlight the unjust and unequal power dynamics, rooted in history, between Indigenous or marginalised groups and dominant state, rational scientific, and settler colonial knowledge systems (Von der Porten and De Loë, 2013b; Wilson, 2020). Jackson (2006), for example, investigated a 12-month planning exercise in the Daly River region of the Northern Territory, Australia, which sought to integrate social, economic, environmental and cultural values into decisions about land use and water extraction. Her research shows how Indigenous and non-Indigenous perspectives were treated differently. The values expressed by Indigenous people were separated out and reified as 'Aboriginal cultural values' that "were perceived largely within the confines of a cultural heritage paradigm" (Jackson, 2006: 19).

A cultural lens has been employed to examine how beliefs, values, and knowledge systems function within social groups to shape water governance processes and outcomes. Doing so reveals how people's worldviews make sense of socio-natural events and processes while also maintaining unequal social orders (Cleaver et al., 2021). Rusca and Schwartz (2014) discuss this within the context of water governance in the city of Lilongwe, Malawi, raising concerns that local values and norms tend to ensure that elites benefit from water development initiatives. Of relevance are gender beliefs and values found across all countries and contexts, which can unfairly shape the form and functioning of water governance arrangements. Asaba (2015), for example, investigates the role of gender stereotypes and patriarchal beliefs in shaping the unequal representation of men and women in local water governance in Uganda (see also Adams et al., 2018; Silva Rodríguez de San Miguel, 2019). Other authors apply the concepts of culture and worldview to whole groups or peoples. This draws attention to historical processes whereby different cultures enter into relationships with one another in messy governance arrangements. The cultural dimension of water governance in settler colonial contexts is a common concern for researchers working from a social justice perspective. In northern Australia, for example, McLean (2017) explored the historical emergence and development of an assemblage comprising Indigenous, colonial, neoliberal, modernist agricultural, and conservation 'water cultures'. She shows how, in the early days of colonial expansion, contested frontier encounters forged new water cultures. This was followed by a twentieth century drive to establish powerful agro-industrial relations during which time different groups negotiated with or ignored Indigenous water cultures. As McLean (2017: 81) notes, these historical antecedents help to explain contemporary water governance dynamics and how "Eurocentric, modernist water cultures have been assembled and resisted over time and space".

A second strand of literature also examines water governance dynamics by exploring the relationship between different cultures and knowledge in a given place or territory. This work adopts a post-structural framing by focusing on competing discourses and narratives as part of a cultural politics of water (Boelens and Vos, 2012; Boelens, 2014; Guzmán et al., 2017). Foregrounding the workings of power and politics within water governance, discourse analysis research reveals highly contested situations reflected in the metaphor of the battlefield (Boelens and Doornbos, 2001; cf Long and Long, 1992). Dominant discourses, including mainstream water governance discourses (see Section 2), legitimise, structure, and facilitate the behaviour of powerful and less powerful governance actors in ways that fundamentally shape hydrosocial, political, and economic dynamics (Baviskar, 2007; Bolin et al., 2008; Chiang, et al., 2021; Feitelson and Fischhendler, 2009). A strong tension exists between the prerogative of governments and modernising capitalist forms of water development on the one hand, and community or local decision-making and water control processes on the other. In Ecuador, for example, research has revealed how different discourses function as part of multiscalar governance processes involving state actors, peasant and Indigenous communities (Hoogesteger et al., 2016). State discourses of 'defending the population', 'national progress' and 'ensuring public goods' naturalize policy approaches and legitimise state initiatives seeking to control water development in the country. This includes initiatives that, through the construction of several large multi-purpose dams, have destroyed local community-management arrangements. In response, peasant communities have drawn upon a discourse of 'territorial water

identity' to legitimise the mandate of their provincial-level water user federations and mobilise mass movements against state water bureaucracies (see also Franco et al., 2013; Roberts, 2008).

Several water governance studies influenced by post-structuralism explicitly engage with Foucault's (2008, 2009) concept of governmentality. Echoing and at times overlapping with research taking a politics of scale approach (see Section 3), this governmentality research highlights how multiple meanings and practices evolve through processes of production and negotiation, resulting in new water subjects, knowledge, and truths (Boelens et al., 2016). In this sense, water governmentality incorporates the subjectification and self-regulation of individuals in ways that render them amenable to state water projects (Hommes et al., 2020) through 'action at a distance' (Rose and Miller, 1992). Thus, in Kerala, India, decentralised water reforms were accompanied by a state programme that deployed the discourse of 'active citizenship' in conjunction with technologies of government such as Participatory Rural Appraisal (Babu, 2009). The effect was to enrol local people in the state's decentralisation agenda through a shift in understanding 'water supply as a citizen's right' to 'water supply as a citizen's duty'. Similar forms of subjectification can be seen in the co-production of committed committee members at the village-level as part of Ethiopia's participatory programme of community water management (Annala, 2021).

A third but related strand of literature is influenced by the ontological turn in the social sciences. This turn has critiqued the assumption of a singular underlying reality 'out there' (Henare et al., 2006; Kohn, 2015; Paleček and Risjord, 2013). Social and geographical contexts and histories are characterised by assemblages of practices, material processes, technologies, artefacts, cosmologies, and ways of being, doing, intervening and relating. For proponents of the ontological turn, these realities constitute different worlds rather than different worldviews (Barnes and Alatout, 2012). As Graeber (2015: 18) has summarised this position: "In the presence of genuine alterity, we must speak not of people who have radically different beliefs about, or perceptions of, a single shared world, but of people who literally inhabit different worlds. We must accept the existence of 'multiple ontologies'". Graeber (2015) notes that what 'ontology' and 'epistemology' have come to mean in this formulation is quite different to what these terms have traditionally meant in philosophy – often leading to confusion among academics. Thus, following the ontological turn, 'epistemology' has shifted from its classic philosophical meaning as "questions about the nature or possibility of knowledge". Instead, it has come to mean "questions of knowledge" or even to act simply as a substitute for 'knowledge'. Likewise, the meaning of 'ontology' has shifted away from its traditional usage as "a discourse about the nature of being", instead referring to "a way of being" (ibid). Moreover, Holbraad and Pederson (2017), two leading proponents of the ontological turn in anthropology, distinguish their turn from four other ontological turns. Such complexity and conceptual drift serves to highlight the variations and tensions that have accompanied the turn(s) to ontology in the social sciences.

It is within this messy and contested academic arena that in more recent times a number of authors have applied an ontological framing to water governance research. Perhaps the primary focus has been the ontological status of water, which is recognised as multiple and always in processes of becoming (Linton, 2010; Vogt, 2021; Vogt and Walsh, 2021). Here the concept of the hydrosocial cycle provides one entry point for examining how water ontologies, or different 'waters', emerge through relational-dialectical processes whereby water and society make and remake each other over time (Budds, 2008; Linton and Budds, 2013; Melo Zurita et al., 2015). Linton and Budds (2013: 175) illustrate this framing by observing that "different kinds of waters are realized in different hydrosocial assemblages; in one such assemblage, water is constituted as a public good, while in another, it is constituted as a commodity". Research into the ontological dimension of water governance often contrasts the Western rational scientific and materialist underpinnings of 'modern water' with the water ontologies of different peoples and societies (Chiblow, 2019; Wilson et al., 2019). One avenue of enquiry has been the status of Indigenous water ontologies within settler colonial contexts. Thus, for the Yukon First Nations of Canada respect for water is a central precept within an ontology of water "characterized by reciprocal relations

of responsibility between people and water as a 'more-than-human person'" (Wilson and Inkster, 2018: 2). On this level, Wilson and Inkster argue that a profound difference exists between the water ontologies of Yukon First Nations and a settler ontology of water viewed as a material resource to be exploited. Yet the settler colonial ontology of water is enshrined in state law and policy, constituting a juridico-legal, epistemological, and bureaucratic apparatus that has functioned to erase, ignore, and silence Indigenous water ontologies.

Situations such as the one just outlined bring to the fore the salience of political-ontological 'problem spaces' in water governance and a resulting ontological politics of water (Carolan, 2004; Zegwaard et al., 2015). Yates et al. (2017) argue that in this way dominant relations, administrations, and knowledge systems tend to reproduce themselves. Several authors have suggested that the existence of multiple ontologies within a given territory explains why attempts to govern water using approaches grounded in a single settler colonial ontology may often fail. Instead, these authors raise the potential of developing new regimes shaped by indigenous forms of water governance, which are capable of accommodating plural ontologies (Jackson and Head, 2020; Parsons and Fisher, 2020; Yates et al., 2017). In a different context, Götz and Middleton (2020) examine the ontological politics of water governance in the Salween River Basin, Myanmar. Employing a hydrosocial cycle framing, they show how multiple ontologies of water are performed by different governance actors in hydrosocial assemblages. Their study focuses on the ways that water governance actors attempt to naturalize their own ontology while downplaying the ontologies of other actors. The authors argue that much rides on the ontological politics of water in the Salween basin, including processes of state-building and peace-making.

MANAGING MESSINESS: APPROACHES IN WATER GOVERNANCE RESEARCH

This section proposes three broad interdisciplinary approaches that in different ways attempt to articulate and manage the messiness that confronts water governance research: resilience thinking, political sociology, and political ecology. These approaches bring together academic traditions and insights from the previous sections on scalar complexity, institutional diversity, and multiple meanings and practices (Table 1). In this sense, they serve as a means for revisiting while integrating the main body of the review. The approaches do not attempt to reflect the fields of resilience thinking, political sociology, and political ecology in their wider academic usage. Nor are they intended to encapsulate the entire body of water governance literature. Rather, as discussed below, the choice of terminology is primarily intended to reflect the disciplinary orientations and influences of the water governance research reviewed in Sections 3 – 5.

The introduction and Section 2 discussed the propensity of mainstream water governance approaches to produce silences and blind spots. What this section will highlight is that critical water governance research necessarily produces its own blind spots as it grapples with the messiness of the world. Indeed, as noted in the introduction, this is the inevitable result of all attempts to analyse and understand – relying as they do on abstraction and simplification of one type or another (Jessop, 1997; Sayer, 1992). However, it is the specific effects of this 'need to simplify' that is of interest in this review. With this in mind, the discussion in this section draws attention to the primary orientation of the three approaches of water governance research, their conception of relationships, and the popular framing devices or key terms they employ – as shown in Table 2.

Resilience thinking

Resilience thinking articulates messiness by combining commons governance theory with developments in ecology and work on complex-adaptive systems (Dietz et al., 2003; Folke, 2006; Gunderson and Holling, 2002; Moberg and Galaz, 2005). Reflected in Table 1, this approach adopts a relatively uncritical treatment of scale, institutions and meaning, leading to a form of instrumentalism that does not substantively deal with questions of power and politics (see below). Messiness emerges through the

Table 1. Three interdisciplinary approaches that deal with messiness in water governance research and their treatment of scale, institutions, meaning and practices.

Approach	Scale	Institutions	Meaning and practices
Resilience thinking	Fixed, pre-given, nested	Neo-institutionalism	Instrumental knowledge and values
Political sociology	Relational, hierarchical, interpenetrating	Critical institutionalism	Worldviews, beliefs and practices
Political ecology	Fluid, political, contingent	Legal pluralism	Discourse, imaginaries, and ontologies

Table 2. The primary orientation, treatment of relationships, and main framings/key terms employed by resilience thinking, political sociology, and political ecology in water governance research.

Approach	Primary orientation	Relationships	Framings/key terms
Resilience thinking	Sustainability	Collaboration	Adaptive governance, Social-ecological system
Political sociology	Social justice	Accommodation and contestation	Institutional bricolage, Problemshed
Political ecology	Environmental justice	Contestation	Hydrosocial territory, Waterscape

complex interactions and feedback loops of interdependent social and ecological systems. Resilience researchers thus employ the concept of the social-ecological system, which they argue shifts thinking from a humans-and-nature framing to a humans-in-nature framing (Folke et al., 2010). The challenges posed by climate change, species and habitat loss, and the need to live with change in an increasingly turbulent world are the predicaments that inform this work. In this regard, the literature has as its primary orientation the resilience of social-ecological systems as the basis for sustainability (see Table 2). Authors have focused their attention on the possibility of enhancing the overall resilience of social-ecological systems by fostering adaptive capacity in environmental and natural resource governance (Armitage, 2005; Berkes, 2010; Walker et al., 2004). This has led to the concept of adaptive governance, introduced in Section 3, which has been taken up widely in water research (Folke et al., 2005; Huitema et al., 2009; Jiménez et al., 2020; Nykvist et al., 2017; Pahl-Wostl, 2006; Pahl-Wostl et al., 2012). As Table 2 shows, both adaptive governance and social-ecological system are therefore key terms for this body of research.

Table 1 suggests that resilience thinking treats scales as fixed, pre-given and nested – in keeping with mainstream policy approaches (see Section 2). Several of its leading proponents argue in favour of the river basin as the natural or desirable unit for managing water ecosystems (Folke, 2003). At the same time, the complex interplay of pre-given scales and levels is central to understanding the messy dynamics that characterise social-ecological systems, including multilevel and nested water governance arrangements (Moberg and Galaz, 2005; Nykvist et al., 2017). The appreciation of interrelated social and ecological processes playing out across scales and levels, often in ways that are hard or impossible to predict, is what in part separates resilience thinking from mainstream governance approaches.

With respect to institutions, researchers examine the innovative arrangements that operate across spatiotemporal scales (Cash et al., 2006). Reflecting its neo-institutional roots in commons scholarship

(see Table 1), resilience thinking conceives of institutions as systems of rules, laws, policies, and norms that incentivize individuals to behave in certain ways. In adaptive arrangements, these institutions are 'flexible', layered, and mixed (Akamani, 2016; Huitema et al., 2016; Olsson et al., 2004). Indicated in Table 1, resilience thinking conceives of meaning predominantly as different forms of instrumental knowledge and the development of new knowledge through collaborative learning processes. Adaptive capacity is seen to depend partly on consensus-building through the integration of diverse forms of knowledge and values, as well as the establishment of a shared vision among different water governance actors (Berkes, 2009; Olsson et al., 2004; Schultz et al., 2015). It is argued that these attributes of institutions and knowledge generation encourage water governance actors to collaborate, reflect upon and learn from system feedback. In so doing, they are able to innovate in the face of social-ecological change and uncertainty (Armitage et al., 2008; DeCaro et al., 2017; Medema et al., 2014). Taken together, collaboration is therefore the primary treatment of relationships (see Table 2).

Resilience thinking recognises that social systems and natural systems are qualitatively different (Gunderson and Holling, 2002). In practice, however, the treatment of scale, institutions, and meaning has tended to evoke system properties akin to ecological dynamics (Stone-Jovicich, 2015; Wilson, 2017). To this extent, resilience thinking and its related concept of adaptive governance have been critiqued for being too optimistic and unrealistic in their outlook (Nadasdy, 2007; Cleaver and Whaley, 2018). Not least, authors working from more critical social science traditions have pointed out a failure to adequately address questions of politics and power (Brown, 2014; Cote and Nightingale, 2012; Matin et al., 2018; Smith and Stirling, 2010). This is a critique resilience thinking shares with mainstream water governance approaches. It is perhaps substantiated by claims that resilience thinking has served as a tool for political actors to promote a neoliberal ideology that aims to decrease state involvement, increase community self-reliance and restructure social services (Cretney, 2014; Joseph, 2013).

Political sociology

Political sociology, unlike resilience thinking, pays explicit attention to the role power plays in animating water governance arrangements. Messiness is articulated through 'thick' social science approaches that attempt to capture how water governance is embedded in wider society. In the first issue of this journal, Mollinga (2008) outlines the case for a political sociology of water resources management. Many of Mollinga's propositions serve as a useful starting point for discussing literature that takes a political sociology approach to analysing messiness – chief among them is that the terms 'political' and 'sociology' are understood in a broad sense. As Mollinga (2008: 8) notes, "politics is a dimension or quality of many social processes, i.e. all social processes in which interests of individuals or groups are mediated". As water governance arrangements are made up of social processes with diverse interests, individuals and groups, it too is inherently political. 'Sociology', in Mollinga's formulation, is understood "in the broadest sense of the study of social behaviour and interaction of social structure" (p. 11). This implies that water governance is socially embedded, for example, in context and history. Mollinga adds to this formulation that a political sociology approach is both critical and interdisciplinary. It also adopts a critical realist philosophy of social science (Bhaskar, 1979; Danermark et al., 2002) and draws upon social theory that treads a middle ground between structure and agency (Archer, 1995; Bourdieu, 1977; Giddens, 1984).

This political sociology formulation is useful for grouping several strands of literature discussed in the preceding sections, with key traits outlined in Table 1. Two concepts, listed in Table 2, are particularly salient in this respect. The first, institutional bricolage (Cleaver, 2012; Cleaver and de Koning, 2015), is a theoretical-conceptual framework concerned primarily with institutions also dealing with questions of scale, meaning and practices (see Section 4). The second, the problemshed (Daré et al., 2018; Mollinga et al., 2007; Mollinga, 2020), is a methodological-conceptual tool that shares a common philosophical and theoretical orientation with institutional bricolage, while differing in other respects. These framings serve as the two poles of water governance research that takes a political sociology approach.

As Table 1 shows, political sociology treats scales and levels as relational, hierarchical, and interpenetrating. The problemshed, for example, emerged partly as a critique of the river basin or watershed approach that now sits at the heart of IWRM. Rather than taking the boundary of the watershed as the 'natural' unit, a problemshed is defined in relation to the boundaries of a given water management issue (Bruns and Meinzen-Dick, 2001; Cohen and Davidson, 2011; Earle, 2003; Griffin, 1999). This is an open, empirical question, predicated upon the spatial, temporal, and social features of the issue whereby "water governance, management and use are embedded in processes and forces from outside the domain" (Mollinga et al., 2007: 706). Thus, the problemshed necessarily incorporates messiness through a focus on the 'issue network', comprising an often broad set of actors and social relations spanning hierarchical water governance levels (Muller, 2019). On the other hand, much water research employing an institutional bricolage lens focuses on messy local-level governance dynamics. Here scale and meaning combine because the logics that imbue local water governance arrangements, and the meanings that legitimise and make sense of them, 'leak' from other social domains (Cleaver, 2000; Frick-Trzebitzky, 2017; Sakketa, 2018). Often these domains exist at governance levels different to the one under investigation, signalling a degree of interpenetration and overlap (Whaley et al., 2021). Moreover, institutional bricolage recognises that the form and functioning of local water governance arrangements, and the agency of local governance actors, is constrained and enabled by governance processes and political-economic and environmental dynamics at different scales and higher levels (Jones, 2015; Sehring, 2009b). While the resilience literature makes a similar claim, it does not pay the same attention to the role of process, power and meaning in shaping these dynamics (Cleaver and Whaley, 2018).

Political sociology engages with institutions through the lens of critical institutionalism (see Table 1). Here institutions are conceived of as bundles of norms, rules, and practices that form messy and dynamic hybrids. These hybrids blend the old and new, formal and informal, through socio-technical processes of improvisation and adaptation (bricolage) in everyday settings (Hall et al., 2014; van der Kooij et al., 2015). History, social structure, and power relations are key to how institutions work and one reason why they partially elude design (Cleaver and Franks, 2005). This treatment of institutions allows a political sociology approach to address its concern with the social embeddedness of water governance arrangements. At the same time, as Table 1 shows, researchers working in this vein employ a cultural lens to explore how water governance is also embedded in wider systems of meaning and the different worldviews and beliefs held by individuals and groups (Hassenforder et al., 2015; Sakketa, 2018). As noted, political sociology understands water governance to be inherently political and characterised by contestation. Yet its concern with the social embeddedness of water governance arrangements also draws attention to the ways in which inequality and injustices are tolerated and accommodated by marginalised and less powerful groups (Cleaver, 2018; cf Bourdieu 1977). As a result, Table 2 lists political sociology's treatments of relationships in terms of both contestation and accommodation. It can be noted that although a political sociology approach recognises the importance of the water environment, its concern tends to be more with water as a resource (e.g. as an input for irrigation farming or domestic water use) rather than with water ecosystems and environmental processes per se.

Political ecology

Political ecology is also concerned with the role that power plays in shaping messy water governance arrangements. Thus, where political ecology differs from political sociology this may sometimes be by a matter of degree rather than type. Yet political ecology, as constituted in this review, has standalone features that position it as a distinct approach in its own right. Perhaps chief among these is the way that it theorises human-environment relations and the implications of this for understanding messiness. In particular, a political ecology approach unsettles traditional divisions between water and society, and more generally between 'nature' and relations of social, political, economic, and cultural power (Swyngedouw, 2004b). 'Hydrosocial' is a neologism intended to reflect this imbrication (Linton and Budds,

2013; Swyngedouw, 2009), with authors using it to develop concepts that include the 'hydrosocial cycle' and 'hydrosocial network' (both introduced in Section 5). Many leading proponents of this approach are critical geographers, influenced in part by assemblage thinking, actor-network theory, and Marxist geography. These traditions have informed the development of two related framing devices, listed in Table 2. These framings reflect the ways in which a political ecology approach combines its treatment of scale, institutions, meaning and practices to articulate messiness in water governance research. The first is the 'hydrosocial territory' (Boelens et al., 2016; Hommes and Boelens, 2017; Hommes et al., 2016; Ricart et al., 2019). This framing is used by researchers to theorise and examine how the purported naturalness of a territory is in fact "actively constructed and historically produced through the interfaces amongst society, technology and nature" (Boelens et al., 2016: 2). The second framing is the 'waterscape', which has been most fully formulated by Budds and Hinojosa (2012; cf Baviskar, 2007).

Both the hydrosocial territory and the waterscape centre on the formation and transformation of hydrosocial networks, through which a politics of scale is enacted (Norman et al., 2012). Such a formulation characterises messy water governance processes as productive and performative. Shown in Table 1, scales and levels are recognised as fluid – even if stable over certain timeframes – and contingent on hybrid socio-natural dynamics that are elaborated through relations of power (Brown and Purcell, 2005; Norman et al., 2015; Zimmerer, 2000; Zinzani and Bichsel, 2018). In this sense, spatial and temporal dynamics animate shifting geographies and processes of territorialisation and de-territorialisation (Boelens et al., 2016). This political ecology perspective has allowed water governance research to explore the making and unmaking of otherwise taken-for-granted scales and levels – be they the river basin or the nation state (Harris and Alatout, 2010; Sarna-Wojcicki et al., 2019; Swyngedouw, 2007; Vogel, 2012). As Section 3 discussed, inherent to these scalar processes is the furthering or marginalisation of different interests, often in relation to capitalist processes of accumulation, dispossession, and environmental harm or destruction.

Political ecology's focus on contested state-society and capitalist relations regarding water allocation and use often highlights the structural features of these processes. This tends to render institutions abstract. 'State', 'traditional', 'local', 'community', 'indigenous' and 'cultural' institutions are named but seldom articulated. However, as noted in Table 1, legal pluralism is the primary lens when political ecology research does take a more nuanced approach to institutions in water governance research. This lens helps to articulate a degree of messiness that is otherwise overlooked in this tradition. Several authors apply legal pluralism to an examination of water rules and rights and the way that legal and extra-legal systems of water rights contend with one another, leading to institutional reforms that territorialize waterscapes (Bavinck and Jyotishi, 2015; Boelens and Vos, 2014; Curran, 2019; Roth et al., 2015). Conversely, territorialising processes engender new or changed institutional configurations, for example by subsuming previously autonomous local customary water rules and norms within state law (Seemann, 2016).

Political ecology employs concepts that include discourse, imaginary, and ontology in its treatment of meanings and practices (see Table 1). Often drawing upon post-structuralism and a governmentality framing, it examines how power and meaning inhere through the discourses of different water governance actors. These discourses frame, contest, and structure hydrosocial relations (Forsyth, 1996; Hommes et al., 2020, 2016; Rodríguez-de-Francisco and Boelens, 2016; Mehta, 1998). Several authors also examine messy meaning-making processes through the imaginaries of a multitude of territorial actors with competing interests (Hommes et al., 2016; Schoderer et al., 2021). Hydrosocial territories are the outcome of the processes whereby contested imaginaries are translated into socio-material realities – a process mediated by power relations, institutional reform (as noted above), the materiality of water, and biophysical, ecological, and technological conditions (Hommes and Boelens, 2017; Mills-Novoa et al., 2020). Finally, political ecology's concern with hydrosocial relations draws attention to the multiple ontologies of water (Flaminio, 2021; Linton and Krueger, 2020; Wilson et al., 2019). Authors have focused specifically on how the practices of different individuals and groups enact these ontologies. This has led

to a more recent concern in the political ecology literature with an ontological politics of water (Augusto and Ioris, 2011; Bormpoudakis, 2019; Harrington, 2017) and its role in the formation of hydrosocial territories (Götz and Middleton, 2020).

CONCLUSION

Mainstream policy approaches increasingly recognise that water governance takes place in a messy world. Yet attempts to deal with this messiness produce simplifications and blind spots that mask the power relations and complexity characteristic of actual water governance processes.[7] This article has reviewed the critical water governance literature to understand what can be learned from its engagements with messiness – constituted here as 'scalar complexity', 'institutional diversity', and 'multiple meanings and practices'. The review highlights the many important insights that this scholarship has produced. Yet to date these insights appear to have had little influence on mainstream policymaking and practice.

At the heart of this dilemma is the rather obvious point that policymakers and other water governance actors are themselves part of the systems under consideration. Having an intrinsic stake in these systems necessarily circumscribes the extent to which governance actors are willing or able to critically scrutinise them. This same fact is likely to promote a conception of water governance that does not rest on critical understandings of power and politics, or with their relationship to questions of change. For example, a more substantive understanding of the workings of power is likely to undermine the win-win (and win-win-win) solutions promoted by mainstream water governance approaches. This would help to explain the depoliticised nature of mainstream policy discourses – not least, the extent to which they are overly optimistic about the potential to address messy governance realities through processes of integration, combination, and participation (see Section 2).

A failure to explicitly recognise their own political and ideological dimensions may also explain why mainstream approaches have seldom been concerned with the research reviewed in this article. To the extent that research employs understandings of power and politics that pose a fundamental challenge to water governance actors, often by implicating them within the critique itself, they are likely to be ignored. There is also the issue of employing theory and language that may represent unfamiliar territory for governance actors. Navigating this new terrain requires time and energy that they often do not have.

Section 6 proposed three broad approaches – resilience thinking, political sociology, political ecology – that reflect the disciplinary orientations and insights of the literature reviewed in this article. Of these approaches, policy has perhaps engaged most with resilience thinking. For example, in the case of the UK, there have been attempts by the government in recent years to employ methods and approaches that better account for the framings and insights produced by this field (Ramalingam et al., 2014). However, while resilience thinking is good at underscoring complexity, it does not have the same critical appreciation of power and politics associated with political sociology and political ecology traditions. Indeed, that resilience thinking holds some sway in policy circles may be precisely because it offers a route to engaging with messiness that is itself not founded on critical conceptions of power – even if it does provide important insights in other respects.

Charging mainstream approaches with failing to deal with messy questions of power, politics, and complexity has become a tired refrain. Is it possible to move beyond this impasse, allowing for more fruitful engagements with critical water governance scholarship? Such a development would bring to the

[7] The inverse could also be argued. That is, mainstream approaches avoid power and politics and this is why they produce silences and blind spots. However, this argument neglects that fact that all attempts to grapple with the messiness of the world necessarily produce silences and bind spots, including the attempts of critical water governance research (as section 6 highlights). Nonetheless, as noted in the conclusion, the *nature* of the silences and blind spots produced by mainstream water governance approaches appears to rest at least in part on their avoidance of politics and power – whether intentional or otherwise.

fore the nature of critical water research, perhaps highlighting a need for more critique, and less criticism, in order to better understand the conditions supporting the reproduction of mainstream approaches and related forms of knowledge generation. Such insights could pave the way for developing more effective strategies of change. Of relevance here is the nature of the relationship between critical academic research and social activism, and the related realm of activist research (or politically active researchers). Several substantive questions follow from these points, including: what are the potential mechanisms and entry points for critical water governance research to influence mainstream approaches? Who is best placed to undertake such work? How would they go about it?

This review has not set out to answer these questions. Rather, by taking stock of critical water governance literature, and providing one way of analysing it, the hope is that it might inspire others to do so. After all, for critical water governance research to be useful beyond its own academic circles, it must find ways of influencing mainstream approaches. The fact that decades of research has largely failed to do this suggests it is perhaps the defining challenge for water governance scholars going forward.

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