Copyright © 2025 by the author(s). Published here under license by the Resilience Alliance. Open Access. CC-BY 4.0
Bilalova, S., N. Valin, A. F. Burchard-Levine, A. K. Gerlak, D. Huitema, N. W. Jager, D. H. Geagea, J. K. L. Koehler, J. Newig, R. Singh, H. Porada, and J. Rodríguez Ros. 2025. Now you see me, now you don't: the role and relevance of paradigms in water governance. Ecology and Society 30(4):11. https://doi.org/10.5751/ES-16279-300411

Research, part of a Special Feature on The Next Wave in Water Governance

Now you see me, now you don't: the role and relevance of paradigms in water governance

Shahana Bilalova[1,2], Nina Valin[1,3], Alejandra Francisca Burchard-Levine[1], Andrea K. Gerlak[4,5], Dave Huitema[6], Nicolas W. Jager[6], Dona H. Geagea[6], Johanna K.L. Koehler[6], Jens Newig[2], Radhika Singh[7], Hannah Porada[8] and Javier Rodríguez Ros[6,9]

ABSTRACT. Current understandings of water governance rely on a multitude of paradigms, defined as normative ideas collectively held by actor groups. These ideas shape how water challenges are framed and addressed; however, the ways in which paradigms influence governance processes and evolve across contexts remain underexplored. Reflecting on the role of paradigms in water governance enables a better understanding of the driving forces behind the implementation of certain water governance arrangements, their international spread, and what interests, politico-economic stakes or power dynamics are at play. This agenda-setting paper is a first attempt to bring together diverse insights on the role and functions of paradigms from various conceptual lenses to inspire more reflexive scholarly engagement with paradigms. Our approach is based on a four-year, iterative, interdisciplinary collaboration involving workshops and virtual labs with scholars from diverse backgrounds. From this process, we identify ten key agenda items for future research. These items highlight critical gaps and recommendations for scholars in the water governance field—such as the underexplored role of paradigms in shaping power relations, the neglect of contextual variation, and the marginalization of alternative epistemologies- which may also hold relevance for practitioners at times. Together, they provide both a conceptual foundation and practical direction for scholars and practitioners seeking to better understand and navigate the paradigm-driven dynamics of water governance.

Key Words: *agenda-setting; normative ideas; paradigms; power dynamics; reflexivity; water governance*

INTRODUCTION

Given the persistent global water crisis, never in modern history has there been a more pressing demand for effective water governance (Woodhouse and Muller 2017, Ovink et al. 2023, United Nations 2023). To address this crisis, a wide range of governance approaches is rapidly spreading across the globe, yet no common understanding exists of how water governance "works" or how it interacts with today's complex systems.

Water governance refers to the governance of water resources, a highly multidisciplinary field that is closely interdependent with key sectors such as energy, agriculture, and the economy. Water resources encompass the sources of water available for human and ecosystem use, essential for drinking water, agriculture, industry, sanitation, and environmental sustainability (Gleick 1996). Whereas water management involves "activities of analyzing and monitoring, developing and implementing measures to keep the state of a water resource within desirable bounds" (Pahl-Wostl et al. 2012:25), the framework for such management is set by water governance. Governance is considered here as an act of steering the economy and society (Pierre and Peters 2020), involving decision-making among actors concerned with a collective problem, which leads to the creation, reinforcement, or change of institutions.

Water governance structures, approaches, and instruments do not emerge in isolation. Rather, they come from a collective and discursive identification of certain problems, which stimulates a need for action in the political agenda, potentially leading to specific governance choices. Such ideas on how to collectively govern water have merged into what we consider today as "major paradigms of water governance" (Challies and Newig 2022). These paradigms represent the ideational underpinnings of current approaches to water governance (NEWAVE n.d.). Paradigms in water governance not only reflect society's water governance needs, objectives, and means but may also play a role in shaping them, e.g., through the focus on policymaking and the allocation of resources. Although researchers have helped conceptualize paradigms (Pahl-Wostl et al. 2006, Moss 2010, Baird et al. 2021) and study the implications and prescriptions of water governance paradigms (e.g., Harsha 2012, Chomba et al. 2017, Tantoh and Simatele 2017, Warner et al. 2017, Lebel et al. 2020), there remains a need to delve deeper into the role of these paradigms, which often remains implicit, needing to be examined in terms of their function and power in shaping water governance outcomes.

Some of the paradigms that have been extensively addressed in the literature include integrated approaches to water management, such as integrated water resource management (IWRM) and integrated river basin management[1] (e.g., García 2008), adaptive management (e.g., Varady et al. 2016), hydraulic mission (e.g., Molle et al. 2009), and water security[2] (e.g., Bakker and Morinville 2013) (Table 1). More recently, newer water governance paradigms have become prominent, such as "rights for nature" (e.g., Harden-Davies et al. 2020) and "remunicipalisation"[3] (e.g., Geagea et al. 2023), highlighting that paradigms become trends as to what is considered "good water governance," and solutions to tackle past governance discrepancies (Bréthaut and Schweizer 2018).

[1]Institute for Environmental Studies, Vrije Universiteit Amsterdam, [2]Institute of Sustainability Governance, Leuphana University Lüneburg, [3]IFRO, Copenhagen University, [4]School of Geography, Development and Environment, University of Arizona, [5]Udall Center for Studies in Public Policy, [6]Public Administration and Policy Group, Wageningen University and Research, [7]Climate Security Specialist, Alliance of Bioversity International and CIAT, [8]CEDLA Centre for Latin American Research and Documentation, University of Amsterdam, [9]Joint Research Unit "Water Management, Actors, Territories (UMR G-EAU)", French National Research Institute for Sustainable Development (IRD)

Table 1. Examples of paradigms with their main characteristics and rationales, drawn from existing literature.

Paradigm	Problems addressed	Preferred solutions	Governance structure	Normative goals		
				Social	Economic	Ecological
Hydraulic mission	Supply enhancement and harnessing water for full control domination over nature "for the benefit of Man" (Molle et al. 2009:332)	Large-scale water resources development involving technology, mechanization, and large-scale centralized planning and production processes (Molle et al. 2009)	State-directed and top-down technocratic approach to decision-making (Molle et al. 2009); centralized coordination and management (Benedikter 2014)	Contribution to welfare through flood control, food and energy generation, and water supply to urban areas (Molle et al. 2009)	Economic development and growth (Molle et al. 2009)	none
Adaptive water governance	Coordinating resource management in the face of the complexity and high uncertainty associated with abrupt changes (Chaffin et al. 2014)	Mainly focusing on a management process rather than an end goal, aims at increasing the adaptive capacity of a social-ecological system by putting in place learning processes and respective conditions for these processes to occur (Pahl-Wostl et al. 2007)	Promotes institutional prescriptions such as polycentric governance, public participation, experimentation, and a bioregional approach (Huitema et al. 2009). Adaptation of management strategies and goals in response to new information and quality of processes (Pahl-Wostl et al. 2007)	Social learning	Economic resilience	Improved resilience of water resources
Rights of nature	Existing laws do not ensure the protection of the natural world as they regulate rather than prevent its destruction (Chapron et al. 2019)	Granting legal personhood for nature (Rawson and Mansfield 2018) and managing human activities to prevent the harm or destruction of nature (Harden-Davies et al. 2020)	Legal systems recognize nature as an entity with inherent rights, as opposed to viewing it as something possessed and governed by humans (Borràs 2016)	Rights of Indigenous communities; rights of future generations (Querejazu 2022)	none	Maintain the ecological balance and prevent disturbances to the ecosystem (Harden-Davies et al. 2020)

From an ontological perspective,[4] water governance paradigms have the power to assert certain worlds while making others invisible. Engaging with a plurality of ontological perspectives thus becomes essential for unpacking the power that certain paradigms hold in defining water governance priorities and legitimizing particular solutions (Blaser 2009, Flaminio 2021). Questioning how one "sees the world" plays a role in understanding how and why certain water governance paradigms are valued above others and thus hold more power in shaping reality. For example, water security has become an important paradigm through a "security" lens from the 2000s onward, influencing global programs by bilateral and international organizations to advance a human security and risk management approach to water governance.

This agenda-setting paper responds to the need for greater critical reflection on water governance paradigms by examining their roles, dynamics, and impacts on both past and contemporary governance. Although insights into the paradigms of water governance exist, they are often fragmented and examined through diverse and sometimes disconnected conceptual lenses. By bringing these insights together, this paper offers a first attempt to initiate a dialogue across these lenses and provide a more integrated understanding of the role of paradigms in water governance. In equipping scholars with a more holistic perspective on paradigms, it aims to foster reflexivity within the academic community and to encourage researchers to explicitly articulate the types and natures of paradigms they engage with. To follow our example from above, if a researcher adopts a risk-based approach, they tend to implicitly engage with the water security paradigm. To support such reflection and ultimately enhance reflexivity, this paper proposes a research agenda that addresses gaps in our understanding of water governance paradigms and their scholarly treatment.

To guide our exploration, we draw from the literature to examine three key questions. First, we inquire into how we can define water governance paradigms—what conceptual frameworks we can employ. Second, we investigate where, why, and how paradigms matter in the practices of governing water, as well as their significance in this context. Third, we explore how actors, spatial and temporal scales, and power dynamics shape the evolution, implementation, and diffusion of water governance paradigms. We argue that it is important to study the actors involved in promoting, shaping, reproducing, and implementing water governance paradigms, spatial reach and temporal dynamics of the paradigms, as well as the power issues involved. This can allow a better understanding of the driving forces behind the implementation of certain water governance arrangements, their international diffusion, and what interests, politico-economic stakes, or power dynamics are at play. In examining these questions, we identify key issues that should be prioritized in a future research agenda on water governance paradigms.

Working toward a better understanding of water governance paradigms emerged as one of the goals of the Next Water Governance network (NEWAVE) (NEWAVE n.d.). NEWAVE is composed of a diverse group of scholars and practitioners from various disciplines who critically reflect on current water governance trajectories around the world. In discussing these

trajectories, it became clear that paradigms of water governance are understood and articulated in diverse ways, depending on the discipline, epistemological approach, and geographical grounding of the people involved. Consequently, the perspectives represented within this paper are as varied as the author team itself, who come from different theoretical and epistemological standpoints. This paper intentionally does not follow a single theoretical or conceptual lens; rather, it reflects a multitude of lenses, drawing from political ecology, decolonial thought, and governance studies, among others. This multiplicity aligns with our commitment to offering a comprehensive and nuanced reflection of water governance paradigms, representing the diversity of viewpoints within the author team. The selection of literature and perspectives is also a product of the authors' positionalities, reflecting our collective experiences and expertise in the field that we brought together through various working meetings between 2021 and 2023.

METHODOLOGY: A REFLEXIVE PROCESS

This paper results from a four-year, iterative, interdisciplinary, and collaborative process, gathering junior and senior scholars from various disciplines in the field of water governance. The core group is composed of seven early-stage researchers and their supervisors, focusing on various water governance paradigms under different epistemologies as part of their research projects.

The methodological approach used was qualitative and grounded in principles of co-production of knowledge. This included: (1) fostering cognitive, normative, and relational reflexivity within the group and engaging in continuous reflection on our positionality as researchers (see Ligtermoet et al. 2025); (2) valuing diverse epistemologies to study and understand water governance, thereby promoting mutual learning and reciprocity (see Tengö et al. 2014); (3) drawing attention to the context in which knowledge is produced, and to the power dynamics and institutional biases that may arise when certain forms of knowledge become dominant (see Mauser et al. 2013); and (4) incorporating iterative cycles of discussion and revision through retreats, virtual meetings, and workshops (see Lang et al. 2012).

In practice, our collaborative process was structured around three in-person workshops, which were complemented by recurring online meetings ("virtual labs") led by different researchers from our group on a monthly basis between 2021 and 2022. The workshops functioned as 2-3 day retreats designed to offer space for open-ended discussions, to mutually learn about our different understandings of water paradigms, and to identify main themes for our analysis.

The first retreat (Germany, April 2021) enabled all researchers to situate themselves epistemologically regarding their approach to paradigms in water governance. The group represented a diversity of approaches, such as institutionalist and agency perspectives, political ecology, policy translation, and feminist and decolonial lenses on water governance paradigms. Building on these experiences, the workshop aimed to interrogate research gaps concerning paradigmatic thinking in water governance by bringing together our different branches of literature and reflecting on possible blind spots in the literature. From conversations and screenings of the literature emerged a shared willingness to explore how power dynamics shape what is researched and discussed in water governance. As some paradigms become dominant while others are marginalized, we asked: what do these paradigms reveal, and what remains hidden? This also led us to identify a need to draw attention to paradigms as a means to enhance reflexivity in water governance literature.

Following up on these questions, the second retreat (Spain, September 2022) started with a mapping exercise of known dominant paradigms in the literature. This was followed by a reflection on our individual Ph.D. research and what perspectives our projects bring on water governance paradigms. This allowed the production of conceptual themes of reflection around paradigms, such as:

- The definition and nomenclature of water governance paradigms,
- Their functional and transformational roles,
- The actors and power relations embedded within them,
- Their temporal dynamics and spatial/institutional scales.

This stage involved recursive cycles of construction, deconstruction, and integration, anchoring our conceptual work in both empirical observations and theoretical pluralism.

Finally, the third retreat (Germany, April 2023) served as a consolidation phase. Participants collaboratively synthesized findings section-by-section, reflecting on the narrative arc and analytical coherence of the work, and jointly refining the contribution and implications.

Throughout the process, the group maintained an open-ended and inclusive ethos, treating emerging ideas and frameworks as provisional and subject to ongoing critique. The virtual labs as well as the retreats allowed continuity of the process and regularly gave each author the chance to disagree or bring new elements to the table. The various group activities were hosted by different members of the group to distribute the workload and to experience different leadership. The methodology was thus not only a means of inquiry but also a space of epistemic reflexivity and scholarly community-building. This methodology model may not be easily replicable, as it requires time and stable funding, institutional support, and scheduling flexibility.

Limitations must be acknowledged here, as despite the diversity of our group in terms of epistemologies and backgrounds, the findings are derived from a specific group of researchers, shaped by their disciplinary, cultural, and institutional contexts. Our conceptualizations of paradigms may have missed broader global or practitioner perspectives, particularly from the Global South or non-academic stakeholders.

DEFINING WATER GOVERNANCE PARADIGMS

Before we examine the different aspects of governance paradigms, it is essential to understand the underlying concept of a paradigm itself. This section explores the evolution of the concept of a paradigm within the context of water governance, drawing on foundational theories and recent developments in the field, while highlighting its significance for the cognitive and normative dimensions of water governance practices.

The notion of "paradigm" can be traced back to Kuhn's (1962) work on scientific progress. Various analogous concepts have been used in academic literature to imply the same function of a

paradigm and are thus at times employed interchangeably. Such terms include "ideas on steroids" (Baumgartner 2014:476), "policy ideas" (Daigneault 2014:482), "nirvana concepts" (Molle 2008), "trends" (Bréthaut and Schweizer 2018), or even "imaginaries" (Jasanoff and Kim 2015). Hall (1993:279) extends the concept to a "policy paradigm" and argues that policymakers work within "a framework of ideas and standards that specifies not only the goal of policy and the kind of instruments that can be used to attain them but also the very nature of the problems they are meant to be addressing."

Concerning water, Pahl-Wostl et al. (2006:6) have put forward a similar definition of "water management paradigms," referring to "a set of basic assumptions about the nature of the system to be managed, the goals of management and the ways in which these management goals can be achieved." In their understanding, a paradigm is held in common by an "epistemic community" (Pahl-Wostl et al. 2006:6), or any other kind of group of actors involved in water management. It is said to become visible through "artifacts"[5] (Pahl-Wostl et al. 2006:6) ranging from infrastructure to planning approaches, but also policies and practices.

Drawing from this foundational work, we define a governance paradigm as a set of more or less coherent normative ideas intersubjectively held by groups of actors about the problématiques[6] that require intervention, corresponding governance objectives, and appropriate means to achieve them. As such, paradigms involve (1) collectively held ideas about reality and the problems (cognitive frames, mental models, imaginaries, etc.), (2) actors related to the problem and its resolution (both state and non-state actors within governance networks), and (3) objectives (the ends and means that aim to solve the identified water-related problématiques).

Although paradigms serve as more or less cohesive prisms for viewing both problems and solutions, they may also be used strategically in agenda-setting by actor groups (Challies and Newig 2022) to benefit their interests or to sideline other groups' interests (Molle 2008). Their circulation can shape local policies beyond functional necessity (Blatter and Ingram 2000). Thus, governance paradigms refer to "the whole range of institutions and relationships involved in the process of governing" (Pierre and Peters 2020:1). This includes formal institutions, such as laws, official policies, and organizational structures, as well as informal institutions, the power relations and practices that have developed, and the rules that are followed in practice (Huitema et al. 2009).

As such, water governance paradigms encompass a wide range of cognitive-normative frameworks that influence water policy. These frameworks shape and are fundamentally shaped by different conceptualizations of water, whether as a common good requiring collective stewardship, a human right, or an economic commodity subject to market forces (Bakker 2007, Sultana and Loftus 2015, Vinciguerra 2024).

FUNCTIONALITY: PARADIGMS AS A "SOURCE CODE"

To effectively navigate the complexities of water governance, it is important to understand the role that paradigms play within these systems. This section examines how paradigms act as foundational frameworks in water governance, playing a role in shaping the intent, identity, and operational dynamics of governance structures. However, paradigms are neither static nor singular; multiple paradigms unfold, compete, and layer on top of each other simultaneously, and they are interconnected with the contexts in which they operate. Both paradigms and context co-evolve over time.

Taking a systems thinking perspective, paradigms can be seen as the "source code" of a system, a backbone determining a system's intent and identity leading to the emergence of rules, norms, values, and goals on which the system is based (Meadow 1999, Abson et al. 2017). In that sense, paradigms play a role in both problem-framing and providing solutions (Challies and Newig 2022). Interpretive frameworks embedded in paradigms guide decisions about appropriate policy goals respective to perceived problems and which instruments to implement to attain these goals (Hall 1993). Because paradigms also provide clear and distinct ideas about how to govern, they influence governance structures and practices on how formal institutions are set up and maintained, and the mandates they work toward (Kern et al. 2014).

As Molle (2008) suggests, paradigms often manifest in the form of "nirvana concepts," which represent idealized, universally accepted solutions that obscure the complexities of real-world governance. Paradigms function together with "narratives" that frame how problems are understood, and "policy models" that offer actionable frameworks for addressing them. This trio of concepts (paradigms, narratives, and policy models) demonstrates how governance frameworks are shaped not only by ideals but also by the strategic simplifications that help align diverse actors around specific approaches to water management.

To exemplify how paradigms translate into political action in water governance, Table 1 presents a loose, non-exhaustive list of diverse and impactful example paradigms, along with details on the problems they highlight, their preferred solutions, the governance structures they envision, and their normative social, economic, and ecological goals. These three paradigms—hydraulic mission, adaptive governance, and rights of nature—were selected for comparison because they exemplify contrasting approaches to understanding and managing water. Each represents a distinct historical trajectory, ontological stance, and normative commitment. Whereas the hydraulic mission relies on positivist science and engineering, and adaptive water governance draws on ideas from social-ecological resilience, the rights of nature is rooted in eco-centric and Indigenous worldviews. Based on these different stances, the paradigms arrive at completely different prescriptions for the governance of the same water resources. For instance, the paradigm of the hydraulic mission aims at full control over water through large-scale water resource development planned and implemented by centralized, top-down, and technocratic decision-making mechanisms (Molle et al. 2009). In contrast, the adaptive water governance paradigm rejects the hydraulic mission's underlying belief in calculability and complete human control. Instead, it emphasizes decentralized, participatory management processes that involve learning by doing and experimentation (Chaffin et al. 2014). These ultimately also lead to substantive tensions and trade-offs between normative goals: for instance, between efficiency and equity, or between economic growth and ecological integrity.

When paradigms are adopted and translated, they have the potential to influence problem perceptions, transform governance structures, and determine which instruments are implemented. However, it is important to recognize that these functional aspects are not entirely context-free. The context in which a paradigm operates plays a significant role in shaping its development and application. Contextual factors such as cultural norms, socioeconomic conditions, and historical legacies influence how paradigms are formulated, interpreted, and adapted.

Despite their analytical separation, paradigms rarely appear in their pure form in practice. Instead, through operationalization and interpretation within specific contexts, they form conglomerates of past, present, and future ideas that become sedimented in particular governance structures, routines, or institutions. Even where attempts are undertaken to implement fundamental paradigm shifts in water governance, they are confronted with routines, practices, institutions, and material artifacts produced under different ideational contexts. These have their own legacies and lock-ins resulting in persistence, incomplete implementation, and overall, a patchwork of governance solutions (e.g., Abdullaev et al. 2015, Shapiro and Summers 2015, Lukat et al. 2022). This is exemplified by China's environmental governance reforms since the 1990s, where attempts to address decentralization issues through various measures like vertical management reforms, environmental transfer payments, and monitoring systems have resulted in a hybrid system combining both centralized and decentralized elements (Chen et al. 2022). Such dynamics are often regarded through lenses of messiness (Whaley 2022) or institutional bricolage, highlighting the ways in which governance actors patch together institutions in changing situations, based on previous experiences and institutions (Lukat et al. 2022). This might lead to situations where paradigms are adapted merely symbolically; for example, Biswas (2008) argues that the operationalization of IWRM has been symbolic in several contexts as actors and institutions continue doing what they were doing previously, but under the umbrella of a popular paradigm to obtain both funding and greater acceptability and visibility. Therefore, to understand them in their context it appears pertinent to look beyond the mere names of paradigms and to uncover the attached actor structures, scalar dynamics, and power relations.

WATCH ME, OR SEE ME NOT: THE ACTORS INVOLVED IN PARADIGMS

Paradigms do not emerge from nowhere; rather, they are embedded in the situated knowledge[7] (Haraway 1988) of human actors who create and circulate them. In this section, we explore the role of actors involved in the creation and diffusion of water governance paradigms and the power dynamics involved. We describe how water governance paradigms often emerge in academia before being adopted and disseminated by epistemic communities comprising actors from governments, civil society, the private sector, and various research disciplines. Within these communities, certain "policy entrepreneurs" promote a given paradigm in specific venues to actors that are receptive to implementing it. Although the role of governments in the promotion of paradigms is relatively well understood, more attention needs to be paid to the influence of the private sector, international development sector, and donors in the uptake and circulation of paradigms in water governance, particularly in the Global South.

A set of actors that play a role in the foundation and implementation of paradigms—often unwittingly—is academics (e.g., Morin 2014). Some governance paradigms find their roots in academic thought. For example, market-oriented thinking hails from economics (e.g., Kalyvas and Katznelson 2001), much of the thought that emphasizes participation can be traced back to social sciences (Newig and Kvarda 2012) and Elinor Ostrom's thinking on collective action[8] (Ostrom 1990), and paradigms that emphasize holistic or integrated thinking can be traced back to ecology and resilience-based nature-based solutions (see Folke 2006). The process through which these ideas find their way from the scientific community, often through empirical case studies, to policy and governance is long and winding (Voß and Simons 2018) and involves multiple iterations.

When paradigms first emerge in academia, they are often connected to locally situated sites where novel practices of governance help to test, assess, and "improve" or reject the paradigms. Often, it is academic researchers who conduct the initial empirical research on water governance issues, elaborate on the social implications of the particular paradigm they are developing, and formulate associated policy recommendations. Once the water governance paradigm is regarded as a useful contribution to prevalent governance processes, certain epistemic communities—often collaborations of scientists, practitioners, non-governmental organizations (NGOs), and political or economic actors—form around the paradigm to facilitate its movement to other contexts (Pahl-Wostl et al. 2006). To promote the paradigm, they might highlight only the positive or successful experiences in adopting the paradigm and downplay negative experiences. These epistemic communities are also sometimes referred to as discourse coalitions (Hajer 1997), advocacy coalitions, or constituencies (Voß and Simons 2014).

Within these epistemic communities, "policy entrepreneurs"[9] (Huitema and Meijerink 2009) or ambassadors (De Oliveira 2021) develop or attach themselves to new ideas; experiment with them to corroborate their value; sell them by linking them to existing problem frames, networks, and coalitions; and identify venues for their propagation. Such channels include transnational networks that form around a common paradigm—a common idea of water governance. These networks may gather in different arenas, such as conferences—where actors are involved in setting or breaking water governance agendas—or through influential water reports that are used to reinforce or adjust the "branding" of a paradigm (e.g., Ovink et al. 2023, United Nations 2023). To give an example, the European Commission and its experts have been referred to as "policy entrepreneurs" for the way they translated the IWRM paradigm into a legislative proposal: the European Water Framework Directive (Valin and Huitema 2023). Different levels or branches of government (local, regional, national, supranational) or sectors of society may be more receptive than others to new ideas, leading policy entrepreneurs to engage in "venue shopping" to promote the paradigm.

Within this process of promotion and implementation, the role of government actors has been well documented (e.g., Suhardiman et al. 2015, Allouche 2017, Lee et al. 2022). Yet, other actors also play a role in the shaping and implementation of paradigms, although they have received less attention in research,

including civil society (e.g., Elfithri et al. 2019, Shields et al. 2021), international non-governmental organizations (e.g., Chikozho and Kujinga 2017), scientific communities (e.g., Pahl-Wostl 2020), citizens and residents (e.g., Chomba et al. 2017), multinational corporations (e.g., Pahl-Wostl 2019), and global private environmental consultancy firms (e.g., Bouteligier 2011).

The process of paradigm emergence and circulation is often politically charged and influenced by power relations. In the literature on water governance, private actors are increasingly being seen as focal actors in the promotion and implementation of water governance paradigms (e.g., Mills-Novoa and Hermoza 2017, Elder and Gerlak 2024). It has been argued that this is a result of entrenched neoliberalism promoting techno-managerialism and public-private partnership models as well as the rise of austerity regimes that facilitate the role of private sector involvement in water management (Geagea et al. 2023, Kaika et al. 2024). Private sector involvement does not involve only water companies, but also private consultancy firms with roles in environmental policy diffusion, transfer, translation, and circulation (see Burchard-Levine et al. 2024). For instance, Leitner et al. (2018:6) reveal how global consultancies like AECOM and Arup promote best-practice tools for assessing resilience, thereby "spreading an urban resilience gospel" that ultimately introduces a technical and managerial approach to urban resilience that privileges the private sector. Bakker (2010) argues that the promotion of private-sector paradigms is most concentrated (and contested) in large cities in the Global South countries, where the widespread lack of access to networked water supplies is seen as a global crisis.

International funding and donor organizations also play a crucial role in the circulation of paradigms. Huitema and Meijerink (2010) call attention to the role of these actors, particularly in the context of the Global South, where they exert more influence on paradigm adoption than in industrialized countries of the Global North. It has been documented that donor organizations such as the World Bank, the International Monetary Fund, the Inter-American Development Bank, and the Asian Development Bank played a crucial role in shaping water policy transitions in countries including Indonesia, Mexico, Tanzania, Thailand, and Turkey (Huitema et al. 2011). As a condition for obtaining financial support, these organizations call for fundamental changes in governance regimes and often the adoption of certain paradigms such as privatization (transfer of ownership and control of a service to the private sector) or decentralization (transfer of an activity to several authorities). The authors emphasize the role of "shadow networks" that consist of actors operating on the peripheries or outside conventional power structures. They play a crucial role in paradigm development and demonstration of paradigm viability, although they depend on collaboration with formal policy networks to translate paradigms into tangible changes in governance. In several instances, powerful place-based and transnational actor-networks, such as those involved in mining sectors, mobilize "universal" paradigms that depoliticize and naturalize certain approaches to govern water, which then stabilize the hydro-social order to serve their interests (Ahlers and Zwarteveen 2009). However, these can be promoted unintentionally, especially where technical solutions play a major role in paradigm setting and actors do not necessarily realize the political implications of adopting certain paradigms.

In conclusion, several actors are involved in different points of paradigm emergence, growth, circulation, and application. Although academia is more active in the initial development of a water governance paradigm, actors in governments, the private sector, and civil society may adopt the paradigm if it aligns with overarching interests. Certain individuals may play an outsize role in promoting the paradigm in prominent venues and arenas and help facilitate funding and resources to actors that may want to apply the paradigm in policy and governance. Across the world, but particularly in the Global South, the private sector, international development organizations, and donors may leverage their influence to ensure the uptake and application of the paradigm in a given context. Identifying relevant actors, their interests, and the tools they use across the "lifecycle" of a water governance paradigm can enable a closer analysis of why and how certain paradigms have attained the influence that they have.

TEMPORAL AND SPATIAL DIMENSIONS OF WATER GOVERNANCE PARADIGMS

Governance paradigms in the water domain travel across space and time: think of the way new approaches to governance can become popular on the basis of certain iconic examples and then start being copied elsewhere. These spatial and temporal dynamics are worth examining, as it is increasingly clear that the processes of emergence, proving, international adoption, and implementation of such paradigms are anything but straightforward. As we will further put to light, these processes are fraught with power differences, diverging abilities to produce or "proof" paradigms, and changes (great and small) in the way paradigms are interpreted, and can be affected by either careful attention to a local context or gross neglect of the same.

Although the issue of scales,[10] at least spatial ones, is well acknowledged in water governance (e.g., Cook et al. 2013, Newig et al. 2016, Norman et al. 2016, Albrecht and Gerlak 2022), it is rarely discussed in the context of water governance paradigms (e.g., Cohen and Davidson 2011). Understanding these dynamics is crucial for uncovering how paradigms influence policy decisions and governance practices across different contexts and timeframes. Against this backdrop, our writing has a more speculative character, and this section will examine: (1) scales within paradigms—whether and how water governance paradigms explicitly address or problematize spatial or temporal dimensions; (2) paradigms within scales—whether and how water governance paradigms reflect the convictions and problems of particular times and places and are thus "typical" for certain eras; and, relatedly, (3) paradigms across scales—whether and how paradigms develop over time and spread across space.

1. Scales within paradigms: Do paradigms explicitly address space and time?

When it comes to the notion of space,[11] water governance faces a particular issue in which hydrological systems rarely fit the political-administrative scales of states and regions. Paradigms treat this issue in varied ways. Integration-oriented paradigms (e.g., IWRM, river basin approach, transboundary water management, and to some extent also the debate on adaptive water governance) are most outspoken and make explicit prescriptions about scales: the scale at which problems emerge is also the scale at which they must be addressed, and institutions must be adapted to this logic. As Schlager

and Blomquist (2008:1) succinctly summarized: "For the last 25 years, prescriptions of the water policy literature have centered upon two themes. The first is that 'the watershed' is the appropriate scale for organizing water resource management. The second is that since watersheds are regions to which political jurisdictions almost never correspond, and watershed-scale decision-making structures do not usually exist, they should be created."

However, these ideas are not without critique. Molle (2009) shows quite clearly that the idea to align problem and solution scales is impossible to realize in practice, if only because water is a multidimensional resource and the scale at which one problem (e.g., related to fisheries) often does not match with the scale at which another issue (e.g., water quality) emerges. He also demonstrates how river basin management is mainly a discursive ploy and that those advancing it tend to favor particular outcomes that they hope will be better served in new institutional settings. Schlager and Blomquist (2008) suggest the same but also argue that institutional engineering in the direction of river basin organizations breaks existing bonds between voters, citizens, and government, replacing visible and known government entities for unknown new entities. Although these issues are well known (Huitema and Meijerink 2014), the lure of integration remains strong.

There are also subtler ways in which space plays a role in water governance paradigms. It is, for instance, clear that approaches such as collaborative, participatory, and community governance rely on a clear preference for local problem-solving. At this scale, actors involved can interact regularly and develop mutual understandings of each other's interests, levels of trust and solidarity can emerge, and there is a track record of preserving water resources in a sustainable way (Ostrom 1986).

Surprisingly enough, the issue of time[12] is not integrated into many water governance paradigms, leaving hydrological time frames rather unaddressed (e.g., seasonal precipitation patterns, time—up to decades—that aquifers need to restore). Water governance paradigms revolving around adaptation (e.g., adaptive governance, resilience thinking) are premised on explicit notions of development over time—for instance, in the form of the resilience cycle, which suggests that social-ecological systems go through loops in which management approaches, often based on simplified understandings of the system, yield results for a while, are applied more intensively, but eventually break down and need to be reorganized or transformed (Holling 1985). However, much of the thinking in these paradigms is about experimentation and learning to probe deeper into the dynamics of the social-ecological systems, thus allowing the parties involved to get ahead of potential collapse, or to experiment their way toward better approaches.

2. Are water governance paradigms "typical" for certain periods or places?

It is not hard to see that water paradigms do reflect the time and places in which they have emerged, and certain attitudes and cultures of dealing with the environment (Franco-Torres 2021). The hydraulic paradigm, with its emphasis on taming water, appropriating it for human use, and centralized decision-making, aligns with the industrial age of the late 19th century—a period of nation-state building in which large-scale water infrastructure was a source of national pride (Linton 2014). Other, more localized and environmental interests were easily cast aside in the spirit of societal progress, driven by efforts to alleviate poverty, introduce electricity, and provide more predictable water availability for agriculture (Molle et al. 2009).

This paradigm dominated discussions about water globally for a long time but became increasingly contested from the 1950s onward, as the first signs and later the full emergence of environmental concerns became visible, and democratization gained importance. Initially, this mainly led to resistance and counter-reactions, but later this resulted in a more positive fight against pollution, the recognition of natural values, and a striving for sustainability—often carried in the form of formal state institutions such as environmental legislation (requiring permits), environmental impact assessments, and public participation rights. So, the state was still at bay but was now supposed to have a more balanced (or greener) approach.

When the critique of the state began to swell in the 1970s and 1980s, the state retreated, and an emphasis on markets and private parties to provide water infrastructure (privatization) on the one hand, and on markets to provide environmental protection (market-based instruments, polluter-pays principles) on the other, emerged (Bakker 2003). Various international organizations, such as the Organisation for Economic Co-operation and Development (OECD) and World Bank, actively sought to insert such approaches and principles in water governance debates and were successful to a high degree in shaping water governance practices in various countries (commodification, privatization).

Finally, the realization that social-ecological systems are inherently complex, and that many approaches to water governance or water resources (such as maximum sustainable yield for fisheries) were essentially based on dangerous simplifications, was brought home by the notion of global change, which transpired from the late 1980s onward. In this context, paradigms such as adaptive governance, resilience thinking, and nature-based solutions could be seen.

Water governance paradigms did not and do not develop in isolation from the era and place in which they emerged. As we have discussed here, one can already glean that societal goals and priorities have changed over time, that thinking about modes of governance (state, market, community) have also changed, and that greater insight into the complexities of water governance developed in accordance with broader societal developments. But paradigms are also marked by the place in which they have emerged. It has been argued in this context (Gupta 2009) that in the global exchange of ideas on water governance, new paradigms are essentially developed, corroborated, and certified in the Global North, uploaded to global institutions such as the World Bank, and subsequently "downloaded" (in highly unequal power settings) to the Global South, where they often sit awkwardly within existing institutional arrangements.

3. Up and down with paradigms: How do they develop over time and diffuse in space?

We do not have many credible conceptual models that can explain how policy paradigms develop over time. The best known publication on policy paradigm change is the one by Hall (1993), who described how British economic and monetary policy went through a fundamental change in the 1970s. Hall suggested that

policy change usually reflects ideational change, and that such ideas are present in any policy subsystem at three levels: the level of overarching goals (paradigms), the level of instruments used, and the level of instrument settings. He emphasizes that policy-related learning is important in driving policy change, and that change at the level of instruments is relatively frequent, but that paradigmatic policy change is rare.

Additionally, it is important to note that multiple paradigms are at times vying for influence over policy. Hall (1993:280) suggests that paradigms compete "because each paradigm contains its own account of how the world facing policymakers operates and each account is different, it is often impossible for the advocates of different paradigms to agree on a common body of data against which a technical judgment in favor of one paradigm over another might be made." He also indicates that it is difficult to objectively evaluate policy paradigms on scientific grounds alone because the movement from one paradigm to another will ultimately entail a set of judgments that is more political in tone, and the outcome will depend not only on the arguments of competing factions but on their positional advantages within a broader institutional framework (Hall 1993). This is also influenced by who is ultimately seen as a reliable expert, especially on matters of technical complexity. Finally, Hall (1993) suggests that the failure of an existing paradigm helps transition to another one, involving experimentation with new policy that shifts the center of authority and reignites competition between paradigms.

Several critiques have been leveled at this model, and in particular, the idea that paradigms are incommensurable with each other has drawn the ire of critics (Zittoun 2015). Indeed, if one looks at a paradigm such as IWRM, one sees a hodgepodge of ideas—including the notion that water governance should be at the river basin level, that it should be participatory, and that the polluter should pay. Sharpe et al. (2016), though not offering an analytical model, do suggest that paradigms can obtain a second life by taking over certain ideas from other paradigms, and it would seem that this has happened with IWRM (which was initially mainly a paradigm to do with integration), resulting in a more broadly aimed paradigm.

One might add that Hall's model is rather "policy-centric," meaning that in essence, he assumes that explanations for policy change are to be found in the world of policy and politics, although social-cultural and socioeconomic developments also figure to some degree—for instance, in the form of societal interests that start organizing around particular issues. This means that developments in socio-technical systems are not very explicitly considered, whereas it is quite clear that in the water management field, technical systems or infrastructural choices tend to heavily influence subsequent public decision-making (through sunk costs, for instance, or through scale advantages and impacts on training and expertise) and societal perceptions and demand. Reflecting on these various comments, Groen et al. (2023) show that for German coastal management, it is very hard to switch from flood risk management through hard infrastructure (e.g., dams, dikes) to alternative approaches, such as those that would use natural dynamics (e.g., nature-based solutions) to potentially create similar safety levels. This realization would fit very well with insights from institutional change theory, which suggests that "new institutions" tend to layer on top of already existing arrangements, causing complex interacting patterns, rather than fully displace "old" approaches (Streeck and Thelen 2005, Patterson 2021, Groen et al. 2023).

THE POWER OF PARADIGMS AND PARADIGMS OF POWER

In the previous sections, we have discussed different dimensions of water governance paradigms and have unpacked some of their complexity. We have, however, not yet drawn on critical scholarship (e.g., political ecology, feminist approaches) that studies how water governance is inherently political and how water governance research is often "more concerned with promoting particular politically inspired agendas of what water governance should be than with understanding what it actually is" (Zwarteveen et al. 2017:1). In this section, we engage with issues of power to unpack how particular interests are promoted through water governance paradigms (Wesselink et al. 2017). We will first examine the power of paradigms, where we will explore the relationships between the crafting, diffusion, and implementation of these paradigms and how they shape the politics of human-water relations. By analyzing the mechanisms that underpin these paradigms, we aim to illuminate how they create norms and establish authority over water governance practices.

Following this, we will turn our attention to governance itself as a paradigm of power. Here, we will critically interrogate how governance frameworks often obscure the underlying power dynamics, normalizing certain ideologies while marginalizing others. This dual exploration not only enhances our understanding of how paradigms function but also emphasizes the need for a critical perspective that recognizes the interplay of power, politics, and governance in shaping water management outcomes.

1. Power of paradigms

The power of paradigms highlights the relation that exists between the features of crafting, diffusing, and implementing water governance paradigms and how they condition and shape the politics of human-water relations. We find potential in not only combining different interpretive and critical approaches to disentangle the universalizing, normative, and naturalizing dimensions of water governance paradigms (Ingram 2011), but also in identifying and understanding tensions in their implementation and the multiple contestations that arise therein.

Looking into the power of paradigms allows us to provide nuance to the academic debate around the "successes" and "failures" of water governance paradigms. Understandings of power, as produced by historically established social structures, have contributed to identifying the drive to scale up and universalize water governance "best practices" and general solutions for context-specific problems (Druijff and Kaika 2021, Lukat et al. 2022). Approaches of power as "power to" (instrumental power, agency-based power, etc.) have been typically linked to highlight "success stories" promoted by specific institutions, operationalizing and normalizing water governance paradigms in accordance with their interest. These approaches give insight into the notion of "success" as often defined by the beliefs of those who benefit the most from a paradigm's implementation. Exploring the agencies of different actors and their capacity to mobilize resources can

also provide critical insights into the implementation of water governance paradigms, such as IWRM (Harrison and Mdee 2017) or water privatization (Bieler 2018). For instance, Harrison and Mdee (2017) show how, in Tanzania, narratives of formalization and market-oriented governance are mobilized by urban elites to shift blame for downstream water shortages and pollution onto small-scale farmers upstream who rely on informal irrigation practices. This framing diverts attention from the impacts of other actors—such as urban residents and large-scale users—whose water consumption remains largely unquestioned. As a result, the positive contributions of informal irrigation to rural livelihoods are devalued, and "success" in water governance becomes defined primarily by the interests and perspectives of powerful downstream actors.

Moreover, the trajectory of a paradigm (e.g., its formulation, adoption, implementation, etc.), as discussed earlier in the Actors section, is often embedded in complex and politically charged relationships between different actor groups. Some groups are particularly "successful" in diffusing hegemonic views through knowledge production, as often argued in post-structuralist research (Gramsci 1971, Foucault 1980, Ekers and Loftus 2008). In addition, approaches of power as "power over" or structural power (Göhler 2009) aim to unveil how domination can be embedded in social structures or institutions via, for instance, norms and roles that can limit individuals' actions and choices.

In other terms, specific discourses that aim to "conduct the conduct" of water uses, are conformed to socially shared perspectives and often naturalized through water governance paradigms (Vos and Boelens 2014). Besides consent production, we observe recurrent tensions in the implementation of water governance paradigms and, particularly, in how the materialization of those imaginaries unfold through multiple forms of violence and coercion in particular contexts (Birkenholtz 2009, Marcatelli and Büscher 2019). Whether these are "slow" (Nixon 2011) or explicit, violence and coercion can be rethought through the lens of radical geographies and decolonial and feminist epistemologies (Álvarez and Coolsaet 2018, Christian and Dowler 2019, Toro 2021), largely excluded from current academic understandings of power. These approaches additionally shed light on the emergence of resistance to certain water governance paradigms, through counter-powers or counter-paradigms, and the capacity of the latter to build alternatives to dominant paradigms (Moffat et al. 1991, Miller 2013, Boelens 2022:19).

2. Paradigm of power

Our critical inquiry leads us to also question the notion of governance itself as a paradigm of power. Drawing from prior scholarship that has scrutinized the powerful ideas inscribed into governance (e.g., Swyngedouw 2005, Priscoli and Wolf 2009, McGregor 2012, Zwarteveen et al. 2017, Nagendra et al. 2018, Sultana 2018, Micciarelli 2022, Querejazu 2022, Whaley 2022), we can problematize how governance is often understood as the "natural" or "normal" mode to address complex political issues (i.e., water problems). The normalization of governance implies the often unquestioned assumption that it (in contrast to government) allows for more democratic governing practices by involving multiple actors and levels in complex decision-making processes and drawing on pluralistic and inclusive principles of cooperation and polycentricity (Mayntz 2003, Shore 2011, Pahl-Wostl and Knieper 2023). At once, the ideological assumptions, norms, values (notably, neoliberal), knowledge (notably, technical knowledge systems), and truths (e.g., humans must "govern" water; belief in engineering solutions) that derive from the governance paradigm are made invisible (Shore 2011).

In Table 2, we propose an entry point to complicate and re-politicize water governance and water governance paradigms, providing relevant theoretical perspectives for examining power dynamics that have been introduced throughout this section. For each theoretical perspective, we exemplify ways to analyze forms of power in water governance. This approach is useful from an analytical perspective in hydrosocial studies, as it avoids a reductionist view of paradigms as power-neutral, instead highlighting them as tools and mechanisms for reproducing power dynamics in diverse forms.

AGENDA FORWARD

Here, we identify 10 agenda items that should be prioritized in a future research agenda on water governance paradigms. These agenda items have been carefully curated on the basis of our conceptual and empirical inquiries in this paper to shed light on various dimensions and challenges within water governance. Our agenda items draw explicitly from our findings on how water governance paradigms fulfill specific functions, evolve over time and space, and experience or exert power pressures from diverse groups of actors. The items are intended to address the gaps we identified and provide a more comprehensive understanding of water governance paradigms for researchers and practitioners. Ultimately, they aim to inspire research and promote critical reflection within both research and praxis in the field of water governance. By outlining this agenda forward, we hope to contribute to the development of more reflexive water governance practices and ultimately, more transdisciplinary approaches where communities and actors are engaged more fully in water governance paradigms research.

1. Paradigms act as a "source code" for decision-making processes and governance practices. A deeper understanding of water governance therefore necessitates researchers to identify and examine what paradigms are underpinning and influencing the core norms, values, and goals of the broader system. This entails a closer look at both the functionality of paradigms (as we discuss in the Functionality section) and also how power is realized in the implementation of different paradigms (as seen in the previous section).

2. A comprehensive understanding of water governance paradigms necessitates an integrated examination of socioeconomic, political, geographical, temporal, and cultural contexts. The importance of context in the adoption and implementation of paradigms is a theme that runs across this entire paper. Researchers and practitioners alike must recognize the significance of these contextual factors and study them systematically, as they influence the development of paradigms, the implementation of governance practices, and the alignment with ecological time frames, thereby shaping governance approaches over time.

3. The necessity and effectiveness of paradigms in enhancing water governance have been largely understudied, perhaps

Table 2. Potential of integrating diverse epistemological perspectives in the examination of power dynamics in water governance paradigms.

Theoretical perspectives	Relevance to understandings of water governance paradigms
Structural power/power over	Despite the limitations of thinking in terms of "power over" for its strict categorization and determinism (Göhler 2009), this structural power lens can be useful to understand social relations, where dominant actors influence others' interests through, for instance, the use of expert knowledge.
Power-to/instrumental power, or agency-based power	This analytical perspective can be useful to understand which and how "success stories" are promoted by particular institutions as "best practices" that aim to normalize certain approaches in water governance. Nevertheless, we believe that analysis focused only on agency perspectives of power as a "capacity" risk falling into assumptions of full rationality if we aim to analyze the pitfalls of particular implementations. We question the "normative rationality" (Flyvbjerg 1998) that underpins water governance paradigms to offer particular solutions with general applicability, based on specific contexts and resources of set actors.
Post-structuralist approaches to power	Unraveling the discursive dimension of power can help to delve into the assumptions and claims that often become naturalized in water governance and underpin particular political orders. Despite its potential to understand the "conduct of conduct," these approaches could benefit from a complementary analysis that takes into account violence and coercion (Dell'Angelo et al. 2021, Pain and Cahill 2021, Dunlap 2023).
Decolonial and feminist epistemologies	Theoretical analysis of water governance paradigms should not lose sight of the exploitations of the environment and the oppression they sometimes generate. In other words, coercion and violence are not only relevant in the physical and emotional dimensions but also in the production of consent and in the implications of marginalizing vulnerable groups in water governance (see Sultana 2011, Harris 2015, Kaika 2017, Zaragocin and Caretta 2021, Kaika et al. 2024). Scholars adopting decolonial epistemologies also warn against approaches that try to recolonize Indigenous knowledge into existing paradigmatic approaches to water governance (Wilson and Inkster 2018, Viaene 2021, Brennan 2022).
Counter-powers	While acknowledging the trap of falling into counter-paradigms as panaceas, it is key to identify that water governance paradigms often unfold hindering local approaches (Immovilli et al. 2022). Recent work on the existence and production of water ontologies can contribute to new understandings of alternative and non-paradigmatic approaches to water governance paradigms (Flaminio 2021). There is a need for the recognition of a "pluriverse" of (political) ontologies (Escobar 2001) when analyzing movements of "resistance." From a standpoint in which "there are no relations of power without resistances" (Foucault 1980:142), we consider the analysis of power to be inseparable from the relations of resistance that emerge from the application of water governance paradigms.

due to the complexity of this enterprise, as highlighted in this paper. However, this topic requires further investigation by researchers, especially on the power of paradigms, as discussed in the previous section, to avoid the pitfall of considering certain paradigms a "success" without acknowledging a success "of what" and "for whom."

4. It is important for both researchers and practitioners to identify which strategies are used by which actors (as outlined in the Actors section) to advance particular paradigms and to acknowledge when these strategies result in the growing hegemony of a paradigm. When paradigms become "locked in," it is equally important to advance strategies that promote debate and study, ensuring that negative experiences inform discussion and that failures are acknowledged.

5. As explored in the Actors and Temporal/Spatial sections, we are beginning to see how some actors are less seen or known in a paradigm's trajectory. Further research should uncover the blind spots in literature around which types of actors have a role and assert levels of agency in the diffusion of water governance paradigms. Research is needed to evaluate how well actors know the paradigm within which they are operating, the paradigm(s) they are circulating and helping to diffuse across time and space, and the consequences of their actions.

6. It is important to acknowledge that paradigms emerge in particular periods and contexts. The development steps and the diffusion of water governance paradigms in space and time remain largely understudied, as we explored in the Temporal/Spatial section of this paper, particularly in relation to advancing relevant water policies and practices. Further study to connect paradigms to the broader spatial and temporal scale can shed light on these issues and better explain change in water governance.

7. In an effort to better understand power in paradigms, as articulated in the Power section, greater attention can be paid to plural ontologies of water (i.e., peasant groups, Indigenous peoples, grassroots movements, and their alternative approaches to human-water relations, such as water as a living entity, caring for water, without romanticizing and essentializing them nor recolonizing them into universal paradigms and panaceas for water management. This can help highlight gaps in research and practice through the acknowledgment of certain actors' capacity and contribution in producing, translating, and absorbing paradigms.

8. Acknowledging the limitations of a reductionist approach of power as merely "one" thing, as argued in the Power section, can better inform us about the workings of water governance paradigms from a multifaceted power perspective, including considerations of "power to" and counter-powers. This awareness is necessary to re-politicize water governance paradigms and draw attention to the power dynamics that underlie them.

9. The normalization of water governance paradigms often leads to unquestioned governing practices, reinforcing their underlying ideological assumptions, norms, values, knowledge, and truths. To effectively challenge this normalization, research and actions aimed at de-normalizing governance must recognize governance itself as a paradigm of power (see Paradigm of power sub-section), as governmentality. Such reflexivity would allow researchers

and practitioners alike to approach their work on and with paradigms with a deepened awareness, facilitating informed adjustments and responses.

10. As shown in the Actors section, most dominant paradigms are generated in the Global North, which has implications for how water governance problems are defined and for the kinds of solutions that are presented in other contexts. We call for pluralizing epistemological and ontological perspectives on water governance as a way to resist universalizing tendencies. Agency-based power, post-structuralist approaches to power, and counter-powers, along with decolonial and feminist epistemologies, among others, as briefly presented in the Power section, may offer new insights into future research agendas around water governance paradigms.

CONCLUSION

Our proposed research agenda highlights that paradigms are not neutral tools but powerful frameworks shaped by historical and cultural contexts, transnational networks, and power dynamics. Paradigms serve as a "source code" for decision-making processes and practices, influencing the identification of water governance needs, goals, and means. However, paradigms are also often implicit, and actors who apply them may not be fully aware of which paradigms they are operating within or of the consequences of promoting these ideas. This calls for greater reflexivity among scholars and practitioners working with paradigms.

As researchers, we must recognize that the paradigms we adopt shape the questions we ask, the data we value, and the solutions we imagine. To advance more reflexive, equitable, and context-sensitive water governance, future research must critically engage with the paradigms that shape governance practices—this means examining not only what they promise, but also whose realities they reflect, whose interests they serve, and how they evolve across space, time, and power dynamics. For this, researchers should begin by (1) reflecting on their role in shaping paradigms and by identifying which paradigms underpin the broader system as well as their own research, (2) interrogating the "success" of paradigms (of what? for whom?) and make context central to this analysis, and (3) make power visible in governance dynamics and seek out underrepresented knowledge to inform their research and resist universalizing tendencies. By doing so, future research can move beyond dominant narratives, make visible marginalized perspectives, and foster governance practices that are more inclusive, adaptive, and just.

This paper makes a first attempt at starting a dialogue between different conceptual lenses that are relevant for studying the role of paradigms in water governance. The agenda items presented in this paper contribute to missing pieces in understanding water governance paradigms and their research. They are not a fixed roadmap but an invitation: to researchers, practitioners, and communities alike, to interrogate the "source codes" of water governance, pluralize the epistemologies informing them, include subaltern actors, and co-create pathways that embrace complexity, contestation, and situated knowledge. They insist on acknowledging contextual factors and of nuancing the idea of "effective paradigms" by carefully examining the actors involved —including those operating behind the scenes—who may benefit from certain paradigms being deemed a "success."

To advance our understanding of water governance paradigms, it is crucial to address these gaps in research, unpack the spatial and temporal considerations, and re-politicize paradigms by recognizing their power dynamics. Moreover, we must avoid the pitfall of recycling old ideas under different paradigm names and strive for reflexivity in our work. By embracing these agenda items, researchers and practitioners can facilitate more relevant policymaking and foster reflexive water management practices.

---

[1] Although many interpretations of the IWRM exist (García 2008), the general idea behind the concept is to promote an integrated view to governance that involves other sectors and actors beyond water.

[2] Water security means ensuring an acceptable level of water-related risks to people, the economy, and ecosystems (Grey and Sadoff 2007).

[3] Remunicipalization means achieving transparent, accountable, and socially just direct public management of water service, with civic participation and oversight (Bagué 2020).

[4] Ontology being defined as the theory of how the world is or is becoming (Mol 2002, Barad 2006, Krueger and Alba 2022).

[5] According to the authors, artefacts represent "institutions and technologies [that] are developed and implemented based on a shared paradigm" (Pahl-Wostl 2006:16).

[6] We understand problématiques as clusters of problems that arise from interdisciplinary understandings of hydrological and social governance challenges.

[7] By "situated knowledge," Haraway means that objectivity and what is considered "objective knowledge" is actually influenced by the materiality (the material, cultural, social context) in which such knowledge was produced.

[8] Collective action means that "a group of principals can organize themselves voluntarily to retain the residuals of their own efforts" (Ostrom 1990:25).

[9] Policy entrepreneurs are "people willing to invest their resources in return for future policies they favor. They are motivated by combinations of several things: their straightforward concern about certain problems, their pursuit of such self-serving benefits as protecting or expanding their bureaucracy's budget or claiming credit for accomplishment, their promotion of their policy values, and their simple pleasure in participating" (Kingdon 1984:214).

[10] By scale, we mean a "spatial scope of management" (Valin et al. 2024:64) that can go beyond administrative jurisdictions.

[11] By space, we understand an area or place "in which objects and events occur and have relative position and direction" (Merriam-Webster 2024a).

[12] We understand time as a "measurable period during which an action, process, or condition exists or continues" (Merriam-Webster 2024b).

Acknowledgments:

We express our gratitude to the Hanse-Wissenschaftskolleg (HWK) for providing a stimulating and supportive environment in which several productive meetings took place during the preparation of this paper. We also thank the reviewers and subject editors for

their constructive feedback and valuable suggestions. Finally, we gratefully acknowledge funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie Innovative Training Network NEWAVE (grant agreement No. 861509).

Data Availability:

Data used in this paper consists in existing academic literature, and no codes were used for the analysis.

LITERATURE CITED

Abdullaev, I., and S. Rakhmatullaev. 2015. Transformation of water management in Central Asia: from State-centric, hydraulic mission to socio-political control. Environmental Earth Sciences 73:849-861. https://doi.org/10.1007/s12665-013-2879-9

Abson, D. J., J. Fischer, J. Leventon, J. Newig, T. Schomerus, U. Vilsmaier, H. von Wehrden, P. Abernethy, C. D. Ives, N. W. Jager, and D. J. Lang. 2017. Leverage points for sustainability transformation. Ambio 46:30-39. https://doi.org/10.1007/s13280-016-0800-y

Ahlers, R., and M. Zwarteveen. 2009. The water question in feminism: water control and gender inequities in a neo-liberal era. Gender, Place and Culture 16(4):409-426. https://doi.org/10.1080/09663690903003926

Albrecht, T. R., and A. K. Gerlak. 2022. Beyond the basin: water security in transboundary environments. Water Security 17:100124. https://doi.org/10.1016/j.wasec.2022.100124

Allouche, J. 2017. The birth and spread of IWRM - A case study of global policy diffusion and translation. Pages 30-56 in L. Mehta, B. Derman, and E. Manzungu, editors. Flows and practices: the politics of integrated water resources management in Eastern and Southern Africa. Weaver Press, Harare, Zimbabwe. https://doi.org/10.2307/j.ctvh8r2qk.5

Álvarez, L., and B. Coolsaet. 2018. Decolonizing environmental justice studies: a Latin American perspective. Capitalism, Nature, Socialism 31(2):50-69. https://doi.org/10.1080/10455752.2018.1558272

Bagué, E. 2020. La remunicipalización del agua en el marco de la re-definición de la Democracia. El Caso De Terrassa. Clivatge 8 (8). https://doi.org/10.1344/CLIVATGE2020.8.4

Baird, J., R. Plummer, G. Dale, B. Kapeller, A. Mallette, A. Feist, and Y. Kataoka. 2021. The emerging scientific water paradigm: precursors, hallmarks, and trajectories. Wiley Interdisciplinary Reviews: Water 8:e1489. https://doi.org/10.1002/wat2.1489

Bakker, K. J. 2003. A political ecology of water privatization. Studies in Political Economy 70(1):35-58. https://doi.org/10.1080/07078552.2003.11827129

Bakker, K. 2007. The "commons" versus the "commodity": alter-globalization, anti-privatization and the human right to water in the Global South. Antipode 39(3):430-455. https://doi.org/10.1111/j.1467-8330.2007.00534.x

Bakker, K. 2010. Governance failure and the world's urban water crisis. Cornell University Press, Ithaca, New York, USA.

Bakker, K., and C. Morinville. 2013. The governance dimensions of water security: a review. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences 371:20130116. https://doi.org/10.1098/rsta.2013.0116

Barad, K. 2006. Meeting the universe halfway: quantum physics and the entanglement of matter and meaning. Duke University Press, Durham, North Carolina, USA. https://doi.org/10.2307/j.ctv12101zq

Baumgartner, F. R. 2014. Ideas, paradigms and confusions. Journal of European Public Policy 21(3):475-480. https://doi.org/10.1080/13501763.2013.876180

Bieler, A. 2018. Agency and the power resources approach: asserting the importance of the structuring conditions of the capitalist social relations of production. Global Labour Journal 9(2). https://doi.org/10.15173/glj.v9i2.3528

Birkenholtz, T. 2009. Groundwater governmentality: hegemony and technologies of resistance in Rajasthan's (India) groundwater governance. Geographical Journal 175(3):208-220. https://doi.org/10.1111/j.1475-4959.2009.00327.x

Biswas, A. K. 2008. Integrated water resources management: is it working? International Journal of Water Resources Development 24(1):5-22. https://doi.org/10.1080/07900620701871718

Blaser, M. 2009. Political ontology. Cultural Studies 23 (5-6):873-896. https://doi.org/10.1080/09502380903208023

Blatter, J., and H. Ingram. 2000. States, markets and beyond: governance of transboundary water resources. Natural Resources Journal 40:439.

Boelens, R. 2022. Rivers of scarcity. Utopian water regimes and flows against the current. Alternautas 9(1):14-53. https://doi.org/10.31273/an.v9i1.1152

Borràs, S. 2016. New transitions from human rights to the environment to the rights of nature. Transnational Environmental Law 5(1):113-143. https://doi.org/10.1017/S204710251500028X

Bouteligier, S. 2011. Exploring the agency of global environmental consultancy firms in earth system governance. International Environmental Agreements: Politics, Law and Economics 11(1):43-61. https://doi.org/10.1007/s10784-011-9149-7

Brennan, R. 2022. Making space for plural ontologies in fisheries governance: Ireland's disobedient offshore islands. Maritime Studies 21(1):35-51. https://doi.org/10.1007/s40152-021-00257-8

Bréthaut, C., and R. Schweizer. 2018. A critical approach to international water management trends. Palgrave Macmillan, London, UK. https://doi.org/10.1057/978-1-137-60086-8

Burchard-Levine, A., D. Huitema, N. W. Jager, and I. Bijlsma. 2024. Consultancy firms' roles in policy diffusion: a systematic review from the environmental governance field. Policy Sciences 57(3):691–718.

Chaffin, B. C., H. Gosnell, and B. A. Cosens. 2014. A decade of adaptive governance scholarship: synthesis and future directions. Ecology and Society 19(3):56. https://doi.org/10.5751/ES-06824-190356

Challies, E., and J. Newig. 2022. Water, rivers and wetlands: governance paradigms and principles. Pages 512-525 in P. G.

Harris, editor. Routledge handbook of global environmental politics. Routledge, London, UK. https://doi.org/10.4324/9781003008873-43

Chapron, G., Y. Epstein, and J. V. López-Bao. 2019. Natural systems from destruction. Science 363(6434):1392-1393. https://doi.org/10.1126/science.aav5601

Chen, G., J. Xu, and Y. Qi. 2022. Environmental (de)centralization and local environmental governance: evidence from a natural experiment in China. China Economic Review 72:101755. https://doi.org/10.1016/j.chieco.2022.101755

Chikozho, C., and K. Kujinga. 2017. Managing water supply systems using free-market economy approaches: a detailed review of the implications for developing countries. Physics and Chemistry of the Earth 100:363-370. https://doi.org/10.1016/j.pce.2016.10.002

Chomba, M. J., T. Hill, B. A. Nkhata, and J. J. Förster. 2017. Paradigms for water allocation in river basins: a society-science-practice perspective from Southern Africa. Water Policy 19 (4):637-649. https://doi.org/10.2166/wp.2017.130

Christian, J. M., and L. Dowler. 2019. Slow and fast violence: a feminist critique of binaries. ACME 18(5):1066-1075. https://doi.org/10.14288/acme.v18i5.1692

Cohen, A., and S. Davidson. 2011. The watershed approach: challenges, antecedents, and the transition from technical tool to governance unit. Water Alternatives 4(1):1–14.

Cook, B. R., M. Kesby, I. Fazey, and C. Spray. 2013. The persistence of 'normal' catchment management despite the participatory turn: exploring the power effects of competing frames of reference. Social Studies of Science 43(5):754-779. https://doi.org/10.1177/0306312713478670

Daigneault, P.-M. 2014. Reassessing the concept of policy paradigm: aligning ontology and methodology in policy studies. Journal of European Public Policy 21(3):453-469. https://doi.org/10.1080/13501763.2013.834071

Dell'Angelo, J., G. Navas, M. Witteman, G. D'Alisa, A. Scheidel, and L. Temper. 2021. Commons grabbing and agribusiness: violence, resistance and social mobilization. Ecological Economics 184:107004. https://doi.org/10.1016/j.ecolecon.2021.107004

de Oliveira, O. P. 2021. A prelude to policy transfer research. Pages 1-24 in Handbook of Policy Transfer, Diffusion and Circulation. Edward Elgar, Cheltenham, UK. https://doi.org/10.4337/9781789905601.00007

Druijff, A., and M. Kaika. 2021. Upscaling without innovation: taking the edge off grassroot initiatives with scaling-up in Amsterdam's Anthropocene forest. European Planning Studies 29 (12):2184-2208. https://doi.org/10.1080/09654313.2021.1903839

Dunlap, A. 2023. The green economy as counterinsurgency, or the ontological power affirming permanent ecological catastrophe. Environmental Science & Policy 139:39-50. https://doi.org/10.1016/j.envsci.2022.10.008

Ekers, M., and A. Loftus. 2008. The power of water: developing dialogues between Foucault and Gramsci. Environment and Planning D: Society and Space 26(4):698-718. https://doi.org/10.1068/d5907

Elder, A. D., and A. K. Gerlak. 2024. 'You scratch my back, I'll scratch yours': an examination of actor engagement in water public private partnerships. Water Policy 26(8):817-834. https://doi.org/10.2166/wp.2024.078

Elfithri, R., M. Bin Mokhtar, and S. Zakaria. 2019. The need for awareness raising, advocacy, and capacity building in Integrated Water Resources Management toward sustainable development: a case study in Malaysia. World Water Policy 5(1):43-54. https://doi.org/10.1002/wwp2.12002

Escobar, A. 2001. Culture sits in places: reflections on globalism and subaltern strategies of localization. Political Geography 20 (2):139-174. https://doi.org/10.1016/S0962-6298(00)00064-0

Flaminio, S. 2021. Modern and nonmodern waters: sociotechnical controversies, successful anti-dam movements and water ontologies. Water Alternatives 14(1):204-227.

Flyvbjerg, B. 1998. Rationality and power: democracy in practice. University of Chicago Press, Chicago, Illinois, USA.

Folke, C. 2006. Resilience: the emergence of a perspective for social-ecological systems analyses. Global Environmental Change 16(3):253-267. https://doi.org/10.1016/j.gloenvcha.2006.04.002

Foucault, M. 1980. Power/knowledge: selected interviews and other writings. Pantheon, New York, New York, USA.

Franco-Torres, M. 2021. The path to the new urban water paradigm - from modernity to metamodernism. Water Alternatives 14(3):820-840.

García, L. E. 2008. Integrated water resources management: a "small" step for conceptualists, a giant step for practitioners. International Journal of Water Resources Development 24 (1):23-36. https://doi.org/10.1080/07900620701723141

Geagea, D., M. Kaika, and J. Dell'Angelo. 2023. Recommoning water: crossing thresholds under citizen-driven remunicipalisation. Urban Studies 60(16):3294-3311. https://doi.org/10.1177/00420980231169612

Gleick, P. H. 1996. Water resources. Pages 817-823 in S. H. Schneider, T. L. Root, and M. D. Mastrandrea, editors. Encyclopedia of climate and weather. Second edition. Oxford University Press, New York, New York, USA.

Göhler, G. 2009. 'Power to' and 'power over.' Pages 27-39 in S. R. Clegg and M. Haugaard, editors. The SAGE handbook of power. SAGE Publications. https://doi.org/10.4135/9780857021014.n1

Gramsci, A. 1971. Selections from the prison notebooks. International Publishers, New York, New York, USA.

Grey, D., and C. W. Sadoff. 2007. Sink or swim? Water security for growth and development. Water Policy 9(6):545-571. https://doi.org/10.2166/wp.2007.021

Groen, L., M. Alexander, J. P. King, N. W. Jager, and D. Huitema. 2023. Re-examining policy stability in climate adaptation through a lock-in perspective. Journal of European Public Policy 30 (3):488-512. https://doi.org/10.1080/13501763.2022.2064535

Gupta, J. 2009. Driving forces around global fresh water governance. Pages 37-57 in D. Huitema and S. Meijerink, editors.

Water policy entrepreneurs: a research companion to the water transitions around the globe. Edward Elgar, Cheltenham, UK. https://doi.org/10.4337/9781849803366.00012

Hajer, M. A. 1997. The politics of environmental discourse: ecological modernization and the policy process. Oxford University Press, Oxford, UK. https://doi.org/10.1093/019829333X.001.0001

Hall, P. A. 1993. Policy paradigms, social learning, and the state: the case of economic policymaking in Britain. Comparative Politics 25 (3):275-296. https://doi.org/10.2307/422246

Haraway, D. 1988. Situated knowledges: the science question in feminism and the privilege of partial perspective. Feminist Studies 14(3):575-599. https://doi.org/10.2307/3178066

Harden-Davies, H., F. Humphries, M. Maloney, G. Wright, K. Gjerde, and M. Vierros. 2020. Rights of nature: perspectives for global ocean stewardship. Marine Policy 122:104059. https://doi.org/10.1016/j.marpol.2020.104059

Harris, L. M. 2015. Hegemonic waters and rethinking natures otherwise. Pages 157-181 in W. Harcourt and I. L. Nelson, editors. Practising feminist political ecologies. Zed Books, London, UK. https://doi.org/10.5040/9781350221970.ch-005

Harrison, E., and A. Mdee. 2017. Successful small-scale irrigation or environmental destruction? The political ecology of competing claims on water in the Uluguru Mountains, Tanzania. Journal of Political Ecology 24(1):406-424. https://doi.org/10.2458/v24i1.20881

Harsha, J. 2012. IWRM and IRBM concepts envisioned in Indian water policies. Current Science 102(7):986-990.

Holling, C. S. 1985. Resilience of ecosystems: local surprise and global change. Pages 228-269 in J. G. Roederer and T. F. Malone, editors. Global change. Cambridge University Press, Cambridge, UK.

Huitema, D., L. Lebel, and S. Meijerink. 2011. The strategies of policy entrepreneurs in water transitions around the world. Water Policy 13(5):717-733. https://doi.org/10.2166/wp.2011.107

Huitema, D., and S. Meijerink, editors. 2009. Water policy entrepreneurs: a research companion to water transitions around the globe. Edward Elgar, Cheltenham, UK. https://doi.org/10.4337/9781849803366

Huitema, D., and S. Meijerink. 2010. Realizing water transitions: the role of policy entrepreneurs in water policy change. Ecology and Society 15(2):26. https://doi.org/10.5751/ES-03488-150226

Huitema, D., and S. Meijerink. 2014. The politics of river basin organizations: institutional design choices, coalitions and consequences. Edward Elgar Publishing, Cheltenham, UK. https://doi.org/10.4337/9781782549222.00006

Huitema, D., E. Mostert, W. Egas, S. Moellenkamp, C. Pahl-Wostl, and R. Yalcin. 2009. Adaptive water governance: assessing the institutional prescriptions of adaptive (co-)management from a governance perspective and defining a research agenda. Ecology and Society 14(1):26. https://doi.org/10.5751/ES-02827-140126

Immovilli, M., S. Reitsma, R. Roncucci, E. Dueholm Rasch, and D. Roth. 2022. Exploring contestation in rights of river approaches: comparing Colombia, India and New Zealand. Water Alternatives 15(3):574-591.

Ingram, H. 2011. Beyond universal remedies for good water governance: a political and contextual approach. Page 241-261 in A. Garrido and H. Ingram, editors. Water for food in a changing world. Routledge, London, UK.

Jasanoff, S., and S.-H. Kim, editors. 2015. Dreamscapes of modernity: sociotechnical imaginaries and the fabrication of power. University of Chicago Press, Chicago, Illinois, USA. https://doi.org/10.7208/chicago/9780226276663.001.0001

Kaika, M. 2017. 'Don't call me resilient again!': the New Urban Agenda as immunology ... or ... what happens when communities refuse to be vaccinated with 'smart cities' and indicators. Environment and Urbanization 29(1):89-102. https://doi.org/10.1177/0956247816684763

Kaika, M., R. Calvário, and G. Velegrakis. 2024. Austerity: an environmentally dangerous idea. Journal of Political Ecology 31 (1):67-81. https://doi.org/10.2458/jpe.5420

Kalyvas, A., and I. Katznelson. 2001. The rhetoric of the market: Adam Smith on recognition, speech, and exchange. The Review of Politics 63(3):549-580. https://doi.org/10.1017/CBO9780511790782.002

Kern, F., C. Kuzemko, and C. Mitchell. 2014. Measuring and explaining policy paradigm change: the case of UK energy policy. Policy and Politics 42(4):513-530. https://doi.org/10.1332/03055-7312X655765

Kingdon, J. W. 1984. Wrapping things up. Pages 195-207 in Agendas, alternatives, and public policies. Little and Brown, Boston, Massachusetts, USA.

Krueger, T., and R. Alba. 2022. Ontological and epistemological commitments in interdisciplinary water research: uncertainty as an entry point for reflexion. Frontiers in Water 4:1038322. https://doi.org/10.3389/frwa.2022.1038322

Kuhn, T. S. 1962. The structure of scientific revolutions. The University of Chicago Press, Chicago, Illinois, USA.

Lang, D. J., A. Wiek, M. Bergmann, M. Stauffacher, P. Martens, P. Moll, M. Swilling, and C. J. Thomas. 2012. Transdisciplinary research in sustainability science: practice, principles, and challenges. Sustainability Science 7(Supp1):25-43. https://doi.org/10.1007/s11625-011-0149-x

Lebel, L., A. Haefner, C. Pahl-Wostl, and A. Baduri. 2020. Governance of the water-energy-food nexus: insights from four infrastructure projects in the Lower Mekong Basin. Sustainability Science 15:885-900. https://doi.org/10.1007/s11625-019-00779-5

Lee, M., H. Kim, J.-Y. Lee, J. E. Yang, and C. Lim. 2022. A shift towards integrated and adaptive water management in South Korea: building resilience against climate change. Water Resources Management 36:1611-1625. https://doi.org/10.1007/s11269-022-03071-x

Leitner, H., E. Sheppard, S. Webber, and E. Colven. 2018. Globalizing urban resilience. Urban Geography 39(8):1276-1284. https://doi.org/10.1080/02723638.2018.1446870

Ligtermoet, E., C. Munera-Roldan, C. Robinson, Z. Sushil, and P. Leith. 2025. Preparing for knowledge co-production: a diagnostic approach to foster reflexivity for interdisciplinary research teams. Humanities and Social Sciences Communications 12:257. https://doi.org/10.1057/s41599-024-04196-7

Linton, J. 2014. Modern water and its discontents: a history of hydrosocial renewal. Wiley Interdisciplinary Reviews: Water 1 (1):111-120. https://doi.org/10.1002/wat2.1009

Lukat, E., M. Schoderer, and S. Castro Salvador. 2022. When international blueprints hit local realities: bricolage processes in implementing IWRM in South Africa, Mongolia, and Peru. Water Alternatives 15(2):473-500.

Marcatelli, M., and B. Büscher. 2019. Liquid violence: the politics of water responsibilisation and dispossession in South Africa. Water Alternatives 12(2):760-773.

Mauser, W., G. Klepper, M. Rice, B. S. Schmalzbauer, H. Hackmann, R. Leemans, and H. Moore. 2013. Transdisciplinary global change research: the co-creation of knowledge for sustainability. Current Opinion in Environmental Sustainability 5(3-4):420-431. https://doi.org/10.1016/j.cosust.2013.07.001

Mayntz, R. 2003. New challenges to governance theory. Pages 27-40 in H. P. Bang, editor. Governance as social and political communication. Manchester University Press, Manchester, UK.

Merriam-Webster. 2024a. Space. https://www.merriam-webster.com/dictionary/space

Merriam-Webster. 2024b. Time. https://www.merriam-webster.com/dictionary/time

McGregor, D. 2012. Traditional knowledge: considerations for protecting water in Ontario. International Indigenous Policy Journal 3(3). https://doi.org/10.18584/iipj.2012.3.3.11

Meadow, D. 1999. Leverage points: places to intervene in a system. The Sustainability Institute, Hartland, Vermont, USA.

Micciarelli, G. 2022. Hacking the legal: the commons between the governance paradigm and inspirations drawn from the "living history" of collective land use. Pages 112-126 in F. Savini, A. Ferreira, and K. v. Schönfeld, editors. Post-growth planning: cities beyond the market economy. Routledge, New York, New York, USA. https://doi.org/10.4324/9781003160984-12

Miller, B. 2013. Spaces of contention: spatialities and social movements. Routledge, London, UK. https://doi.org/10.4324/9781315610191

Mills-Novoa, M., and R. T. Hermoza. 2017. Coexistence and conflict: IWRM and large-scale water infrastructure development in Piura, Peru. Water Alternatives 10(2):370-394.

Moffat, L. Y., A. Geadah, and R. Stuart. 1991. Two halves make a whole: balancing gender relations in development. CCIC, Ottawa, Canada.

Mol, A. 2002. The body multiple: ontology in medical practice. Duke University Press, Durham, North Carolina, USA. https://doi.org/10.1215/9780822384151

Molle, F. 2008. Nirvana concepts, narratives and policy models: insights from the water sector. Water Alternatives 1(1):131-156.

Molle, F. 2009. Water, politics and river basin governance: repoliticizing approaches to river basin management. Water International 34(1):62-70. https://doi.org/10.1080/02508060802677846

Molle, F., P. P. Mollinga, and P. Wester. 2009. Hydraulic bureaucracies and the hydraulic mission: flows of water, flows of power introduction: the prophets of irrigation. Water Alternatives 2(3):328-349.

Morin, J.-F. 2014. Paradigm shift in the global IP regime: the agency of academics. Review of International Political Economy 21(2):275-309. https://doi.org/10.1080/09692290.2013.819812

Moss, T. 2010. Managing water beyond IWRM - from paradigm to pragmatism. 1st Water Horizon Conference, Berlin, 13-14 July.

Nagendra, H., X. Bai, E. S. Brondizio, and S. Lwasa. 2018. The urban south and the predicament of global sustainability. Nature Sustainability 1:341-349. https://doi.org/10.1038/s41893-018-0101-5

NEWAVE. n.d. About NEWAVE. https://nextwatergovernance.net/about-newave

Newig, J., and E. Kvarda. 2012. Participation in environmental governance: legitimate and effective? Pages 29-45 in K. Hogl, E. Kvarda, R. Nordbeck, and M. Pregernig, editors. Environmental governance: the challenge of legitimacy and effectiveness. Edward Elgar Publishing, Cheltenham, UK. https://doi.org/10.4337/9781849806077.00010

Newig, J., D. Schulz, and N. W. Jager. 2016. Disentangling puzzles of spatial scales and participation in environmental governance–the case of governance re-scaling through the European Water Framework Directive. Environmental Management 58:998-1014. https://doi.org/10.1007/s00267-016-0753-8

Nixon, R. 2011. Slow violence and the environmentalism of the poor. Harvard University Press, Cambridge, Massachusetts, USA. https://doi.org/10.4159/harvard.9780674061194

Norman, E. S., C. Cook, and A. Cohen, editors. 2016. Negotiating water governance: why the politics of scale matter. Routledge, London, UK.

Ostrom, E. 1986. An agenda for the study of institutions. Public Choice 48:3-25. https://doi.org/10.1007/BF00239556

Ostrom, E. 1990. Governing the commons: the evolution of institutions for collective action. Cambridge University Press, Cambridge, UK.

Ovink, H., S. Rahimzoda, J. Cullman, and A. J. Imperiale. 2023. The UN 2023 Water Conference and pathways towards sustainability transformation for a water-secure world. Nature Water 1:212-215. https://doi.org/10.1038/s44221-023-00052-1

Pain, R., and C. Cahill. 2021. Critical political geographies of slow violence and resistance. Environment and Planning C: Politics and Space 40(2):359-372. https://doi.org/10.1177/23996544221085753

Pahl-Wostl, C. 2007. Requirements for adaptive water management. Pages 1-22 in C. Pahl-Wostl, P. Kabat, and J. Möltgen, editors. Adaptive and integrated water management. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-540-75941-6_1

Pahl-Wostl, C. 2019. Governance of the water-energy-food security nexus: a multi-level coordination challenge. Environmental Science & Policy 92:356–367.

Pahl-Wostl, C. 2020. Adaptive and sustainable water management: from improved conceptual foundations to transformative change. International Journal of Water Resources Development 36(2–3):397–415. https://doi.org/10.1080/07900627.2020.1721268

Pahl-Wostl, C., N. Isendahl, S. Möllenkamp, M. Brugnach, P. Jeffrey, W. Medema, and T. Tessa de Vries. 2006. Paradigms in water. NeWater Project Deliverable Nr. 1:39.

Pahl-Wostl, C., and C. Knieper. 2023. Pathways towards improved water governance: the role of polycentric governance systems and vertical and horizontal coordination. Environmental Science and Policy 144:151-161. https://doi.org/10.1016/j.envsci.2023.03.011

Pahl-Wostl, C., L. Lebel, C. Knieper, and E. Nikitina. 2012. From applying panaceas to mastering complexity: toward adaptive water governance in river basins. Environmental Science and Policy 23:24-34. https://doi.org/10.1016/j.envsci.2012.07.014

Pahl-Wostl, C., J. Sendzimir, P. Jeffrey, J. Aerts, G. Berkamp, and K. Cross. 2007. Managing change toward adaptive water management through social learning. Ecology and Society 12 (2):30. https://doi.org/10.5751/ES-02147-120230

Patterson, J. J. 2021. Remaking political institutions: climate change and beyond. Cambridge University Press, Cambridge, UK. https://doi.org/10.1017/9781108769341

Pierre, J., and B. G. Peters. 2020. Governance, politics and the state. Bloomsbury Publishing, London, UK.

Priscoli, J. D., and A. T. Wolf. 2009. Managing and transforming water conflicts. Cambridge University Press, Cambridge, UK. https://doi.org/10.1017/CBO9780511551536

Querejazu, A. 2022. Water governance. New Perspectives 30 (2):180-188. https://doi.org/10.1177/2336825X221089189

Rawson, A., and B. Mansfield. 2018. Producing juridical knowledge: "Rights of Nature" or the naturalization of rights? Environment and Planning E: Nature and Space 1(1-2):99-119. https://doi.org/10.1177/2514848618763807

Schlager, E., and W. Blomquist. 2008. Embracing watershed politics. University Press of Colorado, Denver, Colorado, USA. https://doi.org/10.2307/j.ctt46nvqs

Shapiro, A., and R. Summers. 2015. The evolution of water management in Alberta, Canada: the influence of global management paradigms and path dependency. International Journal of Water Resources Development 31(4):732-749. https://doi.org/10.1080/07900627.2015.1005286

Sharpe, B., A. Hodgson, G. Leicester, A. Lyon, and I. Fazey. 2016. Three horizons: a pathways practice for transformation. Ecology and Society 21(2):47. https://doi.org/10.5751/ES-08388-210247

Shields, K. F., M. Moffa, N. L. Behnke, E. Kelly, T. Klug, K. Lee, R. Cronk, and J. Bartram. 2021. Community management does not equate to participation: fostering community participation in rural water supplies. Journal of Water Sanitation and Hygiene for Development 11(6):937-947. https://doi.org/10.2166/washdev.2021.089

Shore, C. 2011. 'European Governance' or Governmentality? The European Commission and the future of democratic government. European Law Journal 17(3):287-303. https://doi.org/10.1111/j.1468-0386.2011.00551.x

Streeck, W., and K. A. Thelen. 2005. Beyond continuity: institutional change in advanced political economies. Oxford University Press, Oxford, UK.

Suhardiman, D., F. Clement, and L. Bharati. 2015. Integrated water resources management in Nepal: key stakeholders' perceptions and lessons learned. International Journal of Water Resources Development 31(2):284-300. https://doi.org/10.1080/07900627.2015.1020999

Sultana, F. 2011. Suffering for water, suffering from water: emotional geographies of resource access, control and conflict. Geoforum 42(2):163-172. https://doi.org/10.1016/j.geoforum.2010.12.002

Sultana, F. 2018. Water justice: why it matters and how to achieve it. Water International 43(4):483-493. https://doi.org/10.1080/02508060.2018.1458272

Sultana, F., and A. Loftus. 2015. The human right to water: critiques and condition of possibility. WIREs Water 2(2):97-105. https://doi.org/10.1002/wat2.1067

Swyngedouw, E. 2005. Dispossessing H_2O: the contested terrain of water privatization. Capitalism Nature Socialism 16(1):81-98. https://doi.org/10.1080/1045575052000335384

Tantoh, H. B., and D. Simatele. 2017. Community-based water resource management in Northwest Cameroon: the role of potable water supply in community development. South African Geographical Journal 99(2):166-183.

Tengö, M., E. S. Brondizio, T. Elmqvist, P. Malmer, and M. Spierenburg. 2014. Connecting diverse knowledge systems for enhanced ecosystem governance: the multiple evidence base approach. AMBIO 43:579-591. https://doi.org/10.1007/s13280-014-0501-3

Toro, F. J. 2021. Stateless environmentalism. ACME: An International Journal for Critical Geographies 20(2):189-205. https://doi.org/10.14288/acme.v20i2.1950

United Nations. 2023. The UN World Water Development Report 2023: partnerships and cooperation for water. UNESCO, Paris, France.

Valin, N., and D. Huitema. 2023. Experts as policy entrepreneurs: how knowledge can lead to radical environmental change. Environmental Science & Policy 142:21-28. https://doi.org/10.1016/j.envsci.2023.01.013

Valin, N., M. Lengkeek, and D. Huitema. 2024. Water governance and the issue of scale: whither river basin organizations? Pages 64-81 in Handbook on the governance and politics of water resources. Edward Elgar Publishing, Cheltenham, UK. https://doi.org/10.4337/9781800887909.00013

Varady, R. G., A. A. Zuniga-Teran, G. M. Garfin, F. Martín, and S. Vicuña. 2016. Adaptive management and water security in a global context: definitions, concepts, and examples. Current Opinion in Environmental Sustainability 21:70–77.

Viaene, L. 2021. Indigenous water ontologies, hydro-development and the human/more-than-human right to water: a call for critical engagement with plurilegal water realities. Water (Switzerland) 13(12):1660. https://doi.org/10.3390/w13121660

Vinciguerra, T. 2024. Water as a common good? Academic differences and their impact on the 2023 United Nations Water Conference. Water Policy 26(9):941-958. https://doi.org/10.2166/wp.2024.131

Vos, J., and R. Boelens. 2014. Sustainability standards and the water question. Development and Change 45:205-230. https://doi.org/10.1111/dech.12083

Voß, J. P., and A. Simons. 2014. Instrument constituencies and the supply side of policy innovation: the social life of emissions trading. Environmental Politics 23:735-754. https://doi.org/10.1080/09644016.2014.923625

Voß, J.-P., and A. Simons. 2018. A novel understanding of experimentation in governance: co-producing innovations between "lab" and "field." Policy Sciences 51:213-229. https://doi.org/10.1007/s11077-018-9313-9

Warner, J. F., J. Hoogesteger, and J. P. Hidalgo. 2017. Old wine in new bottles: the adaptive capacity of the hydraulic mission in Ecuador. Water Alternatives 10(2):322-340.

Wesselink, A., M. Kooy, and J. Warner. 2017. Socio-hydrology and hydrosocial analysis: toward dialogues across disciplines. Wiley Interdisciplinary Reviews: Water 4(2):e1196. https://doi.org/10.1002/wat2.1196

Whaley, L. 2022. Water governance research in a messy world: a review. Water Alternatives 15(2):218-250.

Wilson, N. J., and J. Inkster. 2018. Respecting water: Indigenous water governance, ontologies, and the politics of kinship on the ground. Environment and Planning E: Nature and Space 1 (4):516-538. https://doi.org/10.1177/2514848618789378

Woodhouse, P., and M. Muller. 2017. Water governance—an historical perspective on current debates. World Development 92:225-241. https://doi.org/10.1016/j.worlddev.2016.11.014

Zaragocin, S., and M. A. Caretta. 2021. Cuerpo-Territorio: a decolonial feminist geographical method for the study of embodiment. Annals of the American Association of Geographers 111(5):1503-1518. https://doi.org/10.1080/24694452.2020.1812370

Zittoun, P. 2015. From policy paradigm to policy statement: a new way to grasp the role of knowledge in the policymaking process. Pages 117-140 in J. Hogan and M. Howlett, editors. Policy paradigms in theory and practice. Palgrave Macmillan, London, UK. https://doi.org/10.1057/9781137434043_7

Zwarteveen, M., J. S. Kemerink-Seyoum, M. Kooy, J. Evers, T. A. Guerrero, B. Batubara, A. Biza, A. Boakye-Ansah, S. Faber, A. Cabrera Flamini, et al. 2017. Engaging with the politics of water governance. WIREs Water 4:e1245. https://doi.org/10.1002/wat2.1245