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Working (around/within/against) prior appropriation: Diverse hydrosocial practices to secure water for rivers

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Abstract

Water scarcity in the Western US, through the lens of political ecology, can be understood as inextricably shaped by power dynamics, governance structures, and legal practices of resource allocation. Water allocation in the region is determined largely by the legal doctrine of Prior Appropriation, the 'first in time, first in right' principle. However, prior appropriation is fundamentally based in anthropocentric and settler colonial assumptions, and in light of drought, climate change, and shifting social and environmental values, the system has been critiqued as inadequate to meet contemporary water challenges. Despite challenging historical legacies, water managers in the Western US are developing a range of strategies to work around or within prior appropriation to secure environmental flows for rivers and aquatic species. In this article we use political ecology and diverse economies approaches to consider the challenges of, and challenges to, prior appropriation. We examine a diverse set of practices, work-arounds, and creative strategies being used to secure instream flows, and discuss how these strategies affirm or challenge prior appropriation, how they reinforce or challenge inequities, and how they reform or re-envision water allocation in ways that may open up potential for social and environmental justice.

Keywords: Drought, political ecology of water, settler colonialism, prior appropriation, legal geography, diverse economies, hydrosocial

Résumé

La pénurie d'eau dans l'ouest des États-Unis, du point de vue de l'écologie politique, peut être comprise comme inextricablement façonnée par la dynamique du pouvoir, les structures de gouvernance et les pratiques juridiques d'allocation des ressources. L'allocation de l'eau dans la région est largement déterminée par la doctrine juridique de l'appropriation préalable, le principe du « premier arrivé, premier à avoir raison ». Cependant, l'appropriation préalable est fondamentalement basée sur des hypothèses anthropocentriques et coloniales, et à la lumière de la sécheresse, du changement climatique et de l'évolution des valeurs sociales et

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environnementales, le système a été critiqué comme étant inadéquat pour relever les défis contemporains de l'eau. Malgré un héritage historique difficile, les gestionnaires de l'eau de l'ouest des États-Unis développent une série de stratégies pour contourner ou respecter l'appropriation préalable afin de garantir les débits environnementaux des rivières et des espèces aquatiques. Dans cet article, nous utilisons des approches d'écologie politique et d'économies diverses pour considérer les défis et les défis de l'appropriation préalable. Nous examinons un ensemble diversifié de pratiques, de solutions de contournement et de stratégies créatives utilisées pour sécuriser les débits réservés, et discutons de la manière dont ces stratégies affirment ou remettent en question l'appropriation antérieure, comment elles renforcent ou remettent en question les inégalités, et comment elles réforment ou réenvisagent l'allocation de l'eau d'une manière qui peut ouvrir la voie à un potentiel de justice sociale et environnementale.

Mots-clés: Sécheresse, écologie politique de l'eau, colonialisme de peuplement, appropriation préalable, géographie juridique, économies diverses, hydrosocial

Resumen

La escasez de agua en el oeste de Estados Unidos, a través de la lente de la ecología política, puede entenderse como algo inextricablemente determinado por la dinámica de poder, las estructuras de gobernanza y las prácticas legales de asignación de recursos. La asignación del agua en la región está determinada en gran medida por la doctrina jurídica de la Apropiación Previa, el principio de "primero en el tiempo, primero en el derecho." Sin embargo, la apropiación previa se basa fundamentalmente en supuestos antropocéntricos y coloniales, y a la luz de la sequía, el cambio climático y los valores sociales y ambientales cambiantes, el sistema ha sido criticado por ser inadecuado para enfrentar los desafíos hídricos contemporáneos. A pesar de los desafiantes legados históricos, los administradores del agua en el oeste de los EE. UU. están desarrollando una variedad de estrategias para evitar o dentro de la apropiación previa para asegurar los caudales ambientales para los ríos y las especies acuáticas. En este artículo utilizamos enfoques de ecología política y economías diversas para considerar los desafíos y desafíos de la apropiación previa. Examinamos un conjunto diverso de prácticas, soluciones alternativas y estrategias creativas que se utilizan para asegurar los flujos internos, y discutimos cómo estas estrategias afirman o cuestionan la apropiación previa, cómo refuerzan o cuestionan las desigualdades y cómo reforman o reimaginan la asignación del agua de maneras que puedan abrir potencial para la justicia social y ambiental.

Palabras clave: Sequía, ecología política del agua, colonialismo, apropiación previa, geografía legal, economías diversas, hydrosocial

1. Introduction

Water in the Western United States has long been a contentious subject, with issues of drought, water scarcity, and "water wars" frequently making news headlines. Drought is popularly understood as simply a lack of precipitation, but scarcity of water remains a profoundly social phenomenon (Hohenthal & Minoia 2017; Savelli *et al.*, 2022). Drought is experienced unevenly by different water users (including humans, other living beings, and ecosystems), some of whom are deeply impacted while others maintain secure access to water. Political ecologists have drawn attention to the power dynamics and the socio-ecological dynamics shaping differential impacts of drought and water scarcity across the world (e.g., Kaika, 2006; Ruj *et al.*, 2022). For example, in the Western US, during times of drought, large agricultural businesses continue to produce and export thirsty irrigated crops at massive scales (Cantor *et al.*, 2022; Song *et al.*, 2022), while at the same time in the same place, marginalized communities of farmworkers have found their taps running dry and are forced to use bottled water to meet basic household and hygiene needs (Mendez-Barrientos *et al.*, 2022; Egge & Ajibade, 2021).

These uneven experiences of water scarcity and drought are shaped by political, economic, and legal systems. From a political ecology perspective, water scarcity can be thought of as a function of governance, power, and resource allocation practices, rather than simply an inevitable result of unusually low precipitation and/or high evapotranspiration. Examinations of water allocation practices from the intersecting perspectives of critical legal studies and political ecology help explain issues of drought, power, and equity (e.g., Jepson, 2012; Cantor, 2016; Whear, 2022).

In this article, we critically examine the predominant legal water allocation system in the Western US, the Prior Appropriation Doctrine, which allocates water on a "first in time, first in right" basis. We seek to understand not only the power dynamics involved in prior appropriation water rights allocation but also how water managers are, in practice, attempting to address the problems created by prior appropriation. To do so, we first examine a case study of Oregon's water rights history, then explore a range of alternative practices being used to secure water for rivers across the Western US. We draw from political ecology to examine the diverse array of practices, work-arounds, adaptations, and creative strategies that are being used to handle the challenges presented by prior appropriation, in particular to secure water for rivers and instream flows. We describe case studies of the many existing strategies that are used in practice, and discuss the ways in which these various strategies affirm or challenge the dominance of prior appropriation, reinforce or challenge historical inequities, and how they attempt to either reform or re-envision water allocation practices. Different strategies to work around, within, or against prior appropriation represent different understandings and values of water and social-ecological relationships. Despite the proliferation of calls for change and attempts to address prior appropriation, the doctrine has remained strong, and protecting rivers and ecosystems remains a perennial challenge.

2. The trouble with prior appropriation

For over a century and a half, water in the Western United States has been mainly allocated through the Prior Appropriation Doctrine. Prior appropriation water rights date back to the mid-1800s, when white settlers and miners sought to divert water to support mining and agricultural activities but found that water laws imported from the Eastern US and England did not translate well to the geography of the arid Western US (Gopalakrishnan, 1973; Wilkinson, 1991). Under prior appropriation, the "first" person to divert water for a "beneficial use" holds the most senior right to use that water. We use "first" in quotation marks here, noting that Indigenous communities across what is today the Western US were diverting and using water for many centuries before white settlers staked their claims. Likewise, "beneficial use" appears in quotation marks as the idea of "beneficial," often framed in extractive economic terms, is highly contextual and subjective. After senior rights are established, subsequent water right claims are considered junior, and the most junior claims are the first to remain unfilled in times of water shortages. Prior appropriation stipulates the "beneficial use" of water, historically defined narrowly as water use for human benefit, particularly for extractive or consumptive activities, including agricultural irrigation, mining, industrial use, domestic use, and livestock use. Other aspects of prior appropriation include "use it or lose it" provisions to avoid speculative water claims (Lustgarten, 2015), and prohibitions against "waste" of water (Cantor, 2017).

Proponents of the prior appropriation system argue that it facilitates investment and encourages economic development of water resources by giving some security of property to water rights holders in a way that is suited for arid environments like the Western US (Leonard & Libecap, 2019). According to defenders of prior appropriation, the doctrine allowed for rapid economic development of the Western US in the 19th century by securing property rights; encourages full utilization of water by prohibiting waste and speculation; and is perceived as fair and relatively straightforward (Gould, 1988; Huffaker *et al.*, 2000). However, considering 20th and 21st century issues such as climate change, drought, and shifting societal priorities and values around environmental management in the Western US, prior appropriation has been critiqued by many as problematic when it comes to meeting contemporary water management needs and challenges (Wilkinson, 1989; Huffaker *et al.*, 2000; Tarlock, 2001). There are a number of distinct but interrelated critiques, which we outline below.

First, prior appropriation epitomizes the regime of enclosure and resource theft under settler colonialism (Curley, 2021; Bray, 2021; Berry & Jackson, 2018). Water rights are generally tied to land, whether the water flows through that land, such as in riparian rights, or is attached to land described in the right ("appurtenancy"), which is the case in prior appropriation. Thus, land dispossession and water dispossession have historically gone hand in hand. Activists advocating for "land back" have made the argument that "we can't have land back without water back" (Julia Bernal, quoted in Gersony, 2021), noting that land and water are inextricably interconnected. Definitions of "first" water users were assumed to apply to white settler colonists in the 1800s and were fundamentally based upon the dispossession and displacement of Indigenous communities. Tribes

were granted water rights under the Winters Doctrine in 1908 but have struggled to actually secure those water rights in practice; moreover, some have challenged the very premise and legitimacy of the western water rights system (Curley, 2019). Curley, for example, points out that prior appropriation is a system set up to meet extractive, capitalist, settler water demands and as such, some decolonial Indigenous activists reject the premise of colonial water rights (Curley, 2019). In addition to its basis in Indigenous dispossession of land and water, prior appropriation has historically benefited white landowners, as people of color have historically been excluded from land and property ownership in many ways (Middleton Manning, 2018; Berry & Jackson, 2018; Miller, 2001; Mendez-Barrientos *et al.*, 2022).

Second, prior appropriation is inherently based in an anthropocentric and extractive paradigm (Groenfeldt, 2013). Prior appropriation, initially created to support mining, industry, and agricultural irrigation, was decidedly not invented to consider the needs of aquatic species and ecosystems (Huffaker *et al.*, 2000; Tarlock, 2001). Environmental and instream values of water were not added into the definition of beneficial use until much later; instead, the initial framing of prior appropriation viewed water left instream as "waste." As an overview of Western water law puts it: "The notion that water left instream is water wasted dates at least to the first days of the prior appropriation doctrine in the mid-1800s, when beneficial use was defined solely in terms of commodity production" (Gillilan & Brown, 1997). While some protections for streams and aquatic species were implemented as early as the 1950s, it was in the 1970s and 1980s that the idea of amending beneficial uses to recognize water rights for instream flows began to take hold (Amos & Swensen, 2015; Gillilan & Brown, 1997). It was not until 1987 that Oregon became the first state to legally recognize instream water rights (Neuman *et al.*, 2006). Today, every state has some way of recognizing non-extractive uses of water, including instream flows and aquatic habitat, as beneficial (Amos & Swensen, 2015), but the fact that these beneficial uses were a late-in-the-game add-on means they are not always well-integrated or effective at protecting ecosystems in practice.

Third, prior appropriation is fraught with challenges when it comes to adapting to contemporary water values and needs. Provisions such as "use it or lose it" disincentivize conservation by mandating that water rights holders use their full allocations or risk losing their water rights – a provision initially put into place to avoid speculative claims, but one that today stands in the way of conservation (Lustgarten, 2015; Clark, 2017). There is also the issue of overallocation and difficulty adapting to climate change and drought: water in the Western US was allocated during a wetter period, and in times of drought or lower precipitation, water supplies are frequently inadequate to meet allocations (Grantham & Viers, 2014; Kuhn & Fleck, 2019).

Given the many critiques and issues with prior appropriation, water users and managers in the Western US have struggled to balance conflicting demands and meet the needs of all ecosystems and human uses. Some commentators have lamented the death of prior appropriation (Wilkinson, 1991) while others have noted that despite critiques it continues to hold relevance and maintains its status as the dominant paradigm (Tarlock, 2001). Experts have debated whether the doctrine is flexible enough to meet modern water needs and challenges (Huffaker *et al.*, 2000). Meanwhile though, in practice, within the limitations of this system, many water managers and communities have worked to develop strategies to work around or within prior appropriation to secure instream flows and environmental water for aquatic species (Amos & Swensen, 2015; Gillilan & Brown, 1997).

The prior appropriation system of water rights contains much that is directly relevant to political ecology: it is laden with embedded assumptions (such as ideas of what is "beneficial" and what constitutes "waste"); situated within legacies of racism and settler colonialism; and protected by laws and power dynamics supporting the status quo, as the system has proven highly resistant to change. We next turn to theoretical frameworks from critical geography that we use to contextualize the efforts to work around, within, and against prior appropriation water allocation.

3. Theoretical frameworks: Political ecology, legal geography, and diverse economies

Hydrosocial studies and legal geographies of water

The hydrosocial cycle is a framework used by political ecologists to theorize the social relations that produce water and influence its governance (Linton & Budds, 2014). Hydrosocial studies consider water as consisting simultaneously of material, technological, infrastructural, legal, social, cultural, economic, and political dimensions, all of which are inextricably entangled. Political ecologists like Boelens *et al.* (2016) and Hommes *et al.* (2022) have investigated the ways that co-constitutive human and nature relations produce a socationature where social, political and cultural claims around water compete to define real and imagined hydrosocial territories. Critical analysis of power relations around water is a major focus in hydrosocial studies. For example, Swyngedouw (2009) and Curley (2021) point out that dominant claims, rooted in capitalist, colonial, and imperialist logic, transform water from a public good into private property; consequently, this transformation creates asymmetries and inequities in water's distribution. Political ecology and hydrosocial frameworks offer a useful lens with which to theorize the power and social relations that constitute water and its governance.

Legal geography, with its attention to the ways that space is legislated and litigated, is a useful lens to examine how competing claims are negotiated, subverted, and reinforced within water resource management (Vineyard *et al.*, 2023). Legal geography and political ecology have been fruitfully put into conversation with one another to study water and hydrosocial relationships (e.g., Borgias, 2018; Whear, 2022; Gillespie & Perry, 2019; Cantor *et al.*, 2020). Legal processes are particularly important when it comes to water allocation. There are several types of legal mechanisms involved in water allocation, including water law, which is defined in statute by state legislatures; administrative rule, which is set by each state's water resources management agency and which must comply with existing statute; and case law, which is when statutes and rules are interpreted by the courts and then becomes precedent.

There are many examples of the co-production of legal practices, social discourses and interpretations, and environmental outcomes in relation to water. For example, many Western US states have constitutional directives that require hierarchical categorization of water uses into "beneficial" and "unreasonable" categories, which influences what water uses are considered legitimate (Cantor, 2017). The public trust doctrine, a legal principle requiring states to manage eligible bodies of water for public benefit, relies on interpretations of what exactly it means to be a "public good" (Cantor, 2016). Regional water control and improvement districts mobilize borders as a means of enclosing water distribution by creating and excising "constituents" from a larger public (Jepson, 2012). Nonprofit organizations mobilize coalitions of diverse community members to engage in grassroots activism to support or challenge water claims (Whear, 2022). Indigenous communities demand recognition of tribal rights, sovereignty, and strive to move towards decolonization and an alternative ontology of water by refusing to accept water settlements (Curley, 2019).

All of these examples of legal geographies of water raise questions of "for whom:" who counts as a water user, how do they count, and from where do they draw legitimacy? Critical legal geographic perspectives help to answer these questions. While water governance is largely dominated by status-quo interests and structures such as prior appropriation, there are also avenues for the incorporation of other publics and other additional perspectives, including critical Indigenous perspectives. For example, Indigenous-led governance efforts such as the Confederated Tribes of the Umatilla Indian Reservation's "First Foods" management approach, offer different possibilities for relationships with water (Quaempts *et al.*, 2018). We next turn to this theme of recognizing alternative practices.

Diverse economies of water

Beyond the sphere of water, scholarship on alternative practices more broadly has flourished, inspired by the highly influential work by J.K. Gibson-Graham on "diverse economies" (Gibson-Graham, 1996; Alhojärvi, 2020). Their work, a feminist and anti-essentialist intervention into political economy, challenges the idea of "The Economy" and "Capitalism" as hegemonic monoliths. They put forth "a vision of noncapitalist economic practices as existing and widespread" (Gibson-Graham, 1996, p. 5), pointing to empirical

examination of the many diverse alternative economies that are being enacted all over the world in practice: for example, bartering, gift giving, alternative currencies, unpaid labor, fair trade and social enterprises, worker-owned cooperatives, community land trusts, gleaning, and much more (Gibson-Graham, 2006). These diverse economies have been categorized using typologies to help understand the varied activities (e.g., market, alternative market, and nonmarket transactions; paid labor, alternative paid labor, and unpaid labor; capitalist, alternative capitalist, and non-capitalist enterprises) (Gibson-Graham, 2006, 2008). They call for scholarship to "bring marginalized, hidden, and alternative economic activities to light in order to make them more real and more credible as objects of policy and activism" (Gibson-Graham, 2008, p. 613).

This idea has had significant traction within and beyond critical geography (Gibson-Graham *et al.*, 2019), and has been applied in many contexts and locations (Roelvink *et al.*, 2015). For example, geographers have used the approach to examine alternative food networks (Harris, 2009), social enterprise approaches to manufacturing (Gibson-Graham *et al.*, 2019), and a range of other economic activities (Roelvink *et al.* 2015). Proponents of diverse economies call for "thick description and weak theory," emphasizing a focus on actually-existing practices (Gibson-Graham, 2014; Alhojärvi, 2020). Critics of the approach have argued that this approach does not take structural power seriously enough (Glassman, 2003). At the heart is disagreement over fundamental questions of whether and how powerful structures and ideologies like capitalism can be challenged.

The approach of diverse economies has only lightly been applied to water resources: for example, Wutich and Beresford (2019) discuss diverse economies of water provisioning, including non-market and informal water provisioning and sharing, in a review of different economic anthropologic approaches to water. In this article, we apply a diverse economies approach to water resource allocation practices rather than water provisioning, particularly regarding instream flows and water for rivers. We ask: what kind of actually-existing practices, alternatives, and adaptations are being used to secure water for rivers, working within and around the model of prior appropriation? How are existing hydrosocial relationships being challenged or re-imagined through these practices? Drawing from Gibson-Graham, we seek to counter the monolithic role of prior appropriation in water management by shedding light on the many alternative models, creative adaptations and interpretations, practices and challenges that water managers are using across the Western US.

4. Methods

We used several approaches to understand the challenges of, and challenges to, prior appropriation. First, we conducted a place-based historical analysis of prior appropriation in Oregon to understand the intersections between water allocation and racialized histories of dispossession and discrimination. We reviewed Oregon's water rights history along with histories of dispossession and discriminatory legal practices. We used water rights data from the Oregon Water Resources Department to examine historical water rights allocations.

We then employed a diverse economies approach by reviewing and characterizing different strategies being used in practice to secure water for rivers across the Western US more broadly. To identify these strategies, we searched news articles, legal records, nonprofit organization websites and blogs, and academic articles using phrases such as instream flow, water markets, public trust, and water rights. We also reached out to experts in the field to provide examples. Of the examples we identified, we examined approximately 30 projects within the Western US (including Washington, Oregon, California, Idaho, Montana, Wyoming, Nevada, Utah, Colorado, Arizona, and New Mexico) that included efforts to secure water for rivers, ecosystems, habitat, and/or aquatic species. We built a database that included the following for each project: location, start year, mechanisms used to secure instream flows, source of information, notes on the project's success, and notes describing the strategy. We mapped the projects using ArcGIS to examine spatial patterns and ensure consideration across a wide geographic range, and used ArcGIS StoryMaps to illustrate and communicate about the different projects.

We analyzed the projects by comparing and categorizing different strategies and techniques used in each case. We considered how each method related to prior appropriation, and how different strategies were integrated into existing legal contexts. The goal was not to comprehensively document every project in the Western US, but to examine different types of methods and strategies in different geographic locations in order

to review a wide range of approaches. The database was therefore not comprehensive, but rather, represented a range of locations and strategies. In the next sections we first describe Oregon's history in detail, then discuss selected cases drawn from across the Western US to illustrate different types of instream flow strategies.

5. Placing prior appropriation: Spotlight on Oregon's water rights history

To illustrate the intersections of prior appropriation, social and cultural values, and racism and inequity in a particular place, we use a case study of Oregon's water rights history. Oregon, like other Western US states, uses the prior appropriation system to allocate water resources. Oregon has long been a leader in recognizing non-consumptive uses and piloting innovative strategies to protect instream flows. At the same time, Oregon also has a long history of institutionalized racism and settler colonialism, which impact distribution of water rights. We consider these co-located histories of water rights and institutionalized discrimination and dispossession side-by-side to show how water allocation can be considered a racialized practice.

Oregon, which became a state in 1859, adopted a uniform water code in 1909 stating that all waters within the state belong to the public and were to be allocated using a "beneficial use" prior appropriation permit system (Neuman *et al.*, 2006). Figure 1 illustrates the total volume of water rights allocated by the state of Oregon in each decade from 1900 to the present. As this figure shows, the majority of the state's water rights were allocated prior to 1970.

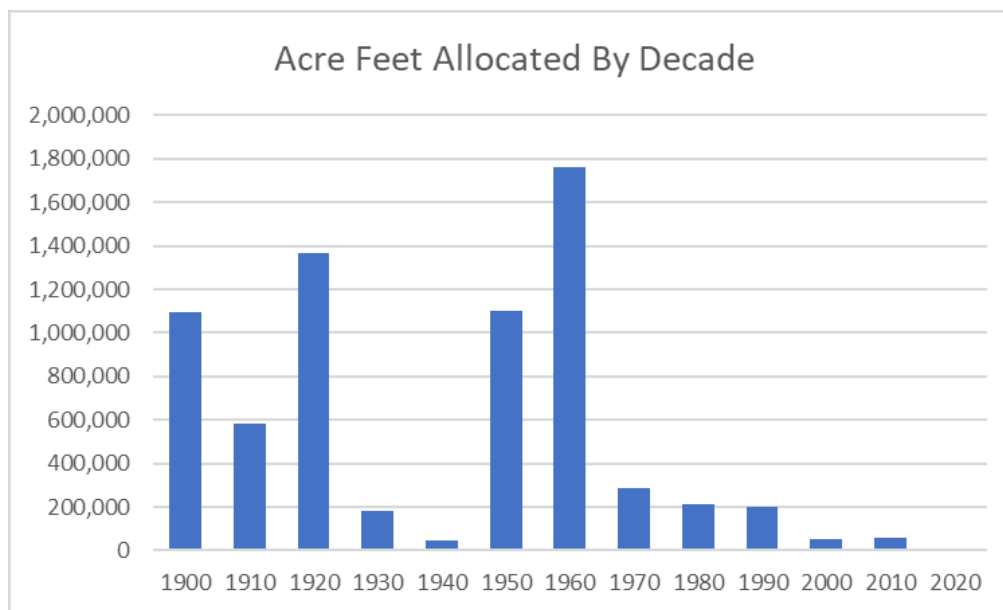


Figure 1: Volume of water rights allocated by decade in the state of Oregon, in acre feet (1 acre foot = 325,851 gallons = 1,233 cubic meters)

Like other US states, prior appropriation was initially developed in Oregon to encourage and protect industries such as mining and agriculture, but Oregon was an early adopter in recognition of non-consumptive beneficial uses. In 1915, the Columbia River Gorge waterfalls were protected by the state for their scenic attributes. In 1953, Oregon further recognized non-consumptive beneficial water uses including recreation and wildlife habitat, and in 1987 Oregon became a leader by recognizing instream water rights, opening the door to water rights transfers and markets to support instream flows (Neuman *et al.*, 2006). However, as Figure 1 shows, most of the water rights by volume in the state were already allocated before the 1987 instream flow water rights were established.

Simultaneously, in Oregon and other Western US states, prior appropriation and other legal instruments of resource management have been used to reinscribe white supremacy and reaffirm a settler colonial paradigm (Bonds & Inwood, 2016). Although a water right is not technically a property right², its indissolubility from land ownership means that it often functions like one. Political ecologists and legal scholars have explained that property rights signal and confer a type of citizenship, bound up in notions of whiteness (Inwood & Bonds, 2017; Berry & Jackson, 2018; Harris, 1993). This has ramifications for water rights, as land and property ownership has historically been limited based on race. For instance, constitutions from Oregon (1857 and 1859), Washington (1886), and California (1879), as well as the Alien Land Law of 1913, expressly prohibited Black people, Chinese immigrants, Japanese immigrants, and other migrants from owning land (McClintock, 1995; Lazarus, 1989; McGovney, 1947). Racist exclusion laws were present in the Oregon constitution until 1926. Meanwhile, Indigenous people were being forcibly removed from or compelled to cede their ancestral homelands as a result of the 1830 Indian Removal Act and other treaties signed with the United States. Figure 1 shows that a large volume of water rights were allocated during times when racist exclusion laws were still in place. Most water rights were allocated prior to Civil Rights movements of the 1960s-1970s.

To sum, while senior water rights were being established in Oregon and across the Western US, Indigenous communities were being dispossessed of water and land, and other communities of color were excluded from land ownership. As a result, prior appropriation is inextricably tied to this racialized history of dispossession, which continues to impact these communities into the present in the form of junior (and thus more vulnerable) water rights. This path of first implementing prior appropriation as the primary water allocation system, then layering on provisions that recognized non-extractive uses (such as scenic or environmental values) to be included within the bounds of the prior appropriation system, is similar to other states in the Western US. The example of Oregon's water allocation in history illustrates how dominant social and economic values were inscribed into water allocation laws and practices early on. Even as legal systems have shifted to recognize new values through adding new beneficial uses to prior appropriation, historically most allocations of water had already occurred by that point, inscribing the prevailing values of those times in history.

6. Water for the river: Strategies employed in practice

Despite the many challenges of a water governance system dominated by prior appropriation water rights, we identified a wide range of efforts and practices that strive to overcome these challenges and limitations. Efforts to secure water for rivers, ecosystems, and aquatic species in the Western United States in practice are numerous and use a wide range of approaches.

After compiling a list of the many diverse types of approaches used by water managers, we categorized them into several broad buckets (Table 1). This framework draws from scholarship by O'Donnell (2019), who has described different ways in which the environment is legally constructed by comparing water markets to legal personhood of rivers in the US and Australia, and Escrivá-Bou *et al.* (2020), who compare different strategies for water accounting. We recognize that these buckets are not mutually exclusive, and that specific strategies may fall within multiple categories; we also recognize that within each bucket are many diverse strategies that may not align ideologically or practically with other items within the bucket. However, the goal is to provide a rough typology of the diverse practices used by water managers to secure water for the river across the Western US.

Markets and environmental water rights

In this section we follow Gibson-Graham's (2014) call for "thick description" of the existing alternatives mentioned in Table 1 by describing each of these categories and discussing some examples of how they are being used in practice. Water markets involve voluntary transactions between willing buyers and sellers. These

² Technically, water belongs to the public, with the state holding the water in trust on behalf of the public. Water users can obtain a permit from the state that gives them the right to use water. Thus, water rights are actually use-rights, rather than rights to the water itself.

transactions can involve short- or long-term leases or permanent sales of water rights, and are intended to redistribute water and enhance flexibility of water allocation (Hanak *et al.*, 2021). Water transfers typically re-allocate water away from agriculture (which accounts for around 80% of water rights in the Western US) toward cities or environmental uses. Seniority of water rights is retained during water transfers, making senior water rights more valuable in transactions (Neuman *et al.*, 2006). There are several varieties of market-based mechanisms for securing instream flows in use.

Category	Types of strategies
Market-based approaches	Leases or sales of water rights for instream flow Buying land with attached water rights Fallowing farmland to lease or sell water rights Buying partial water rights from farms Paying farmers to implement irrigation efficiency
Regulatory and legal approaches	Public trust doctrine Endangered Species Act Clean Water Act Federal reserved water rights Minimum instream flow requirements Tribal water rights Instream flows to support Tribal fishing rights Assigning new cultural and Tribal Beneficial Uses Changes to "use it or lose it" to facilitate leaving water in streams Discretionary enforcement of "use it or lose it" Forfeiture and enforcement of waste and beneficial use provisions Assigning new beneficial uses for environment Dedicating unappropriated water to environment
Community-based approaches	Drought management plans with voluntary conservation targets Negotiated settlements and non-diversion agreements Community-based natural resource management Collaborative governance initiatives
Rights of nature	Legal personhood for rivers
Other	Theft and illegal diversion

Table 1: Types of strategies in use to secure water for the river in the Western USA.

Leasing water rights to water trusts allows water rights holders to financially benefit from instream water use, and prevents resorting to wasteful practices, such as excessive irrigation, to avoid losing the rights (King, 2004). Water trusts are key organizations in these transactions, since they have the financial and institutional resources to acquire rights for the purpose of keeping water in the river. Water trusts are more common in some states than others due to legal infrastructure: for example, Oregon has been a leader in environmental water rights transfers due to the 1987 legislation recognizing instream flow as a beneficial use. Oregon Water Trust, founded in 1993 and renamed the Freshwater Trust in 2009, was the first water trust in the US and is a leading organization in market-based water conservation. This approach is considered to be a quick and effective solution: for example, on Oregon's Lower John Day River, the Freshwater Trust has leased water from senior water rights holders to help maintain adequate instream flows for fish since 1995.

There are several types of water buyback programs, which are commonly used to transfer water from agriculture to instream flow. Land idling involves leaving farmland fallow and leasing the associated water rights to a water trust or other entity. For example, in Southern California, cities have paid irrigation districts to leave land fallow, transferring the water rights to municipal water providers. In contrast, water idling involves leasing only a portion of the water rights utilized for irrigation (rather than outright fallowing of all the land) and allows farms to continue growing crops with their remaining capacity. The latter is considered more effective and efficient, as it incentivizes farmers to examine the opportunity cost of various irrigation and water usage more closely, as was demonstrated in an in-depth case study of the 2010 Klamath Irrigation Project (Elbakidze *et al.*, 2017).

In another variation, farmers are sometimes paid to implement more efficient irrigation systems in order to leave more water instream. This involves a water trust or similar entity funding upgrades for farms to reduce their irrigation needs, with the goal of keeping water for instream flow. For example, the Farmers Conservation Alliance in Central and Eastern Oregon assists farmers with irrigation modernization to reduce water use. Paying for irrigation efficiency upgrades can be a method to permanently acquire water rights.

Acquiring ownership of land along with its water rights (as opposed to leasing) is another direct way to permanently divert water to instream flow. This can require coordination between land and water trusts: for example, on a national scale, the Land Trust Alliance offers guidance on the connection between land and water protection via conservation easements, and helps combine expertise of land trusts and water trusts to navigate connections between land ownership and associated water rights (Bates, 2014).

While markets are often considered a feasible and straightforward way to increase flexibility of water allocation without fundamentally upending prior appropriation, they also have drawbacks: leases can be temporary in nature and require a consistent funding source, and both sales and leases are contingent upon voluntary participation by water rights holders.

Regulatory and legal approaches

The category of "regulatory and legal approaches" is an eclectic and broad group of strategies, encompassing a variety of US federal and state laws and regulations. Several federal laws have the potential to require minimum instream flows regardless of allocation of prior appropriation water rights. States also have a significant diversity of tools at their disposal, including the public trust doctrine and interpretation and enforcement of "beneficial use" and provisions against "waste." Tribes have also leveraged their legal water rights to protect instream flows. What this category of approaches has in common is that it involves the use of legal and regulatory mechanisms to remove water from the prior appropriation system, or declare certain water or amounts of water off-limits for appropriation, by declaring that instream needs must be met first before water is allocated to extractive users.

Under the federal Endangered Species Act (ESA), habitat protection is required if a species is listed as endangered. This can include requirements for minimum instream flows regardless of cost, a requirement that can preempt prior appropriation and has been enacted in many cases. For example, protection of the Rio Grande Silvery Minnow has involved minimum instream flow requirements in New Mexico and Texas (Ward & Booker, 2003). The federal Clean Water Act (CWA) also provides a federal pathway to enact minimum instream flows. For example, in a 1994 case about dam construction in Washington (PUD No. 1 of Jefferson County v. WA Department of Ecology), the US Supreme Court ruled that the CWA could be used to implement minimum instream flows for fish protection, which, again, can preempt prior appropriation. Other federal avenues for protection of rivers and instream flows include the Wild and Scenic Rivers Act, and reserved water rights such as those for national parks and wildlife refuges.

At the state level there are also a diversity of strategies in use. One of the most well-known is the public trust doctrine, under which water is a public resource owned by the state (to which users can obtain use-rights granted by the state), and the state has a responsibility to manage it in the best interest of the public. While highly subjective, it creates a potential avenue for states to override prior appropriation water rights: for example, the high-profile case of Mono Lake, California was an example of public trust taking precedence over prior appropriation water rights held by the City of Los Angeles to protect a water body (Cantor, 2017). Beyond

Mono Lake, the public trust doctrine has been leveraged to protect streamflow mostly within California: for example, to protect interconnected groundwater-surface water resources in California's Scott River, and as part of the process of establishing instream flow requirements for California's Sacramento-San Joaquin Delta.

Another legal strategy that states have used to protect rivers is enforcement of provisions against "waste and unreasonable use" which are built into prior appropriation law in some states. For example, a 2014 California court case involving wine grape growers diverting water from California's Russian River (*Light v. SWRCB*) established that the state does have the authority to govern the reasonable use of water to prevent waste (Johnson, 2016). In this case, grape farmers were using overhead sprinklers to protect grapes from frost damage, causing streamflow to disappear almost entirely and leading to salmon deaths; this water use was deemed "unreasonable" given its impacts, and was subsequently regulated by the state.

While enforcement of existing laws is one strategy, lack of enforcement can be another. For example, in Oregon, the "use it or lose it" clause (intended to reduce speculative water claims by requiring use of water) is interpreted in a broader way in which a water rights holder must only have the *ability* (e.g. infrastructure) to use the whole water right, and need not actually use the water (ORS 540.610(3)). This means that Oregon water rights holders do not, in practice, risk losing their water right if they do not use it all in a given year.

Tribes have long worked to secure instream flows to support non-extractive uses, including subsistence fisheries and other traditional and cultural uses. As discussed in section 2 in this article, senior water rights for Tribal entities exist within the prior appropriation system (and in some cases are quite extensive) but barriers frequently arise when it comes to actually obtaining and securing those water rights in practice. It is important to note here that federally recognized tribes are sovereign nations, and although their access to water is subject to prior appropriation and the US legal system, specific water management strategies vary from tribal nation to tribal nation. Water settlements are one tool used to secure water rights, including instream flow rights, though this approach is not supported equally by all Tribal members (Curley, 2019). Tribal water management strategies frequently focus on fish protection, given the cultural and subsistence importance of salmon and other fish and the sensitivity of these fish to water quality and quantity (e.g. Quaempts *et al.*, 2018). Some creative new strategies are being utilized: for example, one recent strategy being explored in California involves utilizing water quality protections, adding new Tribal Beneficial Uses³ associated with Clean Water Act protections. This approach protects Indigenous cultural water uses and subsistence fishing by granting these non-extractive uses official status and requiring that water quality and quantity is adequate to meet these cultural and subsistence uses. This approach involves setting water aside as non-eligible for prior appropriation allocation until these cultural and subsistence beneficial uses are adequately supported.

Legal and regulatory approaches are a potential means of giving weight to public interests and claims. However, such practices can also serve to reinforce existing power structures within hydrosocial relations. For example, Curley (2021) describes several attempts to address asymmetrical power structures through the 2012 Little Colorado River Water and the 2005 San Juan River Water Settlements, both of which "resolved" Navajo water claims in the Colorado River Basin in court, but ultimately ended up benefiting non-Navajo communities. In practice, water laws often end up reestablishing dominant ontologies and power relations around water, because the recognition and enforcement of water rights is generally complaint-driven (e.g. when senior water rights holders "make a call" for the state to regulate junior users) (Sterne, 1997). This means that politicians, lawyers, and lawmakers representing various constituents and interest groups often end up influencing water management and governance via various legal mechanisms.

Community-based natural resource management

Distinct from (but sometimes overlapping with) regulatory and legal approaches to instream water conservation, community-based natural resource management (CBNRM) is considered a "bottom-up" form of participatory resource management. Characterized by local involvement, CBNRM may be initiated by state

³ These Clean Water Act beneficial uses are not to be confused with beneficial uses under prior appropriation. CWA designated beneficial uses require that certain water quality standards, including temperature as well as levels of pollutants – both of which can be related to quantity of instream flow – are met to support these designated uses.

agencies or local communities, sometimes in response to legal or regulatory mandates, and typically involve collaboration and cooperation between governmental and non-governmental parties (Armitage, 2005; Lurie and Hibbard, 2008). For example, Oregon has 55 locally organized, voluntary, and state-funded watershed councils that cover nearly the whole state; they are encouraged by the state legislature but led by local community members (Griffin, 1999; ORS 541.910). Because they emphasize local involvement, CBNRM projects can provide room for flexibility and creativity that other approaches lack. CBNRM projects differ in their use of collaborative governance, which is defined by Emerson and Nabatchi (2015) as "the processes and structures of public policy decision making and management that engage people across the boundaries of public agencies, levels of government, and/or the public, private, and civic spheres to carry out a public purpose that could not otherwise be accomplished" (p. 15). For example, one goal of Oregon Water Resource Department's 2023 public engagement and outreach effort to update the state's Integrated Water Resources Strategy was "to hear from Oregonians who have not been part of state-level discussions on water in the past" (Oregon's Kitchen Table 2023, pp. 2-3). Although still state-led rather than truly "bottom-up", this attention indicates a governmental willingness to include citizen-level priorities on water management as part of a statewide strategy.

Community-led or collaborative plans do not necessarily explicitly challenge the logic of prior appropriation because they must comply with existing water law and observe existing water rights (Oregon Water Resources Department 2015). However, they can potentially highlight the shortcomings of prior appropriation through meaningful and inclusive public engagement that balances and reflects a multiplicity of interests (Oregon Water Resources Department, 2015; Anderson *et al.*, 2016; Oregon's Kitchen Table, 2023). In some cases, because this type of planning relies upon the representation of interests at the local level, CBNRM projects can actually introduce new forms of flexibility that are outside the traditional boundaries of prior appropriation. For example, in a case of innovative participatory water planning in Montana, water rights holders agreed to manage drought through a practice of "shared giving" in which each participant would contribute water, regardless of the "first in time, first in right" rules of prior appropriation (Anderson *et al.* 2016). Another example is the Columbia Basin Partnership Task Force, which used salmon and steelhead populations as a proxy to convene a diverse group of state, local, and tribal governments, and other associated stakeholders, to discuss how to secure water quantity and quality in the Columbia River Basin (NOAA 2020).

As a result of community-based planning processes, these plans' recommendations are rooted in a shared understanding of the interconnectedness and interdependence of water usage. They can address water allocation through a range of strategies: for example, planning processes in various basins in Oregon have recommended addressing gaps in water data and knowledge; emphasizing education and outreach efforts; or promoting more efficient irrigation practices or participation in water transfer programs. Community-based processes have the potential to establish new narratives and highlight or address the shortcomings of prior appropriation, as the Montana case illustrates (Anderson *et al.*, 2016). At the same time, CBNRM projects have limitations and challenges. They can be dominated by powerful interests such that the outcomes do not effectively challenge the status quo: for example, a case study of collaborative water management in Oregon's Deschutes Basin illustrated that traditional power dynamics can prevail due to limitations on who is able to effectively participate (Vineyard & Cantor, 2024). Additionally, they can involve significant transaction costs, and may suffer from a lack of confidence given that regulators often hold the final say.

Legal personhood and rights of nature

This strategy has only been used in a limited way to protect instream flows in the United States, but is worth discussing because it holds the potential to present a fundamental challenge to the idea of water as a commodity or a resource to be allocated. Legal personhood involves treating an entity – human or nonhuman – as a person for legal purposes. For decades, questions of whether and how the environment has or could have legal standing have been discussed by academics and legal scholars (O'Donnell 2019; Stone 2010). Environmental legal personhood provides the opportunity for standing, meaning that nonhumans can bring a lawsuit in court and the court must provide a remedy (Kubasek & Silverman, 2014). Over the past several decades, the theme has also been pursued through environmental litigation brought by nonprofit advocacy, government, and legal organizations. In some notable cases throughout the world, including India, Ecuador,

New Zealand, and Colombia, lawyers and activists have successfully granted legal personhood to rivers, recognizing their right to exist (Cano Pecharroman, 2018).

Critical scholars have pointed out that these lawsuits are, in practice, brought by humans on behalf of nature, and are addressed via human-assigned value, which raises potential issues around what human needs and values are prioritized (Kohl & Walenta, 2023). While granting legal personhood ostensibly acknowledges nature's right to exist for its own sake, centering the needs and rights of nonhuman nature outside of anthropocentric views, humans are still needed to provide legal representation. More fundamentally, scholars have argued that the argument is uncomfortably close to corporate personhood, and hinges on a Western notion of personhood as the center of rights, which risks reinforcing Western anthropocentric legal systems and paradigms (Reeves & Peters, 2021).

In the context of water in the Western US, several rivers have recently been granted legal personhood by Indigenous tribes. In 2019, the Yurok Tribe declared legal personhood for the Klamath River, a highly stressed river system, making the Klamath likely the first river in North America to receive legal personhood (Smith, 2019). In 2020, the Nez Perce Tribe passed a resolution recognizing legal personhood for the Snake River. In both cases, the Tribal resolutions cited a pressing need to protect salmon populations, and described their sacred responsibilities to protect the rivers, viewed as more than just resources to be exploited. As the Nez Perce resolution states: "the underlying driver behind the degradation of the Snake River is the legal system's overarching treatment of Nature as mere human property, to be exploited for short-term economic gains, rather than treating Nature as a life-giving entity with its own rights." Although both the Klamath and the Snake Rivers now hold legal rights within their respective tribal nation contexts that must be recognized by the US government, both rivers remain rivers in standard legal parlance, subject to prior appropriation and extractive uses, within the US legal context. As a result, it remains to be seen how these plural legal definitions will play out in practice and what type of power the resolutions will have in future litigation and court cases.

Water theft and illicit use

As an aside, we note that other types of extralegal challenges to water rights exist, as well – notably, water theft. Gibson-Graham (2006) categorize theft as a particular type of non-market transaction. Water theft represents a distinct type of challenge to prior appropriation, but for the most part theft does not result in an increase to instream flows – so we consider this theme as an aside rather than a main part of our discussion. Water theft can include diversion or pumping of water from rivers and aquifers without a permit, as well as water extraction that exceeds permit limits and requirements. For example, in 2022, a Central California public water district manager was indicted for illegally diverting over US\$25 million in water over many years (U.S. Attorney's Office, 2022); in 2015 a Northern California water bottling company defied orders to cease water diversions during drought (Cahill, 2015); and cannabis growing operations in Oregon, Colorado, and California have long been accused of stealing water (Wicker, 2021). Water theft persists because state agencies are frequently underfunded and do not have the capacity to enforce regulations (Bittle, 2022). As the saying goes, laws without enforcement are just suggestions; even the prior appropriation system risks erosion without enforcement capacity.

Although water theft does not increase instream flows, it does raise important questions about legitimacy of water uses: what water uses, by whom, and in what circumstances should be considered legitimate? For example, some scholars and activists frame water as a human right and argue that corporate theft of this crucial public resource is the real problem (Barlow & Clarke, 2017). Critical geographers have noted that policing of water theft is an uneven biopolitical act in which some are punished while other arguably unfair models of water management are accepted (Meehan, 2013). Others have made the case from a decolonial perspective that, given the historical context discussed in Section 5, appropriative water rights themselves are a form of resource theft from Indigenous communities, enacted through processes of settler colonialism (Curley, 2021). In the context of prior appropriation, it is worth questioning how and why certain types of water extraction are deemed legitimate and acceptable, while others are constituted as illegitimate or illegal.

7. Discussion: Comparing strategies and interface with prior appropriation

In this research we followed a Gibson-Graham inspired "diverse economies" approach of identifying a wide array of strategies for securing water for the river, each of which involves complex place-based hydrosocial relations. Each of these many examples and strategies could be the subject of its own research article (indeed, many have been). Each has important nuance and context, which we do not have space to fully unpack here. Yet, considering all of them together allows for a fuller picture of how prior appropriation is being utilized and challenged (Table 2). In all of these cases, prior appropriation acts as the elephant in the room, utilizing or responding to the water rights system. Each has a different orientation toward the water rights system, as some approaches fit neatly within the confines of prior appropriation, thus affirming the doctrine, while others hold the potential to present a more fundamental challenge. We note these as "potential" relationships or challenges to prior appropriation, because many of the strategies we have discussed could be read in multiple ways, and the specifics of their implementation matters.

Category	Lead actors	Mechanisms	Usage, reception, effectiveness	Relationship to prior appropriation	Framing of water
Market-based approaches	Private entities, individual water rights holders, water trusts	Buying or leasing existing water rights for instream flows.	Varies based on state policies. Effectiveness varies based on priority date, permanence of transaction, etc. Often framed as "win win."	Affirms/ legitimizes prior appropriation, adding environment as additional, equal user.	Water = commodity
Regulatory and legal approaches	Federal and state government, Tribal entities	Setting aside certain flows as outside of prior appropriation system.	Highly effective in theory; usage varies by type. Can be highly controversial and litigated, which can limit usage.	Potential to challenge or limit prior appropriation by removing water from allocation system.	Water = public good
Community-based natural resource management	Community groups, sometimes supported by state resources	Communities come to agreement over how to use or share water.	Usage varies; can be a resource-intensive and time-consuming process.	Potential to sideline importance of prior appropriation if allocations are a function of community decisions.	Water = community resource
Rights of nature	Nonprofits, Tribal entities	Recognizing rivers or other non-human entities as persons.	Minimal usage in US. Effectiveness TBD.	Potential to challenge prior appropriation by reframing water as a person, not just a 'resource.'	Water = person and rights holder

Table 2: Comparison of approaches to secure water for rivers.

Market-based approaches utilize prior appropriation as a tool to move water from extractive to instream use. Market-based approaches do not challenge the fundamental basis of prior appropriation, but instead, introduce ecosystem users as an additional set of actors in the market of water rights. This approach may be more publicly acceptable than something like legal personhood because it is more familiar and does not

fundamentally challenge status quo power dynamics. Existing water rights holders are typically paid for their rights, which increases acceptability from these stakeholders. While the approach can be effective at securing water for rivers, if the dates of the water rights are not senior enough, rivers can be left vulnerable. Additionally, the approach relies upon voluntary participation of sellers, and is sometimes temporary in nature. Moreover, market-based conservation approaches have been critiqued by critical geographers who note that they treat nature as a commodity and affirm a capitalist-centric status quo. Water rights sales and transfers frequently do not account for externalities such as groundwater or community impacts associated with the transfer of water from one use to another (Cantor, 2017). Additionally, a market-based approach to water rights stands to exacerbate racial inequities by concentrating wealth in the hands of those with senior water rights, which were allocated during times when many people of color were prohibited from owning land— as we illustrated in section 5 of this article.

In contrast, legal approaches such as the public trust doctrine, federal laws like the ESA and CWA, as well as rights-of-nature based approaches involving legal rights of rivers, hold potential to shift water rights out of the domain of prior appropriation. They can challenge the doctrine of prior appropriation by declaring that certain water is beyond appropriation: public-oriented needs such as ensuring ecosystem integrity come first, and must be ensured before water is available for appropriation. More specifically, the rights-of-nature approach holds potential to challenge prior appropriation by declaring that a river has the right to be healthy before water can be appropriated— although, as noted above, critics have noted that the approach risks deepening Western notions of property and personhood (Kohl & Walenta, 2023; Reeves & Peters, 2022). As such, these approaches hold the possibility to recognize water as something other than a commodity—although they do not guarantee this outcome. Both also rely upon a strong legal context in which the state has the power to declare a resource out-of-bounds for extraction and enforce this declaration. In practice the regulation of water in ways that challenge prior appropriation is highly controversial because some see it as "takings" of property, although other lawyers point out that water is a public good to be allocated by the state. These cases are frequently contested through lawsuits from those who perceive their property rights as threatened.

While regulatory and rights-of-nature based approaches share a common recognition of water as more-than-commodity, there are major operational and philosophical differences between them. In practice, under the umbrella of regulatory and legal set-asides of water for rivers, there are a huge range of laws and strategies at work with various strengths and weaknesses. Legal personhood remains less tested in practice. More philosophically, legal personhood approach frames rivers as persons who are themselves legitimate rights holders, whereas many regulatory-based approaches are ultimately grounded in anthropocentric interests (for example, the Clean Water Act's goals of "fishable, swimmable, drinkable" water are ultimately framed in terms of what water can do for humans). However, recent critiques of rights-of-nature based approaches argue that while the approach is purportedly a paradigm shift away from anthropocentric framings, in practice it has been mobilized predominantly by white settler communities to protect entrenched socio-environmental interests characteristic of white liberalism (Kohl & Walenta, 2023).

Community-based approaches are in a somewhat unique position. They serve as a way to negotiate and address the limits of prior appropriation in that a community might decide, together, to allocate water resources differently (Anderson *et al.*, 2016). Many community-based efforts are actually government-led planning processes, and in other cases are motivated by fear of regulation, striving to solve problems at a local level so that 'top-down' regulators do not need to be involved. In practice, these efforts are very difficult: power dynamics are hard to navigate, it is hard to bring everyone into agreement given differing philosophies toward water (Anderson *et al.*, 2016), and voluntary agreements risk collapse (Gosnell & Kelly, 2010). Even so, applying a Gibson-Graham-inspired approach of recognizing diverse practices, their existence is important to recognize, as community-based agreements present a potential challenge to existing water rights systems and could make space for a different kind of politics.

8. Conclusions

Prior appropriation is a powerful legal structure shaping hydrosocial relationships. It shapes how drought and water scarcity are experienced, and remains the predominant system of water rights in the Western US

despite its racialized history, problems and limitations. However, applying a diverse economies approach (Gibson-Graham, 2008) shows that there are many examples of on-the-ground projects that work around, within, or against prior appropriation to secure water for rivers. Water managers (including those from public agencies, nonprofit organizations, tribal entities, and other communities) across the Western US are using a wide range of mechanisms and practices to respond to the contemporary challenges and issues presented by prior appropriation.

The existence of these many strategies raises deep and difficult questions about whether and how hegemonic structures, ideologies, and practices can be challenged. This can be interpreted in several ways. From one perspective, the protection of rivers is happening as a result of hard work by environmental, Indigenous, and other activists working against the status quo, in spite of the dominance of a system that was not originally meant to support anything but extractive activity for the benefit of white settler colonists. In this sense, these challenges are powerful subversions. But, from another perspective, it can be seen as evidence of prior appropriation's stickiness and resistance to change. In turn, this stickiness can be viewed as either a demonstration of prior appropriation's successful flexibility and ability to adapt to changing circumstances, or of its insidious dominance and resistance to fundamental challenge; or both at once, as its dominance is enabled by its flexibility and ability to accommodate change. There are echoes with fundamental debates in critical theory and social sciences about the relative weight of structural power versus the poststructural focus on process and agency (Alhojärvi, 2020; Glassman, 2003). We do not attempt to resolve these perennial academic debates, but rather, to describe and engage with the existence of alternatives.

Although all of the approaches discussed here can result in more instream flow – more water for the river – the many different approaches we have discussed here reflect different hydrosocial imaginaries and ontologies of water. Here, Gibson-Graham's model of "thick description and weak theory" becomes useful in understanding the differences, nuances, and orientations of these various approaches toward capitalism (e.g., Collard & Dempsey, 2017). Some represent relatively minor tweaks or reforms while others can be seen as more radical challenges. Strategies that center the role of markets, such as buying or leasing water rights for instream flows, may successfully secure more instream flows but they do so by treating water as a commodity, cementing prior appropriation by working within the framework. Regulatory and legal personhood-based strategies may at times present more of an existential challenge to prior appropriation, in which water takes on significance as a habitat, ecosystem, public good, or even a person. These approaches have been more controversial and lawsuit-prone than market-based strategies because they present a challenge to dominant power dynamics and property systems. Legal personhood for rivers holds the possibility of an alternative hydrosocial model for considering relationships between humans and river systems (though in practice relies upon Western anthropocentric legal systems). None of these strategies guarantees a fully successful challenge to capitalism and property rights, but together these approaches lend weight to arguments that resources are for more than human exploitation, that non-human beings like rivers have a right to exist, that the public good includes more than economics, and that settler colonial resource grabs are not inevitable or uncontested. This approach aligns with critical legal scholarship, which has called for treating law as a process that is constantly being co-constituted by people in place, rather than law being a static "thing" (Bennett & Layard, 2015; Cantor, 2016).

We conclude by pointing to future research directions that would be helpful in exploring this theme. Building on our initial work, a more comprehensive database of cases and strategies being used across different states could facilitate comparison and transferability of ideas and lessons learned. While many detailed case studies exist, particularly in the area of law review articles, further research could involve development of comparisons that put multiple cases from different places in conversation with one another. This could shed additional light on what geographic, political, or legal factors might facilitate or hamper different strategies. Building on the Oregon case study presented here, future research could attempt to uncover the racial demographic breakdown of water rights holders and further investigate place-based histories of racialized dispossession regarding water. Further research could also involve interviewing water managers, tribes, state agencies, disadvantaged communities, and water rights holders to learn more about their nuanced perspectives on different strategies, approaches, and the future of prior appropriation and Western water rights systems.

Despite the dominance of extraction and growth paradigms in natural resource management, exemplified by the prior appropriation water rights allocation system, diverse strategies to support rivers do exist in practice. Whether or not they can fundamentally challenge prior appropriation is still an open question, but their existence calls for recognition and description. Frameworks and methods drawn from political ecology and legal geography can help us describe, understand, compare, and contextualize them.

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