

Portland State University

**PDXScholar**

---

Geography Faculty Publications and  
Presentations

Geography

---

5-12-2022

# Just Water Transitions at the End of Sugar in Maui, Hawai'i

Chris Knudson  
*University of Hawai'i*

Alida Cantor  
*Portland State University, acantor@pdx.edu*

Kelly Kay  
*University of California, Los Angeles*

Follow this and additional works at: [https://pdxscholar.library.pdx.edu/geog\\_fac](https://pdxscholar.library.pdx.edu/geog_fac)



Part of the [Geography Commons](#)

**Let us know how access to this document benefits you.**

---

## Citation Details

Knudson, Chris; Cantor, Alida; and Kay, Kelly, "Just Water Transitions at the End of Sugar in Maui, Hawai'i" (2022). *Geography Faculty Publications and Presentations*. 248.  
[https://pdxscholar.library.pdx.edu/geog\\_fac/248](https://pdxscholar.library.pdx.edu/geog_fac/248)

This Post-Print is brought to you for free and open access. It has been accepted for inclusion in Geography Faculty Publications and Presentations by an authorized administrator of PDXScholar. Please contact us if we can make this document more accessible: [pdxscholar@pdx.edu](mailto:pdxscholar@pdx.edu).

# Just Water Transitions at the End of Sugar in Maui, Hawai'i

Chris Knudson, Alida Cantor, Kelly Kay

## Introduction

In December 2016, Hawaiian Commercial and Sugar (HC&S) ceased sugar production on 36,000 acres of Maui's Central Valley, ending production on a tract of contiguous farmland that occupies close to 8% of the island. This event marked the end of an era. Since the late 1800s, Hawai'i's economy and politics had been dominated by large agricultural interests, in particular the "Big Five" sugar producers—Castle & Cooke, C. Brewer & Co., Amfac, Theo H. Davies & Co, and Alexander & Baldwin (the owner of HC&S when production ceased)—along with smaller sugar companies such as Wailuku Sugar Company, one of Maui's oldest (MacLennan, 2014; Wilcox, 1997). In addition to their political influence, Hawai'i's sugar industry has controlled and fundamentally reshaped the flow of water resources across the islands.

With the end of sugar's 140-year reign, the island of Maui faces a unique period of transition. This raises critical questions regarding water: how will newly available water will be allocated and used, and what kinds of ecological or agricultural systems will be supported by the water formerly diverted to sugar? Questions of water justice also feature prominently: will new water allocation regimes be culturally, politically, and ecologically just? There are several different pathways that the island could take, each informed by different paradigms and shaped by particular coalitions of actors. The island must simultaneously contend with legacies of sugar infrastructure, legal and social barriers, entrenched political and economic interests, histories of colonialism, and ecological conditions. In this article, we consider multiple dimensions of that transition, including the key players and voices, critical considerations specific to water, and the many barriers and challenges to equitable outcomes. Our conclusions offer insights into not only Maui's possible futures but a wide range of water systems whose users struggle to manage it toward more just ends.

We locate our intervention within bodies of work on water justice and just transitions. A just transition is the structural reconfiguration of a system, typically one centered around a resource, that attends to social and environmental justice (Newell and Mulvaney, 2013). This work tends to consider climate or energy, and water remains an understudied dimension; this paper contributes to that small but critical body of work. Given the specific material, social, cultural, and political-economic characteristics of water, we turn to water justice scholarship to facilitate integration of water-specific dimensions to better understand this transition.

In this article, we first review and connect literature on water justice and just transitions. We then describe Hawai'i's historical context of sugar production and water management, and next describe several distinct pathways for water transitions in Maui, related to different paradigms of food systems and agricultural production. Following this, we analyze several elements of just water transitions in depth, focusing on socionatures of the irrigation ditch system, water rights issues, and situated knowledges of different actors. We argue that analyses of just water transitions must be both grounded in broader concepts of just transitions and engage with place-based, water-specific concepts in order to provide focused and meaningful analysis. We then discuss generalized principles for water justice transitions, organized around the concepts of

space, time, and tradeoffs. We conclude by considering our argument's applicability to Maui specifically and where it can apply more broadly to other water transitions.

## Literature Review

### *Water justice*

The field of water justice examines inequities and power dynamics related to water access, quality, safety, affordability, allocation, and decision-making across multiple geographic regions and scales (Boelens et al., 2018; Sultana, 2018; Sultana and Loftus, 2019; Zwartveen and Boelens, 2014). Water justice scholarship is rooted in the broader field of environmental justice, which focuses on (in)equity and racism in environmental decision-making and outcomes. Environmental justice has grown from an activist-driven realm primarily focused on siting of toxic waste into a geographically and topically diverse body of scholarship and activism (Schlosberg, 2009; Sze and London, 2008). Water justice builds upon a broader environmental justice framework to examine issues of *distribution* (who has access to resources and who is exposed to hazards), *recognition* (of cultural identities and practices) and *participation* (who makes decisions) (Schlosberg, 2003; Zwartveen and Boelens, 2014, drawing from Fraser, 1997).

Geographers and other scholars studying water justice have examined a broad range of issues including water quality and safety (e.g., Pulido, 2016; Ranganathan, 2016); household water access and water security (Deitz and Meehan, 2019; Meehan et al., 2020); as well as water rights and allocation issues related to uses such as agricultural irrigation, urban development, dams, and mining (e.g., Cantor and Knuth, 2019; Hommes et al., 2016; Perreault, 2014). Water justice scholarship emphasizes power relations in many forms, including the politics of knowledge, governance, and decision-making (Boelens et al., 2018; Sultana and Loftus, 2019; Neal et al. 2014). Importantly, scholarship on water justice critically examines root causes of injustice and inequity, including racial inequity and racial capitalism (Pulido, 2016) and gender inequity (Haeffner et al., In press). Indigenous water justice issues and the water injustices associated with settler colonial water management have been an important recent focus, particularly in the contexts of Australia and the Western United States (e.g., Berry and Jackson, 2018; Curley, 2019; Hartwig et al., 2018, 2021; Robison et al., 2018).

Water has distinctive physical, social, and material properties that make it a unique resource (Bakker, 2012; Neal et al., 2014). For example, as Bakker explains, water flows, moves, dissolves, and transports, which can impact public health through transportation of contaminants, bacteria, and metals. In combination with social, economic, and racial inequities, these material properties have important justice implications. For example, the infamous case of lead poisoning in Flint, Michigan, demonstrated the intersection between racialized injustices and water's ability to dissolve and transport heavy metals (Pulido, 2016; Ranganathan, 2016). Water travels through the hydrologic cycle and seeps through the ground: for example, cases of domestic wells in predominantly lower-income Latinx households running dry during California's 2011-2017 drought illustrated the interactions between groundwater hydrology and racialized power relations (Egge and Ajibade, 2021). Importantly for our analysis, as Indigenous-led social movements around the world have proclaimed in many languages, "Water is Life" (e.g., Estes, 2019; Jewett and Garavan, 2019). In one sense, this means that water is a necessary biophysical

condition for life, and its quality and quantity impact human and ecological health. In a deeper sense, in many Indigenous cultures the idea that “water is life” is a literal concept with spiritual connotations (e.g., as Sproat describes from a Native Hawaiian context, 2011), referring to a relational mode of being in which water is not a resource to be exploited but rather the source of all life, sometimes described as a mother or kin relation (e.g., as described by Jewett & Garavan from a Lakota perspective, 2019; see also Anderson et al., 2019; Yates et al., 2017). More broadly, recent calls for Indigenous environmental justice have articulated the need to recognize and take seriously these epistemological and philosophical differences, and to clearly address Indigenous concepts of justice (McGregor et al., 2020). In considering issues and questions of water justice, it is therefore important to consider the unique qualities, properties, and complexities of water—including material/biophysical properties, racialized power relations, and cultural and spiritual meanings—to complement a more generalized environmental justice framework.

### *Just transitions*

Just transitions scholarship focuses on transformative change and structural reconfigurations to socio-technical systems with a goal of sustainability (Newell and Mulvaney, 2013). While environmental justice scholarship frequently focuses on describing, documenting, and explaining root causes of injustices (all of which are important tasks), we argue here that just transitions work can provide insight into transformations and paths toward more equitable practices of water allocation and decision-making.

Just transitions scholarship stems from work on sustainability transitions (Elzen et al., 2004; Geels, 2005b; Kemp et al., 1998; Van den Bergh et al., 2011), which seeks to understand the technical, social, and political changes needed for structural transformations in order to achieve more sustainable futures (Elzen et al., 2004; Geels et al., 2017). Geographers have critiqued sustainability transitions perspectives for focusing on elite actors and technical expertise, arguing for deeper recognition of the power dynamics, politics of representation, and place-specific factors involved in sustainability transitions (Lawhon and Murphy, 2012; Murphy 2015). In light of this critique, the idea of “just transitions,” an idea with origins in policymaking, trade union, and activist circles seeking to protect workers in decarbonization transitions (Climate Justice Alliance, 2020; Stevis et al., 2020) has been leveraged by geographers and other scholars (Eaton, 2021; Heffron and McCauley, 2018; Newell and Mulvaney, 2013). Much of the academic work on just transitions is focused around the need for structural and systemic low-carbon energy transitions to include an emphasis on health, sustainable livelihoods, socio-environmental justice, tradeoffs, power, and political economy (Heffron and McCauley, 2018; Newell and Mulvaney, 2013).

Conceptions of justice in the just transitions framework—as is the case with water justice—tend to be borrowed from the field of environmental justice, examining distributional, participatory (or procedural), and recognitional justice (Agyeman, 2005; Schlosberg 2003). Just transitions brings to the forefront a focus on tradeoffs across different geographic and temporal scales: Stevis and Felli argue, for example, that “the relational and historically grounded examination of scale and scope is necessary because what may seem as a just practice at one scale may well be unjust or deleterious at another” (2016: 40). Newell and Mulvaney recognize that accomplishing all goals at all scales may not be possible, so tradeoffs are a natural part of negotiating just transitions. As Newell and Mulvaney point out, these tradeoffs are highly political, and are

frequently still negotiated in the usual arenas at a range of scales, as “who defines *what is just*, and *for whom*, will be determined by power struggles in particular contexts” (2013: 138, emphasis in original).

Just transitions literature has focused largely on energy and climate and has not engaged directly with water and water justice. Even within the much broader field of sustainability transitions, water remains a niche area of study compared to energy (Markard et al., 2012). Literature that does examine water through the lens of sustainability transitions focuses on urban water supply, treatment, and sanitation (Binz and Truffer, 2012; Brown et al., 2013; Geels, 2005a, 2006; Lieberherr and Truffer, 2015; Sedlak, 2014), with a small thread of scholarship examining water governance, policy, and power dynamics in water transitions (Sullivan et al, 2017; Nastar and Ramasar, 2012). The water-focused sustainability transitions literature – paralleling sustainability transitions literature more broadly – tends to focus on incentivizing technological and infrastructure change, with less focus on transformative dimensions such as political economy or power relations.

*Synthesizing frameworks of water justice and just transitions*

We argue that just transitions can and should be effectively applied to the study of water justice. Water justice and just transitions scholarship have much in common: both take a more critical perspective than is typical in the sustainability transitions framing, with a stronger focus on transformative politics. The concept of justice as multifaceted (including distributional, participatory, and recognitional elements) is shared between the two fields. Yet there are important differences that make it useful to bring these areas of study into conversation. First, the just transitions literature differs from water justice scholarship in its emphasis on tradeoffs, timelines, and the process of shifting a system from one configuration to another. Focusing on tradeoffs between different actors, scales, and types of justice (e.g., what is just, for whom, at what scale?) when moving toward sustainability goals provides an important emphasis that can strengthen studies of water justice. The emphasis on transition as a key process, and the study of processes of change and movement toward just future conditions, provides a useful addition to water justice. Second, water has distinct social importance and material properties, and conflicts over water involve different socioecological configurations than energy (the focus much of the just transitions literature at present). Water involves a specific set of human and nonhuman actors; its infrastructure differs; and its cultural meanings, physical/material properties, and legal systems are unique. Given these important differences, lumping all resources together to study ‘sustainability transitions’ writ large is problematic, making the case for focusing on specific resource transitions in specific contexts and places. We argue that focusing on just *water* transitions in particular places will allow for a stronger understanding of the moments and processes of change involving water.

In Table 1, we compare two sets of conceptual frameworks: first, a just transitions framework as proposed by Heffron and McCauley (2018) and building upon Schlosberg (2003)’s framework of environmental justice more broadly; and second, a collection of concepts identified by Zwarteveen and Boelens (2014) as particularly important to understanding water justice.

Key element	Examples of key questions
<p><i>Just transitions framework</i> (from Heffron &amp; McCauley 2018; Schlosberg 2003)</p>	

Participation	Who makes decisions? Who has authority over rules, laws, and policies?
Distribution	How are ‘goods’ (e.g., resources) and ‘bads’ (e.g., pollution) distributed?
Recognition	Whose identities, livelihoods, and practices are recognized and prioritized as important?
Space	Where are transition ‘events’ happening? What local, national, and international elements are involved?
Time	What are the transition timelines? Is transition happening fast enough?
<b><i>Water justice framework</i></b> <i>(from Zwartveen &amp; Boelens 2014)</i>	
Situated knowledges	How are water-related problems being framed? What positionalities or assumptions are at work?
Socionatures	How are boundaries around nature, society, and technology defined and mobilized?
Contestation	Multiple echelons of water contestation: (1) Distribution: who has access to water and infrastructure? (2) How are water rules, norms, and laws contested? (3) Who has authority to make decisions and participate in policy making? Whose definitions and interests prevail? (4) What discourses, languages, and practices are used to describe water problems and solutions?
Complexity	How are issues of complexity handled? Through ordering and modeling, or through examination of power and situated perspectives?
Water rights (Legal dimensions)	How are water rights defined and understood? How are local norms, practices, and power relations constitutive of water rights?
Scale and scalar politics	What temporal and geographical scales are privileged? How are boundaries defined?

Table 1. Key concepts in just transitions and water justice.

## Methods

This paper draws on research conducted from 2017 to 2019 on the islands of Maui and O‘ahu, Hawai‘i. We used a mix of qualitative and semi-ethnographic methods, drawing from multiple sources. We conducted 46 semi-structured interviews with a range of key stakeholders with an interest in and knowledge about Maui’s water futures, including Native Hawaiian activists and community members, water managers, large- and small-scale farmers, former sugar industry employees, local and state government employees, environmentalists, scientists, and attorneys. Interviewees were first identified from documents on Maui’s water transitions, including news articles and court documents, and from conversations with existing research contacts on Maui. We supplemented this list of initial interviewees through snowball sampling. The content of the interviews focused on the recent legal challenges to water rights allocations in Maui, opinions on Maui’s shifting water uses, and the decision-making processes around Maui’s water rights and resources in the context of the end of sugar production. We spoke with some interviewees more than once, and some interviews were conducted in small groups with more than one interviewee from a particular organization. Interviews lasted between 1-3 hours; we either recorded and transcribed the interview or took detailed notes, according to interviewee preference and logistics.

We also conducted participant observation at community meetings, site visits of water infrastructure, kalo (taro) farms, and ditch systems, and volunteer work with environmental groups. We triangulated information from interviews with archival materials from the University of Hawai‘i School of Law Library, the Maui Historical Society, the Bailey House Museum, and the Hawai‘i Commission on Water Resource Management, including testimonies and exhibits submitted for water rights cases, news articles, and reports and other secondary materials. Using a grounded theory approach, we combined these multiple data sources, analyzing them for salient information as key themes of interest emerged from the research.

The three authors of this paper identify as white non-Hawaiian North Americans, although one researcher now lives and works in Hawai‘i. We have retained awareness and reflexivity of our positionality as outsiders to Hawaiian culture and communities throughout the research process, and have made efforts to reflect participants’ ideas and views as accurately as possible.

### **Context and history of sugar and water in Maui**

Sugar’s influence on Hawaiian water management has been profound (MacLennan, 2014; Wilcox, 1997). The initial rise of cane sugar production was facilitated by the introduction of private property rights by King Kamehameha III through the 1848 Māhele Act (that divided Hawaiian land) and the 1850 Kuleana Act (that allowed native tenants to acquire fee-simple title to their lands). These two acts were designed as a way to regulate both Hawaiian subjects and foreigners, like commercial sugar producers, who were increasingly settling in Hawai‘i and becoming integrated in the economy. Prior to the arrival of explorers like Captain Cook, Christian missionary families and businesspeople that built up Hawaii’s sugar industry, land was managed under a system in which the islands were divided up into wedge-shaped districts, called moku, that typically stretched from mountaintop to the sea. Each moku contained a number of smaller units called ahupua‘a that functioned as socioecological communities with local resource management (Winter et al., 2018). For maka‘āinana (commoners), the ahupua‘a was the most basic unit of land for which they had access to resources. The maka‘āinana worked to provide year-round food – by tending garden plots, fishponds, and lo‘i kalo – under the supervision of a konohiki, who coordinated land and water use, managed property rights, and distributed resources according to the orders of the ali‘i (members of the hereditary upper class) (Fisher, 2015).

The moku of Nā Wai ‘Ehā on Maui was historically the largest contiguous region for growing wetland kalo, a crop that is sacred to Native Hawaiians (Sproat, 2014). It is said that the first kalo plant was the elder brother to Hāloa, the first Hawaiian man, thus establishing a relationship of mutual sustenance. Kalo is generally grown along streams because lo‘i (wetland kalo patches) require large volumes of flowing water. Water (or wai in Hawaiian) has deep connections to multiple dimensions of life in Hawai‘i, which is reflected in the language: wai is not only foundational to wealth (waiwai) and the law (kānāwai, literally “relating to water”), but it is the physical embodiment of Kāne, one of the four principal gods (Fisher, 2015; Sproat, 2009). Fresh water was thus not “merely a physical element; it had a spiritual connotation” (Handy et al., 1991).

After kalo reached a production peak in the 1860s (MacLennan, 2014), it declined from about 20,000 acres across the Hawaiian Islands, to about 1300 acres by 1900. By the early twentieth century, kalo covered less than 400 acres (Cho et al., 2007). While there were multiple causes for this decline, including a shrinking Native Hawaiian population from introduced diseases (Cho et

al., 2007), plantation agriculture dispossessed Native Hawaiians of the land and water necessary to engage in traditional and customary practices. In the second half of the nineteenth century, plantations bought or cheaply leased over 500,000 acres of Government and Crown land (MacKenzie, 2015). The rise of sugar and pineapple plantations and ranching remade the Hawaiian Islands' land tenure arrangements, waterscapes, demography – through the arrival of foreign workers – and political structure, as the business community played a key role in overthrowing the Hawaiian Kingdom in 1893 (MacLennan, 2014). In particular, to reshape Maui around the demands of sugar—a notoriously “thirsty” (Wilcox, 1997) and spatially extensive crop—a vast conveyance system was constructed between 1850 and 1930 to capture nearly all flowing water on the island, bringing it to the dry Central Valley and interrupting the flows which Native communities relied upon (Figure 1).

[FIGURE 1 HERE]

As the “Big Five” failed to compete with international producers and began to transition away from sugar in the 1970s, their considerable political power, exercised through their control over jobs, land, and water infrastructure, began to weaken. By 1995, only A&B remained of the Big Five, with the balance of Hawai‘i’s sugar produced by small plantations on Maui and Kaua‘i (MacLennan, 2014). It was in this opening, in 2003, that the newly formed Hui o Nā Wai ‘Ehā,<sup>1</sup> composed of environmental activists, Native Hawaiians, and kalo farmers, partnered with the environmental group Maui Tomorrow, the Office of Hawaiian Affairs, and the legal firm Earthjustice to petition the Water Commission<sup>2</sup> to restore mountain to ocean streamflow to the Nā Wai ‘Ehā (the four great waters) of Maui—the Waikapū, Wailuku, Waiehu and Waihe‘e.<sup>3</sup> Hui o Nā Wai ‘Ehā and Maui Tomorrow (hereafter, “Community Groups”) had to contest the status quo streamflow because, in 1987, the newly formed Water Commission lacked the funds to establish scientifically-based standards for Hawai‘i’s almost 400 perennial streams. The Commission thus codified the sugar companies’ diversions as the standard, even though they were manifestly insufficient to protect the public trust (Sproat, 2009).

After more than a decade of legal struggles, including a 2009 Water Commission hearing that lasted 11 months with 77 witnesses and over 600 exhibits, the balance of use in the watershed was shifted (see Cantor et al., 2020 for a detailed history). While this landmark decision resulted in 29.4 million gallons per day of water being returned to the four streams, the Community Groups have continued to struggle for a fuller recognition of their rights to water. The partial restoration of streamflow is being used to support kalo cultivation as well as aquatic life. But it was detrimental to the former Wailuku Sugar Company, which in the twilight years of sugar had

---

<sup>1</sup> In Hawaiian, a “hui” is an organization.

<sup>2</sup> In 1987, when sugar interests were still dominant, the State of Hawai‘i created a Water Code designed to fulfill a constitutional mandate that “All public natural resources are held in trust by the State for the benefit of the people.” In order to uphold the Water Code, the State established a Commission of Water Resources Management (hereafter, “Water Commission”).

<sup>3</sup> While multiple contestations over water occurred on Maui around the same time, for the sake of space, we will focus our analysis on Nā Wai ‘Ehā, a region that is more urban than other kalo-producing parts of the island.



rebranded itself into the Wailuku Water Company to use their water conveyance systems to sell that water for profit to Maui County and private developers.<sup>4</sup>

In the next section, we move from this review of Hawai‘i’s history of commercial sugar to describe several groups which, although they overlap in some ways, subscribe to different paradigms of land and water use for Maui’s water resources.

### **Paradigms of Water Use and Agricultural Production**

Maui is in the middle of a historic water transition that is shifting established water systems and use practices in ways that will impact socioecological relations on the island for the foreseeable future. While the current transition is precipitated by the end of Maui’s sugar industry, it also results from long-term activist efforts to challenge dominant industry-oriented water allocation practices. The Maui case fits into a recent history of legal challenges to industrial water allocation on the Hawaiian Islands, from the landmark Waiāhole Ditch case on O‘ahu through cases in East and Central Maui (Ho‘okano, 2014; Sproat, 2011, 2014; Sylva, 2006), as well as attempts to proactively set instream flow standards in West Maui and Kaua‘i in hopes of avoiding future conflicts (Ige and Case, 2021).

Here we review three paradigms for understanding transitions around water use for Maui, backed by loose and sometimes overlapping coalitions of actors. We begin by describing the previously dominant paradigm of industrial sugar production, which has generated intense loyalty even in the final days of sugar, then describe two alternative paradigms that have long coexisted with sugar but could play a larger role into the future: a kalo-centered version and a version that centers diversified agriculture. While these two alternative models for future water use and agricultural production are not necessarily mutually exclusive, they each have a distinct trajectory and emphasis, as well as different historical roots. The three paradigms are briefly outlined in Table 2.

<b>Paradigm</b>	<b>Hallmarks of the Approach</b>	<b>Framings &amp; discourses of water</b>
Industrial Sugar Production	Dewatering of streams; large-scale water conveyance and irrigation; industrial production for export.	Efficiency-driven, production-focused. Highest and best use of water is for profit-driven export agriculture.
Kalo and Cultural Practices	Mauka to makai (mountain to sea) flow of water; restorative justice; reconstructing the moku; reconnection with history and culture through kalo.	Ola i ka wai (Water is life). Water is a manifestation of the god Kāne, the giver of life.

<sup>4</sup> For more background on pre-contact Hawai‘i, see Nakuina (1904); for a history of land politics, see Cooper and Daws (1990); and for detailed information about water law, see Sproat (2009).

Diversified Agriculture	Conveyance of water and irrigation, though with less dewatering of streams than with sugar production; can include production of crops for both export and domestic consumption.	Water is primarily still for agricultural production for profit but should support domestic Hawaiian food security; water should be shared between kalo and small- and large-scale agriculture.
-------------------------	--	---

Table 2: Three Paradigms of Water Use

*Transitioning away from industrial sugar production in Maui*

Sugar production has dominated Maui’s water landscape for over a century, as much of the island’s flowing water was captured through vast conveyance systems and transported to plantations for irrigation. This movement of water across the island has critically impacted Native Hawaiian cultural practices, particularly the cultivation of kalo—which was made nearly impossible without the continuous availability of flowing water. As Native Hawaiian attorney and scholar Kapua Sproat puts it, “plantation agriculture’s wholesale appropriation and redirection of surface water in this region physically and spiritually disemboweled Kanaka Maoli [Native Hawaiian] communities” (Sproat, 2011: 128).

The transition away from sugar has not been an easy one: sugar’s interests are deeply entrenched and discussion of transition away from plantation agricultural production has evoked expressions of deep-seated nostalgia paired with efforts to continue to assert control over resources. When HC&S announced in early 2016 that it would cease its Maui operations by the end of the year, the news generated reactions of sadness across the islands, from public figures to industry employees. For example, U.S. Senator Brian Schatz (D-HI), in a press release that exemplifies how many felt about sugar’s contributions to Hawai‘i’s culture, politics, and economics, stated: “I am deeply saddened by today’s announcement [...] For over 130 years, sugar production on Maui was more than a business, spawning a way of life and generations of hard working women and men who made our State remarkable and great” (Schatz, 2016). Similarly, during our fieldwork we spoke to a man who worked on plantations since the 1950s. Recalling his experiences occasionally brought him close to tears. He spoke nostalgically about his life as a junior sugar manager, telling us that his time in the industry “was bittersweet, but we survived. I wouldn’t have traded it for anything. I’m glad I was able to do it” (Interview, August 14, 2018). The sadness and mythologizing present in our informant’s quote, as well as Schatz’s statement, highlight the extent to which Maui’s social fabric has been shaped by the production of sugar. Nostalgia, and existing path dependencies involving skills and infrastructure, play a major role in shaping discussions around transitions.

Even as sugar production waned, sugar executives worked to retain their control over key resources. A&B’s political and social power was especially strong in Maui, where the company began and held its largest concentration of resources. Even in HC&S’s final decade, executives at A&B used their position as Maui County’s largest employer to maintain control over water. During the 2009 Water Commission hearing, A&B’s Chief Financial Officer threatened to close its last sugar processing plant and lay off 800 workers if streamflow was restored. The A&B Officer said: “We do not believe that there was any intent to shut down HC&S through the

proposed [stream restoration]. Nonetheless, that will be the end result if you adopt the recommended decision” (Sproat, 2014: 212).

Industry control over water has also long been exerted through political and administrative processes. Although the Water Commission was required from its creation to have at least one member with “substantial experience or expertise in traditional Hawaiian water resource management techniques and in traditional Hawaiian riparian usage” (Hawaii State Legislature, 1987), this requirement has not been historically honored (Ho‘okano, 2014). According to an environmental lawyer who petitioned the Water Commission in 2004 for restored streamflow, the Commission in its first decades was “pretty much an arm of the plantation industry [...and...] the plantation club was going to try to dominate this Commission for as long as it could” (Interview, August 10, 2018). As a notable example, during A&B’s last decade of commercial sugar, the company’s Vice President for Government and Community Relations served on the Water Commission, even though she had to recuse herself on many cases. Some Water Commission members allied to the sugar industry felt an ownership over Maui’s water, with one retired member telling us that “we built the system, we’re going to control it” (Interview, August 14, 2018). Many Water Commission members’ loyalty to sugar and largescale agriculture stemmed from a mixture of personal employment, relationships, and the industry’s political and economic importance to the island.

#### *New visions for ancient traditions: Kalo farmers in Nā Wai ‘Ehā*

Among the three main crops brought to Hawai‘i by Polynesians – kalo, breadfruit, and sweet potato – kalo is the sacred crop. Kalo farmers in Nā Wai ‘Ehā are inspired by a vision of their moku before commercial sugar operations largely dispossessed their ancestors of land and dewatered their streams. The work to restore lo‘i kalo has been driven by the fundamental importance of kalo to Native Hawaiians. Speaking of the stream feeding his lo‘i, one kalo grower told us that as “a Hawaiian, this is life, and this is a living being to us. People that are on the other side of this [...] see this as a commodity. We see this as life” (Interview, May 18, 2017).

The desire to restore kalo cultivation has been a crucial driver of streamflow restoration efforts. It was through restoring their lo‘i that community members of Nā Wai ‘Ehā began to realize that there was insufficient streamflow to grow healthy kalo. “I was born and raised up here,” a kalo grower told us. “I’ve seen the dams, seen the diversions. [...] I knew what the purpose was, but I didn’t realize, OK, you know, if I was going to start growing kalo tomorrow, this is how much water I need” (Interview, May 18, 2017). As more people in Nā Wai ‘Ehā revitalized lo‘i, a core group formed a nonprofit organization, Hui o Nā Wai ‘Ehā, in 2003, to politically advocate for the restoration of mauka to makai (mountain to sea) streamflow. Even after water was returned to the four streams, the hui has continued its work to protect water rights by monitoring streamflow to ensure Water Commission decisions are being honored. The hui is also animated by a vision of restorative justice, with the “hope that our community is now transitioning away from plantation era agriculture, politics, and rhetoric” (Hui o Nā Wai ‘Ehā, 2019).

The hard work to restore lo‘i kalo went beyond the administrative tasks of the Water Commission hearing and the physical labor of clearing hau bushes and building terraces. Several

interviewees spoke of the difficulty in moving beyond the “plantation mentality” or “colonial mindset” that accepted the status quo of stream diversions. One young kalo grower placed this within a larger context of discrimination against Native Hawaiians that “makes people hate themselves and their culture because they were taught to do so by those in power” (Interview, January 21, 2019). In Nā Wai ‘Ehā, the younger generations have led the revitalization of kalo, often initially against the resistance of their parents and grandparents who saw it as a regression to the physically demanding farm work of the past. For some in older generations, transcending the plantation mindset means moving on from agricultural work, while many young kalo farmers are rejecting the plantation mindset by reconstructing the moku as it existed before sugar. With mauka to makai streamflow and a variety of locally grown poi being available for everyday consumption, people in Nā Wai ‘Ehā can have valued cultural experiences that their grandparents lacked. The lo‘i kalo have also become part of the education of children on Maui. Through school trips and opportunities to work with kalo, young people are not just learning about the past, but are able to imagine a future in which Native Hawaiians can actively manage land and water. For many Native Hawaiians that are not taught their past, kalo is an entry point to question the history of sugar and its role in overthrowing the Kingdom. One young kalo farmer reflected that “everyone loves the lo‘i: businesspeople, tourists, children. [...] No one objects to kalo” (Interview, January 21, 2019).

Given that a healthy lo‘i requires a continuous flow of cool water, a transition that centers kalo cultivation means less stream diversion and more instream flow (Levin, 2015). Although the efforts to restore streamflow for kalo cultivation began decades ago while the sugar industry was still operational, the end of the sugar industry provided an important opportunity to return water to streams. This in turn supports a range of other aquatic life, as well as supporting traditional Hawaiian cultural practices and nutritional justice.

### *Moving toward “diversified agriculture”*

Beyond the dichotomy of cultural practitioners growing kalo and large monopolies growing monocrop sugarcane are a range of agricultural and environmental interest groups that hold a vision of Maui’s future focused on self-sufficiency and environmental restoration that still retains certain elements of its sugar-growing past. “Diversified agriculture” is a stated goal of a wide variety of actors, ranging from small environmental organizations to the Hawai‘i Farmers Union United, all of whom use the phrase in distinctive ways. The broad use of the term stems from the fact that in Hawai‘i diversified agriculture “includes all agricultural industries other than sugar or pineapple” (Suryanata, 2002: 71). For this reason, “diversified agriculture has become a buzzword laden with multiple meanings. To some, it may simply be a means to economic recovery [...] to others, it symbolizes a defense of local interests and identity in the midst of alienating global forces” (ibid, 72).

Despite this diversity, a paradigm centered around diversified agriculture shares characteristics of both monocrop sugar cultivation and the traditional cultivation of crops such as kalo (both described above). In particular, while it relies upon irrigation, it can also include growing culturally relevant crops, along with aiming to meet the broader food needs of the island’s population and minimize the need for shipments from the continental US. One informant, a farm

manager, explained to us that he is a “mala farmer,” growing dryland kalo (rather than a lo‘i farmer, who grows kalo on streams). He contrasted himself with those in Nā Wai ‘Ehā because he is a commercial kalo farmer, growing a culturally important food for Maui, but doing so on former sugar plantation land using the “modern technology” of irrigation to water his crops (Interview, January 11, 2019).

When it was initially announced that A&B would be moving out of agriculture on Maui, the Together for Maui Coalition was formed, bringing together a range of primarily non-Native Hawaiian stakeholders around the three-pronged goal of regenerative and integrative diversified agriculture, affordable housing, and environmental conservation. Stakeholders included a number of environmental non-profits, including the local Sierra Club chapter, housing advocates, and agricultural interests including the Hawai‘i Farmers Union United. Figure 2, below, captures the coalition’s vision for an eco-village which bridges those three goals into a singular vision which, while not incompatible with a Native Hawaiian vision, is also not entirely aligned either. Similarly, the 2016 *Mālama ‘Āina: A Conversation about Maui’s Farming Future* report from the Maui Tomorrow Foundation—a mixed coalition of Native and non-Native Hawaiian concerns—highlights a similar set of interests in regenerative agriculture, biofuels production, and enterprise crops, including livestock, diversified fruit and nut orchards, and “superfood” crops like Moringa or Acai (Pell and Luyendyk, 2016).

[FIGURE 2 HERE]

In key ways, these visions reproduce historical dynamics created by the sugar industry’s dominance. They maintain the vision of Maui’s arid Central Valley as an economic hub, and one that requires continued large-scale irrigation. It also to some extent validates the idea that the Central Valley was the rightful property of A&B and that the land and its water conveyance system can be freely sold for alternate uses. They also rely on the expertise and financing of institutions like the Maui Farm Bureau and the Hawai‘i Farmers Union United that are entwined with sugar’s past, even as they help to move beyond it. And, critically, these visions of sustainable futures often draw from “mainland” examples and models. The authors attended one meeting of key players in diversified agriculture where a New England family farm was used as a model for clustering housing and agriculture. At the same time, given the intensive water requirements of sugar, nearly any alternative crop will use less water, thereby freeing up more water for streamflow and kalo cultivation.

After several years of planning and negotiation, A&B sold its 41,000-acre holding in late 2018 to Mahi Pono, a joint operation between a California agriculture company and a Canadian pension fund. Some of HC&S’s employees joined Mahi Pono, thus drawing on and preserving their knowledges. In a plan backed by the Maui County Farm Bureau, the new owners are deploying a mix of agricultural practices, including cattle ranching, and planting orchard crops, coffee, and vegetables. While Mahi Pono has drawn from Hawai‘i’s power structure, including employing a former Lieutenant Governor, the company also met with the Maui community in a series of meetings in 2019 to answer questions and solicit feedback. It is still to be seen how Mahi Pono fits into the transition; however, an early agreement to maintain streamflow for kalo growing and

other traditional and customary practices suggests that their water usage may be more compatible with the co-existence of kalo cultivation than their predecessors (Hui o Nā Wai ‘Ehā, 2019).

### **Just water transitions in Maui**

Having provided background context and introduced some of the competing paradigms of water use that coexist on the island, we now examine the transition of Central Maui’s socioecological system of water management through the lens of *just water transitions*. Our conception of just water transitions takes principles from water justice (drawn from Zwarteveen and Boelens 2014), including contestation, scalar politics, socationatures, water rights, situated knowledges, and complexity, and infuses them with elements of space, time, and tradeoffs drawn from the just transitions literature (see Table 1). The transition that is currently underway on Maui encompasses changes to streamflow, water management, agricultural practices, employment, and political power. Our analysis is organized around three overarching concepts that aim to capture the complexity and hybridity of identities, infrastructure, and water governance on Maui: *participation, distribution, and recognition*. Each is considered in turn, below. While these concepts are discussed with specific reference to the transition on Maui, more generalizable takeaway points are extracted from our analysis and presented in the paper’s discussion and conclusion sections.

#### *Participation: The governance of water resources*

*Contestation* over land and water management in Hawai‘i takes place within a blended legal system that combines Hawaiian custom and Anglo-American law (Beamer, 2014). This is similar to many Pacific societies, where legal pluralism plays a critical role in questions of water governance and allocation, as settler and native legal systems for resource management exist as complex hybrids (Berry, 2014; Cantor et al., 2020; Charpleix, 2018). Maui’s just transition thus relies, in part, on restoring and honoring traditional management practices that treat water as a public resource. This ability to move back in time, and to higher governance scales that escape the narrow interests of sugar, shows how *scalar politics* are central to rectifying historical injustices.

The Hawaiian Kingdom’s deliberate creation of “hybrid laws” was a way to both safeguard Hawaiian interests by instituting a private property rights regime that was respected by European and American countries and put into law longstanding customs, such as a tenant’s ahupua‘a-based resource rights (Beamer, 2014: 151). This, however, put into tension the governance of publicly held water with privately held land that contained the watersheds and ditches (Sproat, 2015). As a way to reflect this hybrid approach to resource management, the Community Groups contested the historical injustice of dewatered streams in legal venues at multiple governance scales using an argument based on the public trust. This legal framework links both the cultural and ecological benefits of water – going beyond its value as an economic input – and reflects the Hawaiian Kingdom’s laws where people had the right to use the water, but not to own it (Cantor et al., 2020). However, not all community members agreed with using the legal system to assert their rights, preferring direct action to release streamflow. This was an argument not only over expediency, but about the proper venue. Some questioned the patriotism of the community leaders who were implicitly acknowledging the authority of the state system (Sproat, 2014).

In the end, the Community Groups were ill-served by the adversarial nature of hearings in specialized venues like the Water Commission that were structurally biased towards the status

quo of sugar production. Partial streamflow was restored only by moving beyond the Water Commission's entrenched interests to the state Supreme Court. This act of scale jumping, where groups pursue their interests by moving to a higher level (MacKinnon, 2011), brought the Community's Groups' public trust argument before a Court that had been transformed by an earlier stage of the state's transition away from sugar. As the economy diversified into tourism after statehood in 1959, the newly appointed justices were less sympathetic to sugar interests and began to issue decisions that recognized customary approaches to managing water (Wilcox, 1997). In addition, the justices were now selected locally instead of by the federal government, and were more knowledgeable about Hawaiian custom and tradition (Sproat, 2015). While the Community Groups were ultimately successful, it took four years for the Supreme Court to reverse the Water Commission's decision. The sugar industry's control over the Commission was thus an effective administrative block, which, by delaying justice, allowed the industry to maintain power through their control of the water (Interview, August 14, 2018).

For a just water transition, scalar politics are implicated in both the venues in which distribution questions are contested, as well as the proper boundaries for governing water. In Hawai'i, it has been traditional practice that a moku is a self-sustaining zone that contains resources from the mountains to the sea (Winter et al., 2018). Sugar companies thus violated this tenet of resource management by treating "rivers and streams as plantation plumbing" and moving water from the wet moku of Nā Wai 'Ehā to the dry plains of the Central Valley (Sproat, 2009: 213). Moving vast amounts of water from Nā Wai 'Ehā was unjust because it left its residents without the means to grow kalo and other spiritually important crops, safeguard the health of their streams, and exercise a reciprocal care for the land that supports them (Levin, 2015). But with some streamflow now restored – including a late 2019 agreement with Mahi Pono to leave even more water in the streams – Hui o Nā Wai 'Ehā is pivoting from its legal contests to a "real community-based management" group that can "ensure that these laws are being enforced" (Interview, May 18, 2017).

*Distribution: The ownership and materiality of the water system's infrastructure*

Maui's water system is not only subject to hybrid governance, but is composed of a hybrid network that links streams and irrigation ditches constructed by both Native Hawaiians and the sugar industry (Berry, 2014). It is helpful to view this blended system through the lens of *socionature*, which emphasizes the co-constitution of nature and society (Zwarteveen and Boelens, 2014). Hybridity means that the streamflow of a particular river in Nā Wai 'Ehā arises from the combination of the water cycle, infrastructure, and water demand. In this section, we will see how blurred boundaries between public resource and private system undermines Native Hawaiians' *water rights*.

Water that flows through Nā Wai 'Ehā can take a variety of paths, ending up at family homes and gardens, lo'i for kalo and other canoe crops, large plantations, ranches, and assorted businesses, including for recycling, landscaping, and cement production. This multipurpose network is built on the interlinked 'auwais, which have irrigated lo'i for centuries, and the several hundred miles of irrigation ditches throughout Nā Wai 'Ehā, and East and West Maui to feed sugar and pineapple.<sup>5</sup>

---

<sup>5</sup> Over time, diversion ditches were constructed higher and higher up the mountains cutting off more and more water, with the streams often not reaching the ocean. In Nā Wai 'Ehā, two major,

[FIGURE 3 HERE]

As a result of this hybrid system, many Native Hawaiians in Nā Wai ‘Ehā exercise their water rights through an ‘auwai connected to one of the diversion ditches owned by the Wailuku Water Company (WWC). Permitholders tap into a diversion ditch through a PVC pipe that delivers water through a network of lined or unlined channels (Figure 4). This large-scale modification of the irrigation and agricultural landscape of Central Maui set up a dependence on the ditch infrastructure. This can complicate a just transition, as a member of Hui o Nā Wai ‘Ehā explained:

“There are people who have traditional and customary rights within Nā Wai ‘Ehā from Waikapū to Waihe‘e that rely on the diversions because they don’t have their traditional source anymore. And that is probably one of the most complex things in our case because when water has been restored to the stream, we have to mitigate some of those issues” (Interview, May 18, 2017).

[FIGURE 4 HERE]

In trying to shape the existing infrastructure toward more just ends there is thus the need to equitably work through tradeoffs in the community to ensure that all ‘auwais have adequate flow. But there is also the need to preserve an aging water infrastructure whose ownership spans community members, Maui County, and WWC. According to a lawyer representing Nā Wai ‘Ehā, its communities are at a “transition point”, where they are asking themselves if they are “going to preserve the ‘auwais, [...] that communal system of water management, while that community sense is still there” (Interview, August 10, 2018). Many other communities across Hawai‘i missed the opportunity to preserve their ‘auwais, which have been destroyed or buried under concrete. And some ‘auwais, like in Honolulu’s Nu‘uanu Valley, are protected monuments and cause nuisance flooding as they flow unused between multimillion-dollar houses

For many farmers in Nā Wai ‘Ehā, it is difficult to access land to maintain an ‘auwai – for example, to clear it of debris or prune encroaching invasive species – because it passes through private property. While one can cross another person’s property in order to maintain the ditches, this law is not well enforced. Moreover, some property owners have erected tall fences, with those seeking access sometimes building potentially unsafe tunnels under them (Interview, January 15, 2019). At the same time, sugar water ditches are aging with disintegrating concrete and are even repaired with carpet in places (Interview, August 8, 2018).

The hybrid ditch-‘auwai system also needs to transition to a state that can manage the new reality of more water being left in the streams. For kalo growers, in particular, with ‘auwais directly connected to streams, the amount of water now travelling through the ‘auwais can be destructive during heavy rainfall events, which are projected to increase in frequency as the climate changes. This will exacerbate the extremes of drought and deluge that Hawai‘i is already experiencing, with both more consecutive wet and dry days being recorded (Reidmiller et al., 2017). As one kalo grower in Nā Wai ‘Ehā told us, the water supply to her lo‘i has fluctuated substantially in

---

parallel ditches – the Waihee ditch (at an altitude of 600 ft.) and the Spreckels ditch (at 400 ft.) – intersect the streams of Nā Wai ‘Ehā (Oki et al., 2010).



recent years, yielding destructive flooding through the ‘auwais, and threatening the health of her kalo in weeks without sufficient flowing water.

The hybrid infrastructure also puts into tension water rights and ownership because community members in Nā Wai ‘Ehā who have a water permit for customary or traditional uses can take a certain amount of water for free. But if one relies on the WWC ditch system or the County – as most permitholders do – then they have to pay the delivery charges. Thus, one can grow kalo with free water, but one must pay to transport the water through the old sugar company infrastructure. A just transition in Maui must therefore reconcile the intent of free water for certain uses with a hybrid infrastructure that often requires the use of a private delivery system.

*Recognition: Multiple and competing knowledges and identities*

Indigenous peoples across the Pacific (and beyond) see water as more-than-resource (Charpleix, 2018; Harmsworth et al., 2016; Jackson, 2005, 2006; Memon and Kirk, 2012; Ruru, 2018). This perspective is critical for understanding justice beyond simple questions of distribution. In thinking through a just transition, we must also understand the various knowledges and meanings of water that different groups have. We have already seen how the Water Commission reflected an interest in protecting private property rights and the profitability of the sugar industry. However, by appealing to a higher scale of governance, the Community Groups were able to have their rights recognized. In this section, we examine how problem-framing reveals different group’s *situated knowledges*, and how the *complexity* of water management is variously treated as a scientific issue to be modeled or a socioecological issue that requires attention to power.

The hybridity of Central Maui’s water governance and delivery system requires the inclusion of “diverse and plural knowledges” about processes of water-related change (Zwarteveen and Boelens, 2014: 150). In the earliest stages of seeking legal redress, the Community Groups confronted a Water Commission whose members derived their knowledge of water management from careers in commercial agriculture. With the end of large-scale sugar, many practitioners fear the loss of their knowledge, and that the new reality will introduce new problems that those without a sugar background will be ill-equipped to handle. As a former employee of HC&S explained:

“I did some of that modeling [...] for A&B, just because I have the knowledge of the system—the surface water was a big component of the water that fed agriculture, but there was also the groundwater component. [...] No one really understands what that relationship is between the surface water and the groundwater because surface water was imported into the Central Valley for over a hundred years and recharged those aquifers quite extensively (Interview, September 11, 2018).

One informant who was an agronomist for a sugar company in West Maui argued that anyone who has moved to Hawai‘i in the last ten or fifteen years does not understand the reality of water. He also views water as a resource to not simply distribute, but to create. He credits geologists working for the sugar companies with finding, and thus increasing the amount of fresh water on the islands, by digging development tunnels laterally across the streams to direct groundwater toward them (Interview, January 23, 2019).

In contrast to those linked to the plantation sugar paradigm, who value knowledge as expertise, many Native Hawaiian activists and community members we interviewed see knowledge as

emerging from socioecological relationships of connection (aloha āina, literally “love of the land”) and responsibility (kuleana). As one example, a Native Hawaiian kalo farmer argued that ahupua‘a restoration in Maui should take place at the community scale where people are most deeply connected:

“In one way or another, in each ahupua‘a there are many, many communities that are doing the things they need to do to restore, so, including the fish ponds, including the taro patches, including the water, or the forests. I don’t think people necessarily need to be taught, they kind of know what they need to do, it’s a matter of organizing, mobilizing, getting the resources” (Interview, January 14, 2019).

The knowledge of how to restore one’s moku comes less from expertise than from history and practices. The same informant also described why he declined to advise on kalo restoration at the state level, appealing to the moku as a place of longstanding responsibility, embeddedness, and embodied knowledge. Put simply: “I don’t know your place” (ibid). This form of knowledge is difficult to translate. In particular, scholars have had difficulty bringing unique Indigenous socioecological relationships with water into westernized legal frameworks (Jackson, 2005) and have argued that doing so can compartmentalize Indigenous interests as purely “cultural,” obscuring the cultural connections to land and water that exist in other groups in the region and the political and economic interests that Indigenous peoples may have in water resources (Jackson, 2006).

It is thus important to recognize the complex and multifaceted interests and meanings that each group in Central Maui attaches to water. While Native Hawaiians do derive cultural meaning for water and the cultivation of canoe crops, like kalo and breadfruit, these agricultural products are also increasingly part of livelihoods in Nā Wai ‘Ehā that supplement day jobs, especially as an economic activity undertaken across the generations of a family. Increased streamflow is also valued for its ability to support ‘o‘opu (goby) that reappeared in Nā Wai ‘Ehā once streams began to flow into the oceans again. Yet, as described earlier, a large part of Maui maintains a cultural attachment to sugar. As Maui transitions away from sugar, it must still come to terms with an industry steeped in settler colonialism and resource dispossession for which many Hawaiians feel nostalgic.

### **The role of space, time, and tradeoffs in achieving water justice**

Our analysis of Maui’s period of transition has combined water justice and just transitions frameworks to examine multiple paradigms of water, and the reconfigurations of infrastructure and power involved in transitioning toward a more equitable future of water management. The water justice framework considers water’s unique physical properties and social importance, while the just transitions framework does not emphasize specific properties of any particular resource, but rather emphasizes transition events and timelines (Table 1). Just transitions work adds an important focus on spatial and temporal dimensions of transitions, and the need for equitable trade-offs, while water justice contributes a more precise understanding of water itself. In this section, we first suggest a set of generalized recommendations for water justice transitions, then organize the rest of the discussion around the central principles of space, time, and tradeoffs, drawn from just transitions literature. We pay particular attention to where our analysis can apply broadly to just water transitions and where it has specific relevance for Maui.

A just water transition must attend first of all to existing maldistributions of water, based in historical injustice, and built into the landscape. A just water transition must also look forward, taking steps to right these injustices while recognizing the inevitable resultant tradeoffs among the competing needs and values of different paradigms and user groups. In Table 3, we synthesize some of our key considerations around just water transitions. These are drawn from our specific case, yet we believe they hold broader significance and applicability to water transitions in other locations, though specifics will vary from place to place. These recommendations include aspects of scale, temporality, and tradeoffs, and also are based in an understanding of water’s specific socio-cultural and material properties.

Considerations and recommendations for just water transitions
<ul style="list-style-type: none"> <li>• Jump to a scale that recognizes existing harms and injustices (Scalar politics)</li> <li>• Match scale of management to scale of rights and expertise as well as watersheds and physical water systems (Scalar politics)</li> <li>• Adjudicate harms and injustices quickly (Contestation)</li> <li>• Recognize harms from historical dispossession (Contestation)</li> <li>• Recognize social dependence on water infrastructure (Socionatures)</li> <li>• Ensure the system can adapt to future climate change (Socionatures)</li> <li>• Move to public ownership if private property rights undermine goals of water justice (Water rights)</li> <li>• Include multiple and hybrid knowledges of water (Situated knowledges)</li> <li>• Recognize uncertainty and provisional knowledge (Complexity)</li> <li>• Acknowledge existence and complexity of tradeoffs (Complexity)</li> </ul>

Table 3. Key recommendations for just water transitions

Just water transitions involve important dimensions of space and scale. Within struggles over water rights, contestations over the appropriate scale for the dispute are frequent. As we saw in our case, while scale jumping was used by the Community Groups to appeal to the State Supreme Court, A&B also scale jumped from a focus on harms in Nā Wai ‘Ehā to broader economic benefits. This is a common tactic in cases involving mining companies, for example, which justify dispossession by pointing to their contribution to national development (Zwarteveen and Boelens, 2014). A just distribution of water also often depends on reshaping the spatial configurations of existing infrastructure. This requires both the construction of new conveyances to increase access and the end to transfers that dispossess water users, especially through for-profit systems.

The temporal dimensions of just water transitions are also critical. First, there is the need to understand the past, including knowledge of historical injustices; of earlier sustainable practices that can be recovered; and of the groups responsible for past and ongoing harms. For example, in our case, when the Community Groups appealed to the State Supreme Court, they were asking for the recognition of traditional practices codified in the law. Second, there is need to act quickly, whether that is for the restoration of rights or the admission that drinking water is unsafe. Even weakened businesses can exercise their remaining structural power to delay a

transition adverse to their interests. For example, even in the context of the decline of sugar, A&B attempted to exert control over water. Third, there is the need to prepare for multiple possible futures, especially as climate change alters the distribution of water.

Finally, transitions involve tradeoffs, as various actors and socioecological systems adapt to different distributions of resources. In our case, the hybridity of Maui's water system – characterized by interlinked infrastructure, identities, and policies – produces a particular series of tradeoffs between different actors, scales, and goals for justice. On the one hand, this complicates a transition: for example, the restoration of water rights for kalo farmers necessitates the continued use of the sugar industry's diversion ditches. On the other hand, recognizing overlapping interests can be a way to work through seeming opposition. There will likely remain, however, differing claims over the importance and definitions of equity, efficiency, and effectiveness (Newell and Mulvaney, 2013). In Maui, for example, some groups prioritize 'efficiency' – viewing water flowing to the oceans as economically wasteful – while others prioritize regenerative socioecological stream systems. And a call for redistribution to address historical injustices may conflict with an ethos to treat all groups equally. Above all, though, it is key that a just transition represents a society's range of multiple knowledges and expertise as it adjudicates tradeoffs. Without this recognition of plurality, there is the risk of reproducing the historical injustices that the transition aims to reverse.

### **Conclusions: Paths Forward for a Just Transition**

In this article, we combine the literatures on water justice and just transitions to conceptualize transitions toward more equitable water allocation and decision making. The resulting just water transition analysis emphasizes the spatial and temporal dimensions of a resource transition, while also accounting for water's specific material, social, and political-economic characteristics. Although our Maui case study has a particular context and central issue around recovering water rights, which is especially salient in the Pacific, our conclusions speak more generally.

First, there is the need to use scale strategically, both to find a venue that recognizes the injustice to be rectified and to ensure that water is managed within a system subject to community control. Second, a just water transition should not be subject to unnecessary delays, especially as powerful groups may try to make communities fear change. For water systems built on dispossession, we must be critical of policies or discourses that seek to maintain the status quo. Third, it is important to have a flexible system that can adapt to uncertain future water amounts, changing ownership structures (for example, moving toward public ownership), and a diverse coalition of managers, drawing from multiple knowledges. Finally, it is necessary to adjudicate tradeoffs in a just manner. There may be incommensurable goals within water justice, or across overlapping domains of environmental justice. The pursuit of water justice, for example, may conflict with a tactic for pursuing greater food or energy justice. It is essential, though, to recognize that tradeoffs will be necessary in transforming a complex system, and that compromises can be found through applying the insights of water justice.

Underlying both the water justice dimensions and the elements of our just transition case study is an emphasis on plurality and hybridity. While hybridity takes on particular forms in Hawai'i, it is helpful to acknowledge the complexity of the infrastructure, governance, and identities that constitute any water system. It is for this reason that we analyzed our case study from the perspective of overlapping paradigms rather than insular actor groups. Recognizing plural values and knowledges allows us to see how existing water systems often cater to narrow interests,

privileging private property holders, economic uses, and present needs. By foregrounding underrecognized commonalities across paradigms, we can more easily find opportunities for more inclusive futures.

## References

- Agyeman J (2005) *Sustainable Communities and the Challenge of Environmental Justice*. New York, NY: NYU Press.
- Anderson EP, Jackson S, Tharme RE, et al. (2019) Understanding rivers and their social relations: A critical step to advance environmental water management. *Wiley Interdisciplinary Reviews: Water* 6(6): e1381.
- Bakker K (2012) Water: Political, biopolitical, material. *Social Studies of Science* 42(4): 616–623.
- Beamer K (2014) *No Mākou Ka Mana: Liberating the Nation*. Honolulu, HI: Kamehameha Publishing.
- Berry KA (2014) Actor-Network Theory and Traditional Cultural Properties: Exploring Irrigation as a Hybrid Network in 19th Century Hawai'i. *Human Geography* 7(2): 73–87.
- Berry KA and Jackson S (2018) The making of white water citizens in Australia and the Western United States: racialization as a transnational project of irrigation governance. *Annals of the American Association of Geographers* 108(5): 1354–1369.
- Binz C and Truffer B (2012) Technological innovation systems in multi-scalar space. *Geographica Helvetica* 66(4): 254–260.
- Boelens R, Perreault T and Vos J (2018) *Water Justice*. Cambridge, UK: Cambridge University Press.
- Brown RR, Farrelly MA and Loorbach DA (2013) Actors working the institutions in sustainability transitions: The case of Melbourne's stormwater management. *Global Environmental Change* 23(4): 701–718.
- Cantor A and Knuth S (2019) Speculations on the postnatural: Restoration, accumulation, and sacrifice at the Salton Sea. *Environment and Planning A: Economy and Space* 51(2): 527–544.
- Cantor A, Kay K and Knudson C (2020) Legal Geographies and Political Ecologies of Water Allocation in Maui, Hawai'i. *Geoforum* 110: 168–179.
- Charpleix L (2018) The Whanganui River as Te Awa Tupua: Place-based law in a legally pluralistic society. *The Geographical Journal* 184(1): 19–30.
- Cho JJ, Yamakawa RA and Hollyer J (2007) *Hawaiian Kalo, Past and Future*. Sustainable Agriculture. The College of Tropical Agriculture and Human Resources, University of Hawai'i at Mānoa.

- Climate Justice Alliance (2020) Just Transition: A Framework for Change. Available at: <https://climatejusticealliance.org/just-transition/>.
- Cooper G and Daws G (1990) *Land and Power in Hawaii: The Democratic Years*. Honolulu, HI: University of Hawai'i Press.
- Curley A (2019) "Our Winters' Rights": Challenging Colonial Water Laws. *Global Environmental Politics* 19(3): 57–76.
- Deitz S and Meehan K (2019) Plumbing poverty: mapping hot spots of racial and geographic inequality in US household water insecurity. *Annals of the American Association of Geographers* 109(4): 1092–1109.
- Eaton E (2021) Approaches to energy transitions: Carbon pricing, managed decline, and/or green new deal? *Geography Compass* 15(2): e12554.
- Egge M and Ajibade I (2021) A community of fear: emotion and the hydro-social cycle in East Porterville, California. *Journal of Political Ecology* 28(1): 266–285.
- Elzen B, Geels FW and Green K (2004) *System Innovation and the Transition to Sustainability: Theory, Evidence and Policy*. Cheltenham, UK: Edward Elgar Publishing.
- Estes N (2019) *Our History Is the Future: Standing Rock versus the Dakota Access Pipeline, and the Long Tradition of Indigenous Resistance*. London, UK: Verso.
- Fisher S (2015) Hawaiian Culture and Its Foundation in Sustainability. In: Chirico J and Farley GS (eds) *Thinking like an Island: Navigating a Sustainable Future in Hawaii*. Honolulu, HI: University of Hawai'i Press, pp. 7–27.
- Fraser N (1997) *Justice Interruptus: Critical Reflections on the 'Postsocialist' Condition*. New York, NY: Routledge.
- Geels FW (2005a) Co-evolution of technology and society: The transition in water supply and personal hygiene in the Netherlands (1850–1930)—a case study in multi-level perspective. *Technology in society* 27(3): 363–397.
- Geels FW (2005b) *Technological Transitions and System Innovations: A Co-Evolutionary and Socio-Technical Analysis*. Cheltenham, UK: Edward Elgar Publishing.
- Geels FW (2006) The hygienic transition from cesspools to sewer systems (1840–1930): the dynamics of regime transformation. *Research policy* 35(7): 1069–1082.
- Geels FW, Sovacool BK, Schwanen T, et al. (2017) Sociotechnical transitions for deep decarbonization. *Science* 357(6357): 1242–1244.
- Haeffner M, Hellman D, Cantor A, et al. (In press) Representation justice as a research agenda for socio-hydrology and water governance. *Hydrological Sciences Journal*.

- Handy ESC, Handy EG and Puku'i MK (1991) *Native Planters in Old Hawai'i: Their Life, Lore, and Environment*. Honolulu, HI: Bishop Museum Press.
- Harmsworth G, Awatere S and Robb M (2016) Indigenous Māori values and perspectives to inform freshwater management in Aotearoa-New Zealand. *Ecology and Society* 21(4).
- Hartwig LD, Jackson S and Osborne N (2018) Recognition of Barkandji water rights in Australian settler-colonial water regimes. *Resources* 7(1): 16.
- Hartwig LD, Jackson S, Markham F, et al. (2021) Water colonialism and Indigenous water justice in south-eastern Australia. *International Journal of Water Resources Development*: 1–34.
- Hawaii State Legislature (1987) Hawaii State Water Code. Available at: <https://files.hawaii.gov/dlnr/cwrm/regulations/Code174C.pdf>.
- Heffron RJ and McCauley D (2018) What is the 'just transition'? *Geoforum* 88: 74–77.
- Hommes L, Boelens R and Maat H (2016) Contested hydrosocial territories and disputed water governance: Struggles and competing claims over the Ilisu Dam development in southeastern Turkey. *Geoforum* 71: 9–20.
- Ho'okano P (2014) Aia i Hea ka Wai a Kāne? (Where Indeed Is the Water of Kāne?): Examining the East Maui Water Battle. In: Goodyear-Ka'ōpua N, Hussey I, and Wright EK (eds) *A Nation Rising: Hawaiian Movements for Life, Land, and Sovereignty*. Durham, NC: Duke University Press, pp. 220–231.
- Hui o Nā Wai 'Ehā (2019) Hui o Nā Wai 'Ehā Statement re CCH Closing Arguments Hearing. Available at: [https://www.facebook.com/permalink.php?id=177150435811427&story\\_fbid=1146225052237289](https://www.facebook.com/permalink.php?id=177150435811427&story_fbid=1146225052237289).
- Ige DY and Case SD (2021) Instream Flows Set for Traditional Kalo Farming Communities on Kaua'i and Maui. Available at: <https://files.hawaii.gov/dlnr/cwrm/news/2021/nr20210519.pdf>.
- Jackson S (2005) Indigenous values and water resource management: a case study from the Northern Territory. *Australasian Journal of Environmental Management* 12(3): 136–146.
- Jackson S (2006) Compartmentalising culture: the articulation and consideration of Indigenous values in water resource management. *Australian Geographer* 37(1): 19–31.
- Jewett C and Garavan M (2019) Water is life—an indigenous perspective from a Standing Rock Water Protector. *Community Development Journal* 54(1): 42–58.
- Kemp R, Schot J and Hoogma R (1998) Regime shifts to sustainability through processes of niche formation: the approach of strategic niche management. *Technology analysis & strategic management* 10(2): 175–198.

- Lawhon M and Murphy JT (2012) Socio-technical regimes and sustainability transitions: Insights from political ecology. *Progress in Human Geography* 36(3): 354–378.
- Levin P (2015) Searching for sustainable agriculture in Hawai'i. In: Chirico J and Farley GS (eds) *Thinking like an Island: Navigating a Sustainable Future in Hawaii*. Honolulu, HI: University of Hawaii Press, pp. 46–78.
- Lieberherr E and Truffer B (2015) The impact of privatization on sustainability transitions: A comparative analysis of dynamic capabilities in three water utilities. *Environmental Innovation and Societal Transitions* 15: 101–122.
- MacKenzie MK (2015) Historical Background. In: MacKenzie MK, Serrano SK, Sproat DK, et al. (eds) *Native Hawaiian Law: A Treatise*. Honolulu, HI: Kamehameha Publishing.
- MacKinnon D (2011) Reconstructing scale: Towards a new scalar politics. *Progress in Human Geography* 35(1): 21–36.
- MacLennan CA (2014) *Sovereign Sugar: Industry and Environment in Hawaii*. Honolulu, HI: University of Hawaii Press.
- Markard J, Raven R and Truffer B (2012) Sustainability transitions: An emerging field of research and its prospects. *Research policy* 41(6): 955–967.
- McGregor D, Whitaker S and Sritharan M (2020) Indigenous environmental justice and sustainability. *Current Opinion in Environmental Sustainability* 43: 35–40.
- Meehan K, Jepson W, Harris LM, et al. (2020) Exposing the myths of household water insecurity in the global North: A critical review. *Wiley Interdisciplinary Reviews: Water* 7(6): e1486.
- Memon PA and Kirk N (2012) Role of indigenous Māori people in collaborative water governance in Aotearoa/New Zealand. *Journal of Environmental Planning and Management* 55(7). Taylor & Francis: 941–959.
- Nakuina EM (1904) *Hawaii, Its People, Their Legends*. Honolulu, HI: Hawaii Promotion Committee.
- Nastar M and Ramasar V (2012) Transition in South African water governance: Insights from a perspective on power. *Environmental Innovation and Societal Transitions* 4: 7–24.
- Neal MJ, Lukasiewicz A and Syme GJ (2014) Why justice matters in water governance: some ideas for a 'water justice framework'. *Water Policy* 16(S2): 1–18.
- Newell P and Mulvaney D (2013) The political economy of the 'just transition'. *The Geographical Journal* 179(2): 132–140.



- Oki DS, Wolff RH and Perreault JA (2010) *Effects of surface-water diversion on streamflow, recharge, physical habitat, and temperature, Na Wai 'Eha, Maui, Hawai'i*. Reston, VA: U.S. Geological Survey.
- Pell J and Luyendyk L (2016) *Mālama 'Āina: A Conversation About Maui's Farming Future*. Maui, HI: Maui Tomorrow Foundation.
- Perreault T (2014) What kind of governance for what kind of equity? Towards a theorization of justice in water governance. *Water International* 39(2): 233–245.
- Pulido L (2016) Flint, environmental racism, and racial capitalism. *Capitalism Nature Socialism* 27(3): 1–16.
- Ranganathan M (2016) Thinking with Flint: Racial liberalism and the roots of an American water tragedy. *Capitalism Nature Socialism* 27(3): 17–33.
- Reidmiller DR, Avery CW, Easterling DR, et al. (eds) (2017) *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*. Washington, DC: U.S. Global Change Research Program.
- Robison J, Cosens B, Jackson S, et al. (2018) Indigenous water justice. *Lewis & Clark L. Rev.* 22: 841.
- Ruru J (2018) Listening to Papatūānuku: a call to reform water law. *Journal of the Royal Society of New Zealand* 48(2–3): 215–224.
- Schatz B (2016) Schatz Statement on Closure of Maui Sugar Plantation. Available at: <https://www.schatz.senate.gov/press-releases/schatz-statement-on-closure-of-maui-sugar-plantation>.
- Schlosberg D (2003) The justice of environmental justice: reconciling equity, recognition, and participation in a political movement. In: Light A and De-Shalit A (eds) *Moral and Political Reasoning in Environmental Practice*. MIT Press, pp. 77–106.
- Schlosberg D (2009) *Defining Environmental Justice: Theories, Movements, and Nature*. Oxford, UK: Oxford University Press.
- Sedlak D (2014) *Water 4.0: The Past, Present, and Future of the World's Most Vital Resource*. New Haven, CT: Yale University Press.
- Sproat D. Kapua'ala (2015) From Wai to Kānāwai: Water Law in Hawai'i. In: MacKenzie MK, Serrano SK, Sproat D. Kapua'ala, et al. (eds) *Native Hawaiian Law: A Treatise*. Honolulu, HI: Kamehameha Publishing.
- Sproat DK (2009) *Olaika Wai: A Legal Primer for Water Use and Management, Hawai'i*. Honolulu, HI: Ka Huli Ao Center for excellence in Native Hawaiian Law.

- Sproat DK (2011) Wai through Kanawai: Water for Hawai'i's Streams and Justice for Hawaiian Communities. *Marq. L. Rev.* 95: 127.
- Sproat DK (2014) A Question of Wai: Seeking Justice through Law for Hawai'i's Streams and Communities. In: Goodyear-Ka'ōpua N, Hussey I, and Wright EK (eds) *A Nation Rising: Hawaiian Movements for Life, Land, and Sovereignty*. Durham, NC: Duke University Press, pp. 199–219.
- Stavis D and Felli R (2016) Green Transitions, Just Transitions? Broadening and Deepening Justice. *Kurswechsel* 3: 35–45.
- Stavis D, Morena E and Krause D (2020) Introduction: The Genealogy and Contemporary Politics of Just Transitions. In: Morena E, Krause D, and Stavis D (eds) *Just Transitions: Social Justice in the Shift Towards a Low-Carbon World*. London, UK: Pluto Press, pp. 1–31.
- Sultana F (2018) Water justice: why it matters and how to achieve it. *Water International* 43(4): 483–493.
- Sultana F and Loftus A (2019) *Water Politics: Governance, Justice and the Right to Water*. New York, NY: Routledge.
- Suryanata K (2002) Diversified agriculture, land use, and agrofood networks in Hawaii. *Economic Geography* 78(1): 71–86.
- Sylva S (2006) Indigenizing Water Law in the 21st Century: Na Moku Aupuni O Ko'Olau Hui, a Native Hawaiian Case Study. *Cornell JL & Pub. Pol'y* 16: 563.
- Sze J and London JK (2008) Environmental justice at the crossroads. *Sociology Compass* 2(4): 1331–1354.
- Van den Bergh JC, Truffer B and Kallis G (2011) Environmental innovation and societal transitions: Introduction and overview. *Environmental innovation and societal transitions* 1(1): 1–23.
- Wilcox C (1997) *Sugar Water: Hawaii's Plantation Ditches*. Honolulu, HI: University of Hawaii Press.
- Winter KB, Beamer K, Vaughan MB, et al. (2018) The Moku System: Managing biocultural resources for abundance within social-ecological regions in Hawai'i. *Sustainability* 10(10): 3554.
- Yates JS, Harris LM and Wilson NJ (2017) Multiple ontologies of water: Politics, conflict and implications for governance. *Environment and Planning D: Society and Space* 35(5): 797–815.

Zwarteveen MZ and Boelens R (2014) Defining, researching and struggling for water justice: some conceptual building blocks for research and action. *Water International* 39(2): 143–158.