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An Unfolding Story of the Colorado River

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Aller au sommaire du numéro

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Résumé de l'article

Since colonialists first entered the southwestern United States, they've needed a river to secure their futures. Empires are built on rivers and the United States, during westward expansion, is no different. The Colorado River is a product of colonial imaginary, to take the various waters flowing from mountains and through canyons into the Gulf of California and treat it as one thing that can be made predictable and controllable. This paper argues that the Colorado River is a story of 'colonial becoming,' the making of a 'resource' for purposes of diversion, irrigation, and ultimately dispossession. The paper works first to show how settler-colonialists defined 'the river,' then linked it to projects of empire informed by a colonial ontology that saw the desert as bereft of life and needing improvement. I show how these developments led to the ultimate enclosure of the river in the Colorado Compact of 1922, which ignored tribal interests while defining the river for the states. I conclude with a consideration of climate science and the role of physical geographers in reifying colonial divisions in their work and argue that the river is ultimately a product of colonial becoming.

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Colonial Becoming: An Unfolding Story of the Colorado River

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Abstract

Since colonialists first entered the southwestern United States, they've needed a river to secure their futures. Empires are built on rivers and the United States, during westward expansion, is no different. The Colorado River is a product of colonial imaginary, to take the various waters flowing from mountains and through canyons into the Gulf of California and treat it as one thing that can be made predictable and controllable. This paper argues that the Colorado River is a story of 'colonial becoming,' the making of a 'resource' for purposes of diversion, irrigation, and ultimately dispossession. The paper works first to show how settler-colonialists defined 'the river,' then linked it to projects of empire informed by a colonial ontology that saw the desert as bereft of life and needing improvement. I show how these developments led to the ultimate enclosure of the river in the Colorado Compact of 1922, which ignored tribal interests while defining the river for the states. I conclude with a consideration of climate science and the role of physical geographers in reifying colonial divisions in their work and argue that the river is ultimately a product of colonial becoming.

Keywords

Indigenous, water, water rights, Colorado River, settler colonialism

"…with incredible audacity, the deed is done, the Colorado has literally been sold down the river – and no man living today need fear the slave's revenge. What the victim may be planning to do some day to the Boulder Dam Project is of no concern for several generations." – Gusse Thomas Smith, Arizona Highways Magazine, 1947

"Do you think the water will forget what we have done, what we continue to do?" – Natalie Diaz (Mohave/Gila River), 2020

Introduction

Read most reports about the Colorado River and you will inevitably find reliance on colonial names, political demarcations, and ontological assumptions as ways of summarizing natural features of the river. In a well-known paper discussing the potential impacts of climate change on future water flows, Bradley Udall and Jonathan Overpeck rely on unnatural colonial names and infrastructures to demonstrate certain effects climate change has on the river (2017). They make the argument that a prolonged drought from 2000-2014 portends periods of less water in the next century. But Udall and Overpeck divide the Colorado River Basin into its known political divisions, so-called 'upper' and 'lower' basins, while discussing reservoir levels behind large dams on the river, such as the Hoover Dam and the Glen Canyon Dam. This mapping that uses colonial divisions and understandings of the river has the effect of making these dams appear as if they are natural features of the landscape and as if the water that stores behind a reservoir is part of an ecosystem worth preserving.

The naturalization of damming, large scale diversions, and other forms of colonization limits how we can even think about environmental problems and solutions. In the conclusion of their paper, Udall and Overpeck write, "Climate change threats to western water supplies are very real, and should prompt great concern and urgency among water managers and the citizens of the Southwest" (pg. 2415). On the surface, this statement reads very reasonable and captures the stakes of our political and environmental challenges in the so-called 'management' or 'governance' of the river. However, their conclusion does two things to evade the colonial problem and perpetuate dangerous environmental intrusions. First, it directs our attention toward climate change and away from the hyper exploitation of the river or even large-scale damming as the main threat to the multiple people and life that rely on the river and its tributaries in the disparate environments that comprise the two basins. Second, their conclusion refers to a settler-colonial "we" in the form of "citizens of the Southwest," i.e., the benefactors of colonial divisions, infrastructures, policies, and laws that comprise the governance of the river. This kind of science stipulates to colonial acts and completely ignores Indigenous critiques of dams along the river. The "we" doesn't include the tribes lacking basic water rights and infrastructure, features of a social world these scientists benefit from but are less willing to name. What is worse, the science of their piece avoids the problem of too much consumption and too much colonialism.

Settler colonialists ushered in profound ecological changes to the region that are unsustainable, from ranching to damming of surface water ways. They have turned to "science" in land grant universities to fix the problems their behavior created. To this degree, damming and overgrazing aren't new problems. They are the longstanding threats to the Indigenous peoples, plants, and animals in the region and are already profoundly damaging (Curley 2021a). The unknowing of a particular version of the river, such as that constructed in climate change narratives, leaves us with new questions we must answer. We are confronted

with the question of what does the river look like outside of climate change crisis narratives? What is the river that we call the Colorado River and how has our understanding of it been circumscribed into a narrow, utilitarian, and hyper exploitative understanding of water in the region? What is the role of geographers and other scientists in this process of documenting a colonized river? Physical geographers and hydrogeographers continue to use colonial references, concepts, political divisions, and physical infrastructure to project a fantasy of a "natural river." Almost all reports on water levels in reservoirs make no mention of the aberration dams represent. Most historical accounting of the river skirts the history of megadams, large-scale diversions, and campaigns of genocidal violence leveled against Indigenous communities, thereby naturalizing colonialism as part of the landscape, part of the river. Research such as those done by my colleagues in physical geography and the environmental sciences attempt to know the ancient history of the region, but they inevitably rely on colonial terminologies and divisions as part of their understanding of the river. This has the effect of erasing Indigenous histories and ignoring our lack of access to the river while projecting existing colonial divisions backward in time in a very unnatural framing. A consideration of deep history is inattentive to current colonial conditions while trying to talk about abstract environmental problems are colonial acts (Smith 2025).

In this article I rely on a recent work in abolition ecology to speak of rivers as something becoming, meaning it is socially constructed out of the context of colonization, imperialism, and state formation. If we understand the river in the context of racial capitalism, U.S. imperialism, and settler colonialism, we can better understand the environmental problems facing people in the region and know that equitable solutions to these must also analyze legacies of injustice.

Researchers working within the narrower interpretations of science might argue that this information isn't necessary in predicting future water levels and focusing on important policy and governance questions. Yet, these same researchers will entertain ancient environmental reconstructions to paint a picture of past climate patterns that are arguably more obscure information than existing colonial divisions. They consider only the ancient past and the immediate present, jumping over decades of colonial violence that has changed every facet of water flow in the region. The practice of projecting present problems of overuse and overallocation backwards takes our attention away from the system of water allocation that has created the problem in the first place. In short, serious (often white and male) scientists who are doing what they consider the important work of understanding our environmental problems are willfully ignorant of the colonial acts that created the problem in the first place, what Kevin Bruyneel calls settler memory (2023). They accept major dams and diversions while speculating about the long-term effects of climate change. On the other hand, the water regime and system of water governance they are trying to make work *is* the root of the crisis on the river and more broadly. What is more, this crisis isn't recent and only confined to era of climate change. Since the beginning of settlement in the west, there has never been enough water for colonial designs, first during the expansion of ranching and irrigation and today with urban growth.

Colonial infrastructures like dams and reservoirs have generated dramatic social and environmental change in the region. For Indigenous nations, damming of perennial water ways was world changing. As much as lines on a map demarcate settler space from traditional homelands, dams became the concrete manifestations of colonial ambitions; complete with

ontologies of nature and space and ideologies of progress and modernization that amplified colonial difference, racial capitalism, and concretized settler communities (Lawson 1994; Ornelas 2011). More than that, the dams and reservoirs built during the 20th century were made possible by practices of *terra nullius* that accompanied westward expansion and colonial land dispossession. For dams to be achievable, settlement needed water to take on ontological characteristics that were quantifiable, exploitable, and exhaustible (Dryer 2023). Much of today's climate crisis narratives about the Colorado River replicates colonial violence through its reproduction of colonial ontologies as a way of understanding the river. Specifically, I focus on how notions of deserts produced measurement practices designed to control and divert the river, which in turn lead to broader temporal understandings of water that are consistent with colonial-capitalistic logics and inconsistent with Indigenous understandings.

Rivers as Colonial Becoming

Rivers are human ideas, abstractions of water that appear to us as a singular thing, as a network, as an ecosystem, or the markers of political boundaries. Rivers are also ideas with shifting meanings. Wohl and Merritts (2007) write that our expectation of rivers is conditioned by a long history of human interactions with the land, sometimes in ways that change the natural course of what we call rivers. What we think of as 'natural' is inevitably impacted by humans. Edgeworth and Benjamin argue that rivers are neither natural or unnatural, they are both and much more (2017). Kimari and Parish write that "a river is in a perpetual state of becoming," often subsumed in colonial histories, structures, and logics. They call for abolition ecology, or the active dissolution of these logics, in future relationships with the river (2020).

Building on Kimari and Parish's idea of rivers as *becoming*, in this article, I argue that the river is a thing of *colonial becoming*, it is feature of the colonialscape defined in the interest of settler-colonial expansion (S.E. Hunt 2014b). I don't take as granted that the river is a natural entity worth naming and defining. Rather, it is a way different peoples impose their understandings onto the landscape. For the Colorado River, the river's *becoming* was when it was first described as a river, as a unified object, as a source of regular water for some of the most arid, dry, but also diverse regions throughout the world. This is true for the Colorado River, which appears to be like other rivers we know but in total volume, is much less than the Mississippi or Columbia rivers (Kuhn 2019), making the unifying idea of "river" misleading. The river and its mystique served colonial narratives about conquering the west and making it habitable for white homesteaders. The river was amplified as something that could be a regular source of water for future settlement. To this day, this fundamental and flawed assumption is left intact. In my theory of colonial becoming for the Colorado River, I show that drought narratives, measurements tied to colonial diversion, and environmental science unattuned to colonial dispossession comprise the colonial becoming of the Colorado River. I use the verb *becoming* to understand the fluidity and present-day formation of colonialism; colonialism premised on keeping water that wants to be in motion behind dam walls, diversion gates, and onto cotton fields instead of river deltas.

Colonial science has come to understand rivers through notions of universal measurements, management, damming, and diversion – all in order to make the landscape "legible" (Scott 1998). In fact, an impetus for this article was hearing late political theorist James C. Scott talk about rivers, colonialism, and the politics of measurement in his 2019 talk,

"In Praise of Floods" at Duke University[1]. The settler enacted violence on the land, i.e., a physical transformation onto the water, when he imposed the idea of acre-feet onto it.

For Indigenous scholars, our questions of water and rivers are fundamentally about colonial dispossession and the violent imposition of new kinds of governing logics onto the landscape. It doesn't matter if you are in places of plenty or supposed "drought," colonial states interpret natural water pathways, when water moves from the mountains to the sea, as water wasted. Working in Mushkegowuk communities in northern Ontario, Michelle Daigle argues that crisis around water serve colonial capitalist projects, particularly future mineral extraction (2018). Importantly, Daigle presents an alternative form of river governance, one informed by Indigenous relationships with each other through movement across rivers and water ways. With colonial territorialization, and the making of fixed Indigenous spaces, Indigenous water governance as it was practiced was no longer possible. Daigle builds on the work of Sarah Hunt, Kwakwaka'wakw, who refers to these new kinds of landscapes as "colonialscapes." This includes the new cartographic, legal, political reading of the land according to Western discovery narratives and state formation (2014b). Daigle also writes that the reworking of Mushkegowuk (and other Indigenous identities) through colonial laws like the Indian Act in Canada altered kin relations, denying the political power of women, and instilling a patriarchal line of leadership consistent with the needs of an emerging wage labor capitalist economy. This is true with the management of the river today. Most tribal decision makers, including councils and presidents, are men.

For the remainder of this article, I highlight how colonialists imported ideas of deficit to understand the desert regions of the Colorado River Basin. These ideas informed later planners and governing officials to use irrigation as a basis for state making around colonial-capitalist temporalities and against Indigenous understandings of the environment. Eventually, drought narratives and settler temporalities informed how we think about climate crisis on the Colorado River.

Deserts, deficit thinking, and colonial becoming

When settlers entered the west, they saw deserts as bereft of life (August 1999; Koch 2020). To the hundreds of Indigenous nations and thousands of communities, the idea of deserts was not only how colonizers understood our environments, but how they acted upon it. The colonialist, coming from the east and Europe before that, built infrastructure on cultural practices around the use of resources that were exploitative and exhausting (Curley 2021b). Animals were killed to extinction, forests felled, water ways diverted, and the earth mined for minerals. Jen Rose Smith (2021) shows how settlers imposed a 'temperate normativity' onto diverse landscapes, taking places like the Arctic and deserts as devoid of water and in need of geoengineering. Such an attitude set into motion damming throughout the west for the purpose of expanding access to new lands incorporated into settler-colonial projects.

The diverse ecological areas of what would become Arizona demonstrate how the environment and notions of time, progress, and modernity were core to the making of colonial landscapes. Both Indigenous peoples and colonialists saw the same environment, but they had different historical experiences and, consequently, different ontological

[1] https://www.youtube.com/watch?v=IwMQSOdLULI, last accessed 10/16/2024.

framings for thinking about the world around them. However, as Sarah Hunt persuasively writes, "ontologies" can be used as a word to deny Indigenous lifeway practices. Colonial epistemologies can acknowledge alternative or counter "ontologies" but remain inattentive to the power relations that shape knowledge producers in colonial institutions, i.e., white scientists at research universities on big National Science Foundation grants, who include but are not led by Indigenous researchers, practitioners, or knowledge holders. Despite, inclusion, ontology in practice can make parochial Indigenous lifeways and understandings (2014a). Hunt prefers stories over ontologies, and as I've heard from my former colleague Diné activist and scholar Moroni Benally, our epistemology is found in our songs, stories, and prayers – it is where we find a Diné epistemology. River stories don't inform how state makers talk about the Colorado River.

Settler-colonialism didn't just extinguish aboriginal title, it erased centuries of historical relationships between people and the environment. As historian Erika Bsumek writes about the foundations of Glen Canyon Dam along the Colorado River, ideologically and even spiritually for settlers, rivers, waters, and resources were part of a colonial world building founded on dispossession (2022). It pretended people weren't there and nature was for the remaking. It both erased Indigenous life and made the possibility for new racial hierarchies. As Mark Rifkin writes about settler time, "the temporal trick whereby Indians are edited out of the current moment – or cast as inherently anachronistic – emerges out of the refusal to accept the (geo)political implications of persistent Indigenous becoming, the ways the presentness of Native peoples challenges settler claims to possession now and for the future" (2017, pg. 5). In other words, by design, settler-colonial geopolitical impositions erase and negate Indigenous temporal claims to the continent. This is evidence in the way Indigenous water governance are sidelined in debates about the Colorado River. Starting with John Wesley Powell, the Native nations in the Colorado Basin and along the Colorado River were presented as anachronistic, as a feature of the landscape in need of transformation.

The maxim, "first in use, first in right," foundational to much of western water law, was established during the California Goldrush, a murderous event that witnessed both genocide and environmental rampage (Kanazawa 2015) . Mining camps established laws that were both anti-Indian and based on evolving shared understanding about what was 'public domain' and the rights that followed 'discovery' (Wiel 1979). It has long been assumed that the riparian system of water law was rejected because of water scarcity of the desert, that too little water existed to satisfy industrial use of water so might as well provide enough water to the a few industries that can develop it – namely the first claimants onto the water source. As Kanazawa (2015) documents, notions of prior appropriation in California's early water governance came directly out of mining codes. He writes that it was "inappropriate" to use riparian principles in diverting creeks and streams toward large scale mining operations because these operations could not guarantee any water would be left for other users (pg. 192). From the beginning, western water law was antithetical to sustainability. It was designed toward maximal exploitation. In her recent work, Kaitlin Reed shows that these structures of water law allow settler cannabis growers to divert water toward this thirsty, burgeoning industry at the expense of Wiya't water access and security (2023).

However, in the case of California, the land was viewed as empty – Indigenous presence erased. Writing in 1911, Wiel adds that the riparian system was based on English common law and a way to ensure water to disparate users despite ancient property rights.

Consequently, land and water could be divided as property rights to the pillagers who came to mine it (Wiel 1979, pg. 76). In other words, settler-colonialism created the conditions for reworking understanding and uses of water that were fundamentally unsustainable. The doctrine of prior appropriation spread from California, as a state, to the territories surrounding it. It was the only water law in the region and courts from Nevada to Colorado adopted it.

Another notion that emerged out of the California mining camp and that eventually was key to the quantification of water in the west was the notion of the acre-feet of water. The acre foot referred to one acre of land flooded with one foot of water, about 325,851 gallons (Hansman 2019, pg. 14). The acre-foot-of-water was imagined for mining exploitation, but eventually became the dominant metric by which water was measured and quantified. It transformed from a mining logic, to an agricultural one early in California state history. The acre-feet-a-year was the new temporal understanding of water. It became central for both hydrological studies and legal-political rights. The acre-foot is measured by calendar year and not by any time frame a river might recognize. The acre-foot put water systems and the movement of rivers, both in time, space, and volume, into imperfect colonial timeframes, often seasonal. As states across the west adopted water codes that mimicked California (and then Colorado), the surveying of water for the purpose of development and rights became critically important.

In 1902, Congress passed the Reclamation Act, establishing what would become the Bureau of Reclamation (BOR) and ushering in major water projects throughout the western states (Sneddon 2015). The BOR transformed water ways consistent with logics of appropriation already existing among settler institutions. In most ways, the mega dams and diversion projects that followed the creation of the BOR were in service to a need to divert, dam, and drain western waters. These infrastructures were built on early forms of dispossession that served as colonial beachheads against Indigenous territorial claims and jurisdictions. Maria Lane shows the colonial practices of early hydrogeography in New Mexico leading up to and immediately following the Reclamation Act (2024). Frederick Newell, who would become the first principal hydrologist for the BOR, said in support of the emerging colonial water regime in the west: "several acres well-tilled by white men would be destroyed for the benefit of one acre poorly worked by Indians" (Smith 1981: 133). The water rights regime that would take shape from the Colorado Compact of 1922 and subsequent dams and diversion was fundamentally anti-Indian. As President Roosevelt said in 1902, leading up to the passage of the Reclamation Act:

> The reclamation of the unsettled arid public lands presents a different problem. Here it is not enough to regulate the flow of streams. The object of the government is to dispose of the land to settlers who will build homes upon it. To accomplish this object water must be brought within their reach.

Nothing better summarizes the river as colonial becoming than the statement of the lawmakers who conceptualized and eventually passed the legal-political reality of the Colorado River.

Irrigation and Settler-Time

Initially for Anglophone colonialists (to distinguish from Spanish colonialists who first entered the region), the Colorado river was the water that flowed through the Grand Canyon and emptied into Gulf of California. It is over the course of the twentieth century through expanding agriculture interests in states like Colorado and Utah when the Colorado River – again a colonial idea – was expanded northward to give these newly created states claims to the waters of the river. But before these states became states, more intuitive definitions of the river's origin were used. For John Wesley Powell, one of the first Anglophone colonialists to describe the river in print, he wrote "The Colorado River is formed by the junction of the Grand and Green" (1875) – literally the first sentence of his book. This junction is just north of the Arizona state boundary. At the time of his expedition, Arizona was still part of New Mexico Territory and the whole system of water rights wasn't yet in practice.

As soon as white Americans saw the river, they imagined a source of water for future irrigation, westward expansion, and the replacement of Indigenous nations with white communities. In other words, it is more useful to understand the Colorado River not as a thing, but as an idea. The waters that flow through the Grand Canyon and that empty into The Gulf of California travel through high plateau to low lying desert are put together under the category of a river, tributary, and connected ecosystems though geographic abstraction. These are all very different kinds of places brought together under the concept of the *river*.

Since settlers entered the region starting in the late 19th century, hydrological science measured annual river flow of the Colorado River (Council 1991). In their book, *Science Be Dammed*, Kuhn and Fleck refer to army surveys starting in the 1870s as the basis of initial measurement of waters flowing through the Colorado River (Kuhn 2019, 21). The first U.S. presence on the Colorado River is at a place today called Yuma, Arizona. It was established as Fort Yuma in the early 1850s to expel Quechan people, called 'Yuma' at the time, from controlling the crossing of the river and restricting white immigration into California during the Gold Rush (Davis 2024). In other words, U.S. control of the Colorado River is built on imperial anti-Indian violence. It was from Fort Yuma that the U.S. initially sought to estimate the total flow of the Colorado River.

Only after the passage of Reclamation Act in 1902 did institutions in the United States embark on a systematic way of estimating the flow of the Colorado River; water studies that informed the eventual dividing of the Colorado River in the Colorado compact. The hydrological studies were funded through the Reclamation Act with the expressed intent of estimating the river for productive use. Productive use or irrigable land was a key concern for Anglophone settlers as they entered the region. The early studies were crude and there were few points to gather data. In Arizona, the Gila River and the Salt River were excluded from the Colorado River to appease Arizona and not count against its claims to the mainstem of the Colorado River. In Figure 1 we see there were gauging stations along these rivers, but by Figure 2, BOR no longer maintains gauging stations on the Gila and Salt Rivers because, politically, they were removed from Arizona's contribution to the Colorado River, this fact benefiting Arizona and allowing the state to completely deplete these rivers for the expansion of settler communities in the Salt River Valley.

In 1922, the Colorado River was divided between the seven colonial states who claimed an interest in it. At a point called Lee's Ferry, along the western border of the Navajo

Nation, the river was divided in half. Everything north was saved for the states of Wyoming, Utah, Colorado, and New Mexico, and everything south for Arizona, California, and Nevada. Mexico was also guaranteed waters that was part of a treaty agreement in 1944 (Kuhn 2019). With hydrological estimates, the states and the federal government financed dams, diversions, and created irrigation districts. The compact transformed hydrological imaginations into legal, political realities. It subverted Indigenous water rights and awarded the entirety of the river and its tributaries to the state governments. The Colorado Compact of 1922 and the Boulder Canyon Act of 1938 made into a legal-political fact the miner's measurement of water, acre-feet-a-year.

The river was brought into settler temporality, both legally and materially, as a future source for colonial expansion. After the signing of the Colorado Compact, California helped pass the Boulder Canyon Act in 1938, the basis of the Hoover Dam. By that point Arizona and California were in an entrenched conflict over the waters for the lower basin – divided by the compact. Arizona was in fact fighting the compact and the ratification of it in the state legislature, but California was already in the process of setting the Colorado river into motion for energy and irrigation (Mayo 1964).

Irrigation and the future course of water were integrally bound in the making of settler space. Notions of 'beneficial use' became key negotiating points for dividing the river between the states. The colonial imagination of water was to envision how much of the Colorado River could possibly be deployed to irrigate land in any of the seven states claiming interest in the Colorado River (Mayo 1964). Hydrologic estimates, a scientific quantification, made the dividing and pillaging of the river possible. The understanding of water through acre-feet-a-year was stamped onto the understanding and negotiating of the waters of the river from 1922 onward. Measurement was used to divide the river, not to understand it. In 1901, shortly before the passage of BOR, President William McKinley said, "…in my mind, there is nothing that will facilitate immigration like irrigation" – settlement through the colonial becoming of rivers.

Drought, climate change, and colonial demographers

Today, the Colorado River is one of the most important and disputed water sources on the North American continent. For years, geographers and geologists have incorporated the colonial definitions of the river and the region into their science. As was stated earlier, starting with John Wesley Powell, geographers approached the river with colonial intentions. The intent of knowing the river, from the beginning, was to transform it. What early mappers and 'explorers' envisioned were dams, diversions, and future white settlements along the river. It was an epistemology of agriculture rooted in colonialism and imperialism.

A comprehensive appreciation for rivers as in the way we study the Colorado River is different from understanding the environment according to local ecologies or sustainable economies built on centuries of limited, minute, and often bounded environmental observations. In the past, Indigenous environmental sciences did not limit rivers to basins or categorize them within systems. As with observations of the land, Indigenous science was based on a different episteme, one inclusive of land, plant life, and animals. Importantly for water access and water security, Indigenous peoples knew where they could find regular supplies of water. This knowledge can identify where natural springs are, or where rivers are

good to access. This isn't some mystic understandings of water, air, and the land; Indigenous knowledges are practical and necessary for survival.

In colonial hydrological sciences, water is measured using imperfect cycles, such as annual flow according to monthly and yearly delimitations of time.[2] The monthly and yearly temporal markers are colonial in nature, coming from Europe, and are inconsistent with Indigenous temporal understandings. For example, the Diné start the new year in October around logics related to planting and harvesting. The winter months have terms that refer to the kind of climate to expect, from snow to snowmelt to the coming of spring weather, characteristics more relevant for our current climate questions and questions about the Colorado River than references to Greek and Roman gods that are at the origin of many colonial months. This all might seem trivial, but it all has larger implications in how we think about the river. If our references to time are divorced from climate understandings, then they provide less information. The months in hydrology don't contain weather characteristics or understandings, they are simply numbers of days – an abstract measurement removed from generations of climate knowledge.

What is more, the calendar year as the colonial states understand it, are tied to capitalism and the expansion of profitable activities. The calendar year in the United States has more importance for business cycles than patterns we find in the planet tied to seasonal change. Places as ecologically diverse as Phoenix and Denver, Los Angeles, and Salt Lake City, are brought into the same temporal understanding of labor and profit. Marxists have long argued about the working day as a product of industry and profit. For example, EP Thompson writes about shifting temporal understandings among industrial societies through the rise of capitalism, enclosure of subsistent activities with 'task-oriented' temporalities, and the greater ability of watches and clocks to measure time and enforce industrial temporal discipline (1967). Inevitably, water allocation is tied to consumption, "growth," and demand on the river's waters that are part of market expansion, settlement, and capitalism. It moves water cycles from those Indigenous peoples would have had oriented around tasks, cosmologies, and localized understanding of their section of the river, with a broader, more abstract 'river' that flows along industrial time. The day is no longer bound to the availability of sunlight but divided into working shifts. To accomplish this unnatural activity, tremendous amounts of resources and energy are expended. Electricity maintains business activity after dark, which demands power and much of this power comes from hydroelectric dams along the Colorado River, such as the relationship between the Hoover Dam and Las Vegas.

The possibility of fluctuation over hundreds of years was absent in early hydrological estimates and is only now considered a possibility, often framed in the language of "megadrought" (Cook et al. 2010; Gangopadhyay et al. 2022). As was mentioned earlier, the origin of our current dispute starts with the Colorado Compact, when representatives from the seven Colorado River states came together to divide the river (Robison 2022). They did so assuming there was 17-million-acre feet of water that annually flow through the river south of Lee's Ferry. Now, the presumptive equilibrium of the two halves was completely political. It did not even match how hydrologists were conceptualizing the river and its basins at the time. Most of the gauging stations were located north of Lee's Ferry (or Lee Ferry) assuming

[2] The U.S. Geological Survey and Bureau of Reclamation maintain water flow measuring stations at various points along the river that quantify and then estimate monthly and then yearly estimates of water volume.

that the Green and Grand Rivers contributed most of the waters to the river (Kalra et al. 2017). The river was already a political abstraction, divorced from Indigenous knowledge, practices, and understandings. It was worked into a fantasy of millions of acre-feet for consumptive and 'beneficial' use.

In 1922 the calculations were ambitious and assumed a regularity tied to seasons familiar to those living in temperate environments – again temperate normativity. The river was brought into a singular systematic understanding. Instead of Diné bikeyah, or the lands where Diné people lived, which include local washes, springs, mountains, plant and animal life, the Colorado River was imagined as a basin, with mountains near the headwaters and a marshy delta near where it entered the ocean. The assumption was that when the winter snow comes to the mountains, in the spring it melts, and in the summer, it drains into the Colorado basin and supplies the region with water. This seasonal assumption of the river is still part of its official governance. With this knowledge, early hydrologists calculated the total amount of water that was expected to pass through a riverbed during a year. Although this appears as useful information, it gives state planners a false sense of confidence of knowing the river. An early editor for the Arizona Highways Magazine, Raymond Carson, wrote in 1947:

> Always over the land is the threat of drought. Several times in recent years the snows were light in the winter, the rains did not come and the water stored behind dams was low and the canals half empty. Then men peered dry-eyed at the hot white sky and prayed for rain. So far, though the water has flowed through the canals ever since they were dug decades ago. But what of tomorrow? And can man circumvent the caprice of Nature, if Nature choose not to bring the snow and rain that mean water behind stout dams, water flowing placidly between canal banks, reflecting the blue sky and a passing cloud, mirroring the dark green of citrus groves from which luscious rich desert grapefruit is produced for all the world, watering the soil in which caried crops grow to rifeness every moth of the year? Yes! Nature's whims can be circumvented, if man is wise and looks toward the future. Both Nature and the future are a challenge.

This quote, although not represented of science, is characteristic of a popular sentiment in Arizona and the seven colonial states that claim an interest in the Colorado River. It is a fear of the "caprice of nature," or a general climate anxiety that informs how settlers think about environmental problems and solutions.

What is the significance of rehashing this history for geographers? It's to reveal the way our sciences are built on colonial assumptions. Hydrologic sciences within the Colorado River are inevitably tied to projects of transformation. It is hard to know a naturalness of a river that is heavily legislated and diverted through settlement. The modeling of the river today is largely based on data that is collected by the Bureau of Reclamation, the same entity created to destroy the existing river and create something new. As of 1906, most of the streamflow stations are maintained in the upper basin rather than lower basin. Part of the reason for this is because the lower basin is understood to contribute less to the total flow of waters reaching the Colorado River. This is because the upper basin is in higher elevation and water tends to run downhill. For almost a hundred years, dams have set back major portions of the Colorado River in the lower basin states. It's hard to measure a river's flow when dams prevent its progress. These unnatural barriers are the objects of concern and the warning of changing

climate. The lakes formed behind these dams set into political motion cutbacks in allocations (to settler communities) when the reservoir is low.

What is more, hydrological science that is focused exclusively on climate change and notions of megadrought to understand crisis for the Colorado River takes our attention away from the destruction to rivers through damming and directs our focus instead toward vaguer ideas like megadrought. If we look at the concept historically as it's played out on the Colorado River basin, ideas of "drought" are socially constructed and ideologically tied to notions of the desert and the wasteland that make southwestern ecologies dispensable for state making projects (Kuletz 1998; Voyles 2015; Koch 2020). For example, in a 2017 report summarizing 100 years of hydrologic data on the Colorado River, Kalra et al. observe difference in average temperatures in times of drought during the 1950s and more recently. The obvious implication is that greenhouse gases are raising average global temperatures, affecting snowmelt, and threatening water supplies. What is *assumed* into the idea of naturalness of the river are colonial diversions of water. The major dams along the pathway of the Colorado River. The crude calculations that went into its making (Figure 3).

As is seen in the formula above, "natural flow" includes colonial impositions onto the river and its tributaries, including current rates of consumptions and the holding back of waters and evaporation loss in dams (Prairie 2005). Perhaps the most representative map of the colonial ontology of the Colorado River is a BOR operational schematic diagram, which defines the river and its tributaries in perfect straight lines inclusive of colonial infrastructures, such as reservoirs, tunnels, and canals (Figure 4).

Conclusion: colonial ontologies, climate science, and a river becoming

Today crisis narratives of the Colorado River are tied to climate change defined as declining water levels behind colonial dams. What is missing in nearly all news accounts and scholarly publications on climate and the Colorado River are the colonial intrusions that transformed the landscape in the first place. There is historical amnesia; a settler memory at work among colonial water managers, lawyers, policy drivers, tokenize tribal "representatives" who attend conferences in which what's left of the river is further pillaged. The effect of bringing in tribal representatives now, 100 years after the river was divided and plundered, is to add a multicultural veneer to longstanding structures of colonial depravations that have left tribes the most vulnerable and underserved water communities in the southwest despite the longest record of continues human habitation.

This article has asked up to re-think how we understand the Colorado River as a river defined through colonial ontologies and epistemologies and against Indigenous claims to the disaggregate waters now unified and put into interchangeable acre-foot units in the idea of the Colorado River. It is a story of colonial becoming, where the waters are constantly in motion and consequently the laws, policies, and colonial ideologies are also always adapting – climate adaptation as colonial adaptation. As Traci Voyles writes about the Salton Sea, to put settler communities in flood plains despite warnings of Indigenous peoples and to correct the movement of the water instead of the movement of the people when disaster hits (2022).

Our apocalypse narratives around climate change incorporates and reproduce colonial epistemologies. "Science" funded and conducted through colonial institutions, such as the University of Arizona where I work, only reenforces these narratives. Our current climate

change discourse is centered around the future planning of colonial communities, the continuation of the status quo of appropriation and diversion, mixed with a narrative of impending doom, collapse, and the dire need for technological innovation. Yet this narrative conscribes a linear time of modernization and progress that are core to both colonial historical and contemporary climate mitigation efforts.

This is represented in the thread that holds Roosevelt, Raymond Carson, and Bradley Udall's commentaries on the Colorado River together. Each is writing in a different epoch, yet each is writing to transform existing practices to make settlement more possible, to make the environment work for the colonizer. It is this thread of similarity across time and shared among settlers that are part of the continued colonial becoming of the Colorado River. It is discursive politically and ideologically, as well as material. Ideas inform infrastructure and infrastructure later informs ideas. Colonial becoming is a centuries long process and is still in motion. In summary, climate science inattentive to colonial realities replicate colonial dispossession and colonial acts. This work contributes to a river becoming, a river understood only through the lens of colonial conquest and anxieties, which include climate change's impact on existing overuse of the waters that comprise the idea of the river. In a colonial universe it is a colonial becoming.

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