

New Hippos at the Water Hole:
How Energy and Tech are Challenging Water Management
Nuevos hipopótamos en el abrevadero:
cómo la energía y la tecnología están desafiando la gestión del agua

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Abstract

Big tech and climate change are transforming how and where people live and work. Artificial Intelligence, the internet and the search for climate-friendly fuels are moving at the speed of imagination. It may be uncertain how developments in those fields will actually change our lives, communities, and the world, but this much is certain: (1) They are going to be water dependent and (2) the laws and governance systems that regulate water are not ready to deal with the demands of these sectors. The technical and engineering aspects of making these activities more water-friendly are getting increased attention, but too little has been given to the legal implications of major new water users locating in already water-stressed areas. That needs to change if the hoped-for benefits of these innovations are to be realized and the worst of their impacts are to be avoided.

Keywords

Water, Law, Energy, Data Centers, Governance.

Resumen

Las grandes empresas de tecnología y el cambio climático están transformando cómo y dónde vive y trabajan las personas. La inteligencia artificial, el internet y la búsqueda de combustibles sostenibles para el ambiente avanzan a la velocidad de la imaginación. Puede que no se sepa a exactamente cómo los avances en estos campos cambiarán nuestras vidas, nuestras comunidades y nuestro mundo, pero hay dos cosas que son seguras: (1) van a depender del agua y (2) las leyes y los sistemas de gobernanza que regulan el agua no están preparados para hacer frente a las demandas de estos sectores. Cada vez se presta más atención a los aspectos técnicos y de ingeniería para que estas actividades sean más amigables con los recursos hídricos, pero se ha prestado muy poca atención a las implicaciones jurídicas de la reubicación de nuevos usuarios de agua en zonas que ya sufren escasez de agua. Esto tiene que cambiar para que se materialicen los beneficios esperados de estas innovaciones y se eviten peores consecuencias.

Palabras clave

Agua, Derecho, Energía, Centros de Datos, Gobernanza.

1. Introduction

What is old is new again, or so the saying goes, and when it comes to the role of water in our lives, it seems true. Historically, to a substantial extent, water dictated where people lived, how they lived and how they did business. In the days before automobiles and air travel, waterways were our main highways of commerce. In the days before steam, industry depended on water



to power mills and factories and even since then, water has continued to play a critical role in producing power and goods.

Sourcing, treating and delivering water for farms, industries, communities and homes has always been a technical, legal, political and economic challenge, but aside from burgeoning population growth, the general types of water users did not change all that much between the mid-20th century and 2020. Indeed, in the United States, per capita water consumption actually decreased due to improved water management and conservation.

That was then. Fast forward to today and we are facing a very different and, in many ways, unplanned-for reality. Driven by the push to decarbonize and expand the energy sector, nurture the burgeoning Artificial Intelligence (AI) and cryptocurrency sectors, and accommodate both the impacts of climate change and the exhaustion of traditional sources of water used in industry, agriculture and public supply, the demands on already stressed water resources are going nowhere but up, while the laws and institutions charged with managing water resources lag behind. That is both a recipe for conflict and a catalyst for change.

2. Water, Nature and Human Development

When it comes to the things that shape our planet and all life on it, nothing looms larger than water. It is not an exaggeration to say that the developmental arc of human societies is closely tied to the harnessing and control of water. Early human settlements were concentrated around accessible water sources and the development of urban areas, agriculture, states, nations and empires turned on their ability to import, repurpose and recycle water. The Roman, Aztec, and Minoan civilizations, to name just a few, were dependent on water management just surely as the urbanization and industrialization of Europe was in the 18th and 19th centuries.

The mid-20th century ushered in a new era of human expansion and development with the advent of electrical service and pumping technologies that brought the world's groundwater resources into service in ways that were unthinkable before. Industrial uses, electricity production and agriculture transformed life but were—*are*—largely water dependent. The hydro-electric plants and the reservoirs that served them brought power, water and progress to remote areas, fueled the mass movement of people and economic activities, and allowed desert locales to blossom into large cities such as Los Angeles (CA), Las Vegas (NV), and Phoenix (AZ) in the space of a single generation.

Whether it is wise or sustainable to put more and more people in places with extremely vulnerable or limited water supplies is debatable, but at least the bulk of the water has been put to the cause of serving people, growing their food, and making the things they need. Indeed, thanks to conservation measures and increased efficiency, per capita water use in the United States has decreased by 9% between 2010 and 2015, according to the United States Geological Survey, despite unabated growth (Water Science School, 2018). However laudable, water conservation only relieves pressure on water supplies; it does not eliminate that pressure and much of the United States is already experiencing shortages, particularly in the Colorado River valley, which includes the states of California, Arizona, Nevada, New Mexico, Colorado, Wyoming and Utah, states that have seen their populations grow by more than 3.78 million people between 2010 and 2020 (Wockner, 2022).

That population growth was facilitated by the construction of federally sponsored reservoirs, hydropower, irrigation and highway projects in the 20th century. In many ways, in the United States and many other places, populations were growing and sprawling because it was policy to use water resources to encourage it. And it worked—but it isn't working so well today.

To be sure, our society faces enormous challenges and our best options for dealing with them may well come from these sectors. A lot of private equity financiers seem to think so. But good ideas in theory still need to work in practice and that is where things get sticky. Too often

the drive to go “live” with these bold ideas presumes, rather than plans for, the availability of water. When that happens, the result can be a very rude awakening with opposition and conflict substituting for consultation, cooperation, and adaptation.

How much water do these new “hippos” at the waterhole need? The consensus is a lot, though the specifics are hard to pin down since public information is hard to come by. The simple fact is we don’t know very much because of where these facilities are being located and the wide use of Nondisclosure Agreements. There often is very little information available to evaluate them on the front end and few obligations for their water use to be disclosed. Without more transparency, options for less water-dependent processes—particularly alternatives to water cooling systems so vital to data centers and AI and Crypto facilities—tend not to be pursued, at least initially. Indeed, the lack of water accountability is not just an external issue. According to a report published by the American Society of Civil Engineers, many if not most data centers do not monitor their water usage, apparently because they see no business justification to do so (Osaka, 2023).

That said, we do know what has been reported and experienced to date. For example, a single data center has been reported to consume as much as 5 million gallons (18.9 million liters) of potable (drinking) water each day, which is enough to supply thousands of homes, farms and businesses (Osaka, 2023). Globally, AI data centers have been projected to consume up to 1.7 trillion gallons (6.6 billion cubic meters) of water each day by 2027 according to the World Economic Forum (2024).

Apart from the data center scenario, the race to decarbonize energy production is also proving to be more water dependent. While no one will argue that natural gas is climate-friendly, it can be friendlier than some of its alternatives such as coal. That fact has helped drive the natural gas and liquified natural gas surge over the past decade. Of course, that natural gas has long been plentiful, but it was not until recently affordably accessible. The practice of hydrofracking changed that. Basically, hydrofracking involves the use of highly pressurized water to fracture gas-bearing rock formations deep underground. Fracking is highly reliant on aquifers and each well requires an average of 5.6 million gallons (21 million liters) of water (Ceres, 2016).

Farther along the green energy spectrum, green hydrogen carries great promise as a way to fundamentally shift away from carbon-based fuels. The premise is simple, to create more free hydrogen by stripping hydrogen atoms from water molecules. The reality is more complicated and hugely dependent on power from electric utilities.

That last point, the need for electrical power, deserves special notice. All of the discussion so far about the water impacts of the major new water users has focused on their direct use and consumption. From a water use standpoint, producing the power to run a data, crypto or green hydrogen facility can have its own water footprint that can be very significant. Those facilities need lots of electrical power to run just as they need water for their own operations. Those two factors should be considered simultaneously but all too often are not.

While the impacts of a given facility may seem modest in the overall picture of water use and mining, its impacts are often very localized and can have dramatic impacts on other water users. That last point can be made for all aquifer reliant users, which would include most of the new “hippos”. Texas offers a cautionary lesson. Southern Texas is dry, with few cities but well suited to irrigation-based agriculture. The region was long known for its tomato and fruit crops. Recent years have seen a significant decline in agricultural production and, if the Texas Commissioner of Agriculture is correct, the state is losing a farm each week and tomato farming is mostly gone. To the Commissioner, the reason is clear: the state is running out of water, yet is welcoming new residents and businesses, including hydrofracking, data centers and a growing green hydrogen industry, and there is not enough potable water for everyone (Malenfant, 2024).

Clearly, as the above-mentioned World Economic Forum report indicates, there are ways of making these new industries more water-friendly. There are alternatives to water cooling, and water-dependent electricity generation. There are ways to reuse and repurpose water and there are ways to locate facilities in places that are less water-stressed. We know that because it has been documented and because it has been done (Skidmore, 2025). So why isn't it happening?

The answer to the question is two-fold. First, it is because they are not required to and often do not know better. The second is because of out-of-date laws and policies. Often the easiest option is to put these new mega-scale facilities in places already suffering water stress. Until those factors are addressed, no one should expect the roll-out of green hydrogen, data centers and AI/crypto facilities to produce more conflict and confusion than value. Let's consider why.

The location of these facilities is driven by a handful of factors: access to ample energy supplies, a compliant legal/regulatory environment, and abundant affordable land. Missing from that list has been the availability of water, though that is not because it has not been important. It is because water has been presumed. That needs to change but it will not change by itself. And change alone will not be enough, it will need to be purposeful change, a change that has to be rooted in law.

That last observation is not based on the belief that law fixes things and that law is based on informed deliberation. On the contrary, it is based on the fact that, where water stewardship is concerned, the law is part of the problem. A big part. In places that trace their legal systems to western Europe—and that is much of the world—the development of law was heavily influenced by the need to define and protect property. Land was and is a special type of property and the ownership of land carried with it rights and some responsibilities regarding what one could do with it. For the most part, unless proscribed by some other law (like a local zoning or land-use law), landowners could do pretty much whatever they wanted to do on their property, and the law would defend their right to do it. They could even cut down a forest, pave over cropland and aquifer recharge zones and build a data center on it. And they still can. However, if a land-use is so disruptive of the rights of neighboring landowners as to create an actionable nuisance or trespass, it could hinder how that land is developed. That is why massive data centers and the like tend to be located in rural areas with few neighbors and no land-use laws. And because ownership of land traditionally carried with it the right to use adjacent surface waters and groundwaters with no need for permission or water use monitoring, is it any wonder that the industrial revolution called into service rivers, streams and lakes around the world? That body of law, called riparianism, viewed surface waters as public things amenable to the use and exploitation by adjacent landowners. While shortages could occur, riparian law was based on the notion that water would be available for all riparians and that none would unreasonably diminish the quality or quantity of the waterway.

3. Water for Whom, Water for What

The days when high intensity population centers and economic activities were confined to places with abundant surface water are long gone. In fact, the doctrine of prior appropriation, which prevails in the western half of the United States assumes just the opposite—that surface water is scarce and those who exploit it first should have a legally protected priority. This system essentially uses water rights to incentivize economic development. As a result, most of the surface water rights in the American West are spoken for, so new users are having to look more and more to groundwater, which can be subject to a variety of legal regimes, most of which reward whomever can get to the water first. The details and distinctions between those regimes are beyond the scope of this paper but it's fair to say none of them are based on a balancing of social, economic and environmental costs and benefits. Again, water is seen through a utilitarian lens that rewards pumping over planning. Though the amount of water one may pump is generally unlimited, the

right to pump is tied to the ownership of the land above the aquifer. Said another way, not just anyone can drop a well, it requires surface ownership—or the permission of surface owner.

Water law may demand some effort to get access to the water but what it does not do is require that anybody pay for the water. Indeed, water's special status as a public thing or being an incident of adjacent land ownership precludes the state from actually charging anything for it. That alone probably explains why there is so little interest in embracing water conservation measures when siting a facility. There simply is no business reason that is apparent to a facility developer. Until the water is not there.

Unfortunately, law in general and water law in particular are creatures of habit. Getting legislative bodies and courts (keep in mind that in Common Law systems court rulings are a source of law) to recognize the need for more flexible laws that take into account the dynamics of water is no simple matter. To them, and to much of the broader community, law is a tool for maintaining order and resolving disputes. Its propensity to stay the same is its virtue. But water abhors order and is inherently dynamic.

The new water hippos will undoubtedly make their presence known but that will not be enough to secure their future if water gets truly scarce. Aside from strict prior appropriation jurisdictions, water-law regimes compel either equitable sharing of available water or prioritize human health and welfare. The United Nations (n.d.) has recognized access to water as a fundamental human right and long-standing laws and jurisprudence (at least in the United States) have recognized that priority. If farms in Texas are already closing down because of lack of water, it takes no imagination to foresee that thirsty industries that are not essential to human survival will be curbed or forced to adapt their practices. These are not the realities that economic development officials and site selection professionals are focusing on, but they should. Water is scarce and getting scarcer and push will come to shove.

4. Conclusion

Data centers and next generation energy production may be getting lots of attention and criticism, but they are not the problem, at least from a natural resource management standpoint. Rather the problem is how they are planned for, where they are sited, and counter-productive laws and policies that govern them. The data center/AI binge is highlighting those problems by confusing compliance with legal standards with adequate planning, emphasizing speed over deliberation, and avoiding public engagement even when matters of profound public importance are at stake. Whatever is gained by rushing to act also plants the seeds for future conflicts and loss of the social license to be welcomed in the future and in other places. There are signs this is being recognized. Google, Microsoft and Amazon have all signed pledges to be “water positive” (i.e., returning more water than they take) by 2030, and Microsoft has developed a “closed loop” cooling system it hopes to deploy soon (Abdullahi, 2025). But 2030 is a long way off and new data and AI/crypto centers that still use evaporative cooling are popping up regularly. Hippos may be the kings of the water hole for a while, but it won't count for much when the water is gone or when the predators arrive.

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