Political Risk Assessment

Data Centre Usage Uptake and its Impact on American Water Systems: A Political Risk Analysis

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Figure 1

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Executive Summary

Given the increased adoption of resource-intensive GPUs in AI development and operation, it is pertinent to examine some key risks related to the rise of this technology, as well as potential risk mitigation strategies. Water usage is critical for data centers used in AI and related activities. Data centers are often located in arid, low humidity areas, because dry air reduces the risk of corrosion and electrical issues. However, these same areas often are marked by much competition for scarce water, and so the presence of data centers can deteriorate available water resources. The United States is home to about 30% of the world's data centers, and there are three main types of water rights in the USA. There is some evidence that large-scale data centers and their business partners may exert more influence over governments in competition with local groups and communities for access to water at reasonable rates. Policymakers should be cognizant of those groups and stakeholders impacted by data centers that may pull from the water table, or that are housed in nearby communities. This analysis holds that there is a heightened responsibility with respect to engaging in proactive policies, and authorities should balance the interests of all stakeholders, especially considering the broader social and economic importance of water availability. This report surveys the risk implications with respect to increased water usage in US data centers driven by AI, and it proposes some associated mitigation strategies for stakeholders.

As such, this report touches upon the following areas:

- Direct and indirect economic risks and associated mitigation strategies
- Political/legislative risks and associated mitigation strategies
- Environmental/Ecological risks and associated mitigation strategies

Introduction and Background

Given the increased adoption of resource-intensive GPUs in AI development and operation, it is pertinent to examine some key risks related to the rise of this technology, as well as potential risk mitigation strategies. Water usage is critical for data centers used in AI and related activities. Data centers are often located in arid, low humidity areas, as dry air reduces the risk of corrosion and electrical issues. However, these same areas often are marked by much competition for scarce water, and so the presence of data centers can deteriorate available water resources. The United States houses more than 30% of the world's data centers, and there is general difficulty in tracking water usage – as well as assigning usage rates for different activities.[1] Note that the water footprint of such centers can be analyzed using three scopes. Scope 1 measures direct water consumption, where it is primarily used for cooling servers and other equipment. Data centers in the U.S can consume approximately between 1 to 9 liters of water per kWh of server energy. Scope 2 measures water-intensive electricity generation, specifically the electricity used to power the thermal or hydroelectric center. Finally, Scope 3 is the most complex scope to measure, as it encompasses the water used in the entire A.I. supply chain.[2] For the purposes of this discussion paper, we focus on direct water usage (Scope 1) in the US in order to maintain clarity and cohesiveness for the reader.

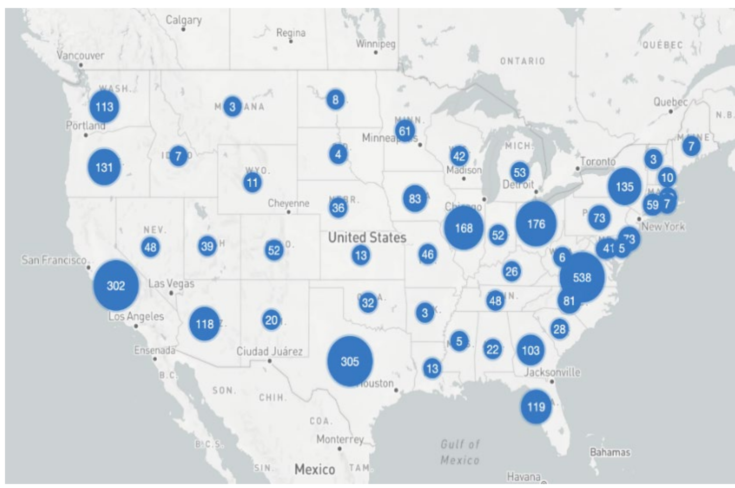

Figure 2

There are three main types of water rights in the United States: riparian rights link water usage to land ownership, ensuring landowners near a water source have the right to use it. The usage of the water must be reasonable, and this threshold is measured by comparing to other riparian landowners and assessing its impact on downstream users. In some places, users not adjacent to a water source can buy rights to it, if they can demonstrate that it does not adversely impact downstream users. Finally, unused rights do not expire, but state permits must be renewed upon reaching their fixed time limit. Prior appropriation rights operate on a first-come, first-served basis. They are mostly used in dry regions where rivers do not flow year-round, and water shortages are common. In times of scarcity, senior users can receive access before junior users, where seniority is determined by the date of the water claim. To be granted a claim, users must demonstrate intent to use the water for a beneficial purpose and once granted, they must put the water to use and solidify their claim. Hybrid rights combine aspects of both riparian and prior appropriation rights and are managed at the state level. Currently, eleven states have varying forms of hybrid rights.[3] Given the increased water usage rates in data centers because of AI adoption, it is important to clearly delineate usage rights to stakeholders in relevant jurisdictions.

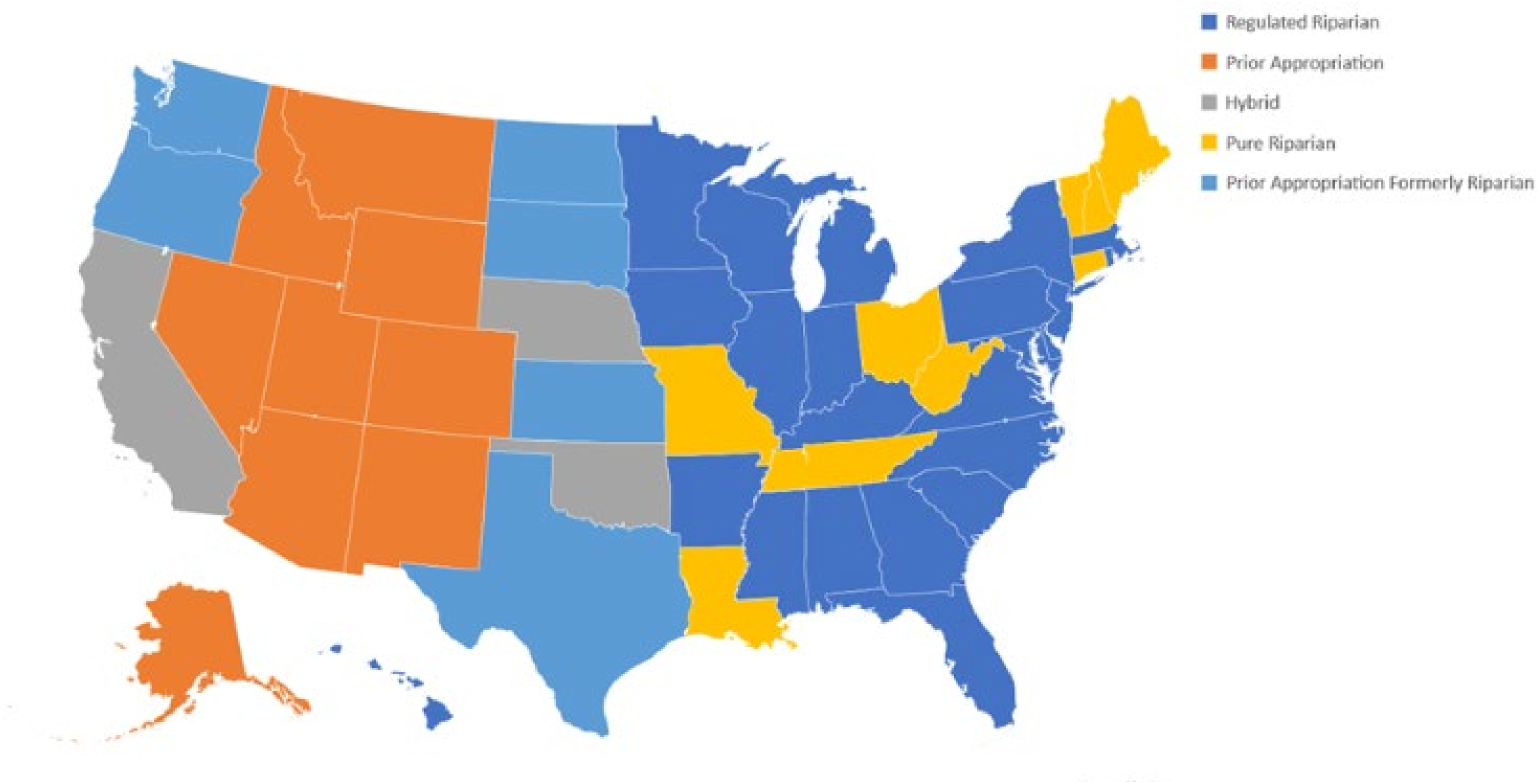

Figure 3

One sees that the variance in water rights between jurisdictions, as outlined above, allows for various types of risk to manifest.

Despite the lack of clarity, it is evident that data centers are among the world's largest water consuming commercial industries, particularly in the United States. Given the scale of AI usage, as well the general ubiquity of AI in the main-stream American consciousness, this paper’s scope is limited to the potential impacts in the United States – with various regional examples and case-studies as relevant. As a general point, policymakers should be cognizant of those impacted by data centers that may pull from the water table, or that are housed in nearby communities. There is a heightened responsibility with respect to engaging in pro-active policies – which should balance the interests of all stakeholders, especially considering the broader importance of water availability. This report aims to provide an overview of the risk implications with respect to increased water usage in US data centers driven by AI and propose associated mitigation strategies for stakeholders.

Economic Risk

It would seem that to some extent, the lack of clarity around water rights in the USA has allowed economic risk to manifest. The emergence of data centers as a water-intensive industry has challenged existing water rights treaties, leading to disputes over resource allocation. Protests and legal disputes between data centers and communities further put a financial strain on stakeholders. In 2022, a 13-month legal fight ensued when Google refused to reveal water usage in one of its data centers in The Dalles, Oregon. After an unsuccessful battle, it was revealed that Google's data centers had used 355 million gallons of water, 29% of the city's total water consumption.[4] Large companies are also able to negotiate better rates, while local communities are forced to pay higher rates for water. In Mesa, the city allowed Google to pay $6.08 per 1,000 gallons of water, while consumers were forced to pay $10.80 for the same amount, sparking outrage in the community.[5] Accordingly, one sees the impact on local economies, namely through rising costs for competing users, as well as industry specific costs.

Rising Costs for Competing Users

The availability and quality of water is critical for many industries aside from IT infrastructure, such as agriculture, manufacturing, and municipal and domestic use.[6] As data centers expand and require more water, they compete directly with these sectors. The potential downstream effects are massive, as the water used by data centers is often used to prevent bacterial growth, rendering it unsafe for human consumption. This removes it from the local water cycle and raises critical questions about the needs of local residents, ecosystems and agriculture. For instance, a medium sized data center uses as much water as three hospitals.[7]

The proposed expansion of a Meta data center in a New Mexican town raised concerns about resource allocation and strain on local communities. The center was granted access to 500 acre-feet or 163 million gallons of water rights through the agreement.[8] New Mexico is one of the most water-scarce states in the U.S., with 33 counties under USDA Drought Disaster Designations.[9] Consequently, industries such as agriculture face higher operational expenses or even supply shortages. Municipalities are also forced to raise water prices to manage increased demand, and such policies disproportionately impact smaller businesses and households. This resource competition raises concerns for farmers, who already operate on tight margins, as higher water costs could reduce their production capacity.

Industry Specific Costs & Market Distortions

Growing data center demand puts a strain on local resources, as municipalities must upgrade their water supply and cooling infrastructure. Not only do data centers require permission from water utility companies, but there is an additional cost of wastewater treatment facilities, ongoing maintenance, and large-scale infrastructure to support operations. Due to this complexity, historically it has been difficult to measure the full impact of data center water usage.[10] San Diego County, California's second largest county, is expected to see a 14% increase in water rates – in spite of a current surplus of water.[11] Upon further investigation, the rate increase is being implemented to fund energy and infrastructure projects, many of which are tied to data centers, according to the San Diego Water Authority. Many municipalities are forced to invest into water infrastructure. The need for continuous funds directs money away from other facilities, such as healthcare or transportation. As a result, ratepayers indirectly bear the costs of sustaining data center operations. Similarly, A.I.-driven computing accelerates energy demand, forcing utilities to expand their grid capacity – another potential burden on the tax base. Data center electricity demand is projected to increase by up to 27% per year through 2028.[12]

The rapid expansion of data centers in many arid and dry regions is often driven by governments offering tax incentives. For instance, Google's data center in The Dalles, Oregon, is receiving $260 million in tax subsidies over a 10-year period.[13] The center employs about 200 people and generates over $5 million in local taxes. On average, a typical data center generates about $1.1 million in revenue for local and state governments, creating 157 local jobs, and injecting about $32.5 million into the local economy annually.[14] Evidently, these facilities contribute to job creation and local economic growth, but they also place additional burdens on municipal water and power infrastructure.

Additionally, there are concerns around real estate valuations. Around 20% of data center servers draw water from areas that are moderately or severely water stressed, and half are powered by plants located in water stressed regions.[15] Water stress in these regions can have a considerable impact on property values and industrial investment. It may be that property investors are growing more wary of water-scarce areas, recognizing that limited access to water can hurt property values and asset performance. Indeed, concerns about the high-water usage of data centers and a corresponding increase in electricity rates can lead to impacts on real estate (commercial or residential development) in local areas.

Finally, data centers are often located in arid, low humidity areas, as dry air reduces the risk of corrosion and electrical issues. Consequently, this has the highest marginal cost in terms of water consumption.[16] The Water Risk Premium represents the additional cost a user will pay for water due to scarcity or pollution. The U.S. Southeast has the highest risk premium, as seen in Figure 4. Simultaneously, many Southeastern states have the highest concentration of data centers (evident in Figure 1 earlier in the paper). As such, in areas with high water scarcity or highly competitive water needs, downstream users including households and industries face increased financial burdens and uncertainty – such as property tax distortions (given that tax burden is calculated using home value which may decrease as the competition for water increases).

	Environmental Issue		Financial Implication		Comments
Location	WRI Quantity Risk (0–5)	WRI Quality Risk (0–5)	Water Risk Premium Relative to Market Price (normalized to 1)	Revenue-at-Risk from Water Scarcity* (%)	
US Midwest	3.81	4.19	2.2x	75	Poor quality and high demand put revenue at risk
US Northern Virginia	2.73	2.92	2.2x	83	Growing demand for water puts future revenue at risk, even though quality and quantity risks are moderate
US Southwest	2.63	3.25	1.1x	92	Quality risk and increasing water demand drive up revenue-at-risk
US Southeast	2.36	1.32	4.6x	78	Water is underpriced, resulting in a high risk premium, while increasing water basin competition puts revenue at risk
US Northwest	1.84	2.01	0.4x	96	Current water prices reflect value, lowering the risk premium, but increasing competition and population growth leads to a high revenue-at-risk
Cape Town, South Africa	3.68	3.39	6.8x	100	High quantity and quality water risk in a drought-stricken, populous area results in a high water risk premium and revenue-at-risk

Figure 4

Mitigation Strategies

Given that water usage in data centers comes with considerable economic risk, especially with respect to the potential to increase residential electricity costs and the financial impact of increasing water usage, it may be appropriate for U.S. policy makers to engage in mitigation strategies as outlined below.

Optimized taxation on data centers can be used to directly subsidize residential energy costs. Alternatively, additional sources of tax revenue can be used to fund local grid modernization, with the goal of reducing bottlenecks and stabilizing electricity rates by better managing peak demand through real-time monitoring and demand response.[17] In the alternative, governments can also create tax incentives for investing in local renewable power sources and encourage (or mandate) data centers to support these new projects, which are often developed as private-public partnerships.[18] Governments can also take a more active role, engaging in regulatory oversight through price stabilization mechanisms, by capping utility prices, or creating planning boards composed of various stakeholders (e.g., utility representatives, data center operators and community members). These boards would have the authority to review expansions of data centers and project potential impacts on electricity resources.[19]

Building on demand-side regulation, centers can also be asked to enter into direct power purchase agreements (PPAs) where they agree to a contract stipulating that data center operators must generate a certain portion of their electricity from renewable resources and that they also pass along a share of cost savings to the local community.[20] There also exist community benefit agreements (CBAs) where data center operators commit to ensuring certain benefits for the community (e.g., stable electricity prices, infrastructure investments or addition of jobs) to offset economic risk.[21] Broadly, to reduce water usage of data centers, optimized cooling systems, discussed later on in this analysis, are likely to pay the most dividends as they are the most water dependent process.[22] Governments should also work to provide both subsidies and other incentives to increase hardware optimization and efficiency, including low-interest loans on the purchase of new equipment, loan guarantees or creating import duty exemptions on hardware items. Governments can also impose regulatory requirements to track water usage and keep data centers accountable, measured through Water Usage Effectiveness (WUE) metrics and monitored through independent audits or routine inspections.[23]

Looking to mitigate negative property value effects, governments (especially at the municipal level) should carefully consider the introduction of specified zoning laws. These regulations should focus on ensuring that data centers are built in areas where there is adequate prior water infrastructure to preserve local resources and support property values. Meaningful environmental impact assessments and community consultation should precede any official zoning decisions so that local municipal councils are well informed about the potential economic and distortionary impacts of data centers. A vigorous consultative approach underscores the preceding mitigations outlined by this analysis, and will ensure stakeholder needs are met and addressed appropriately.

Political/Legislative Risk

Fragmented Water Governance

With the perceived economic benefits of data center expansion, protecting local resources may come second to attracting investment, leading policymakers to look at annexing such resources. This is in the context of legislative protections for water, or political priorities. Recall that water resource regulation and rights are fragmented in the USA, with jurisdiction held by the states, leading individual states to determine their own priorities over water usage. A noticeable divide exists between eastern and western states, with eastern states granting almost entirely riparian usage rights. Riparian water usage rights allow landowners unrestricted water access within their property borders.[24] In contrast, western states often regulate the usage of water. Nevertheless, the scarcity of water usage is a national issue, with 50% of the continental United States experiencing some drought conditions since 2000.[25]

States' actions also affect jurisdictions downstream; watershed states like California, Colorado, Washington, and Oregon, which sit along the continental divide, largely dictate that a large chunk of water is passed onto the aquatic arteries to other states.[26] If western states were to adopt a less stringent regulatory framework, coupled with their more attractive business environment, like Washington's tax regime or California's capital hub, downstream states may be at risk of a dwindling water supply and the marked increase of crisis conditions which have plagued watershed states. However, the inverse is true – where water scarcity may also prove a threat to data center viability in affected areas. California's track record of stringent environmental protection laws does not disappoint in the context of data centers; lawmakers responded quickly to data centers' threat to local water resources, with the LA wildfires prompting decision-makers to promptly mobilize the political will to protect water resources and impose usage restrictions on the data center industry.[27]

International Treaties/Commitments

Increasing political pressure at the highest levels of the American government and fragmented authority present the perfect recipe for international disaster. Water rights in the United States are decentralized to provide a localized approach to water usage. Prominent government figures have identified data centers, driven by the increased adoption of cryptocurrencies and AI, as a priority to stimulate America into a new age of digitization and to position America as the dominant digital power.[28]

Nevertheless, the American federal government enters into co-usage agreements with international partners, the most notable being the Canadian government, which shares the world's largest land border and the Great Lakes. The federal governments entered into agreements to standardize water treatment, usage, and sewage dumping on both sides of the 49th parallel to ensure that water resources are utilized responsibly.[29]

Additionally, watershed and river flow treaties have been established between many states and provinces, completely absolving the federal government of jurisdiction over water usage and giving border states an upper hand in negotiating for their interests over states which must receive their water downstream to border states.[30] Most notably, Alberta and Montana entered into a treaty for the Milk River and St. Mary River. It sets out the fair, equitable utilization of the rivers on both sides of the border, effectively supporting the large petrochemical and agricultural industries on both sides of the 49th parallel.[31] Still, this agreement fails to consider any states that depend on these rivers downstream, and so stakeholders must lobby Montana, for example, for their interests. So far, no problems have surfaced, and it is proving to be a rewarding treaty for downstream Montana and upstream Alberta; however, it is unlikely the built-in treaty dispute mechanisms for review on climate change can prove strong enough when political will changes to support the booming data center industry, presenting a risk that stakeholders break their international commitments to foster domestic economic growth.


Figure 5

Corporate Influence

Fragmented water governance legislation and political risks can affect water usage by data centers that lack oversight. This, coupled with increased support for cryptocurrencies by the current US administration, poses significant risk for ensuring sustainable water governance practices. The literature has shown that while cryptocurrencies represent a small percentage of financial transactions, their environmental impact is much larger than conventional financial transaction systems – impacts that are to sure continue with the increasing adoption of AI, and therefore increasing data center usage as well.[32] In this vein, there seems to some level of corporate influence over community politics and impact. Federal jurisdiction typically applies to interstate and navigable waters under the Clean Water Act, establishing a basic structure for regulating pollution discharge into bodies of water.[33] However, individual state and local governments often maintain primary control over groundwater and local bodies of water, which leads to significant variability in water governance regimes. There is risk in irresponsible governance leading to unsustainable usage of water and energy resources by data centers or other actors – perhaps due to community desire for capital attraction.

Considering the example of Google's data center in The Dalles, Oregon, in 2021 it consumed nearly one-third of the city's water supply, around 355.1 million gallons of water.[34] This triggered staunch backlash and local opposition due to its disproportionate impact on municipal resources. The Dalles city officials sided with Google, attempting to block journalist access to water use information through a lawsuit.[35] This effort ultimately failed; however, it illustrates the risk communities face if local governments align with the interests of large corporations over their own constituents. Consequently, communities often lack bargaining power when negotiating the terms of water use with multinational corporations and technology conglomerates. This may result in a 'race to the bottom', where municipal, and other sub-national governments compete to attract data center investments through relaxing water and environmental regulations.

The current federal administration's anti-regulatory, pro-crypto stance may further weaken oversight, encouraging states to attract data center investments through lax regulation. Therefore, legislative and technology-based mitigation strategies must be sought out to ease the risk faced by communities, while promoting sustainable alternative cooling methods for data centers. This is possible through policies aimed at incentivizing the development and implementation of alternative, less water intensive cooling technologies. However, today's political reality suggests that industry resistance and federal inaction may allow unsustainable practices to persist, at least in the short term.

Mitigation Strategies

An effective mitigation strategy would see the federal government impose legislation enacting stricter permit requirements and limits on intensive water withdrawals by data centers. The adoption of a national framework for sustainable water uses standards, akin to the Clean Air Act's approach to emissions in the United States, would ensure that data centers and tech firms are held accountable.[36] Amending the Clean Water Act to include stronger federal oversight and enforcement, as well as centralized uniform standards across all states, could help mitigate the risks associated with fragmented water governance. Additionally, state-level restrictions on the construction of new data centers in high-risk areas, such as very drought-prone communities, should be considered, while allowing for comprehensive environmental assessments to be conducted, with private capital allocation scenarios still being considered. Government should also take a policy stance that encourages efficiency gains from data center usage – whether it be hardware improvements, or other methods, as is highlighted throughout this analysis. One such method could be a software-informed approach, in that policy makers encourage reduced private water usage for cooling reduced by allowing space for industry to make informed trade-offs between performance and usage intensity, raising the level of application programming to allow for more energy-efficient means of computing.[37] A broader environment encouraging government-funded research and the development of alternative cooling technologies may also be key (see some specific details examined later in this paper).

In parallel to discussions on policy oversight, broader debates around AI governance and its societal implications have led to proposals for temporary AI lockdowns, which could have indirect effects on data center water usage. In March 2023, an open letter signed by tech leaders and researchers called for a pause in AI development beyond GPT-4, citing risks such as widespread misinformation, job displacement, and potential loss of human control over AI-driven decision-making. While the primary intent of such lockdowns is to establish better safety, transparency, and governance frameworks for AI, a secondary consequence could be a temporary reduction in data center workloads, leading to lower energy and water demands. However, these reductions would likely be short-lived, as AI adoption continues to accelerate across industries, driving long-term demand for both energy and cooling solutions. At large, however, addressing all these challenges requires incorporating sustainability efforts into AI governance discussions, ensuring that future technological growth is aligned with environmental responsibility rather than exacerbating existing ecological strains.

Environmental Risk

The water depletion that will come from AI data center expansion will have a significant impact. The method used for calculating a data center's overall water impact is called the "water footprint." A comprehensive umbrella term, the water footprint measures freshwater sources (blue water), rainwater/runoff water (green water), and polluted water requiring treatment (grey water), providing a more complete assessment than total water withdrawal by tracking both direct and indirect water usage.[38] In an Environmental Science and Technology journal article, the authors write about the downstream effects on ecosystems due to blue water extraction. The withdrawal of freshwater resources from an area can deplete both surface water and groundwater reserves, disrupting the natural water cycle and potentially reducing water availability for local ecosystems. This can lead to a severe decline in biodiversity.[39] The lack of green water in the area then additionally contributes to the depletion of insects and birds, who are key players in an ecosystem due to their pollination abilities.

When analyzing the risks inherent in an AI data center, city planners and policy experts must consider all the stakeholders who are reliant on the blue water of that particular ecosystem (e.g., farmers, factories, communities, etc.). An AI data center's potential consumption of both blue water and green water, without replenishing these resources, can significantly impact the local ecosystem's water balance, potentially contributing to environmental degradation in the surrounding area.

Drought Vulnerability

When an ecosystem experiences reduced green water availability, it becomes more vulnerable to drought conditions, which can have devastating effects on overall ecosystem stability.[40] A study examined the impact of a drought on British grasslands, and it found that the impacts of the drought would cause inconsistent productivity (measured in terms of a particular plant growing and spreading over time) for at least nine years after the drought.[41] This then had a significant impact on other species of plants and animals that lived in the area. The long-term and widespread environmental impacts should be a major cause for concern for AI companies, as poor water management practices could paint their name as a contributor to long-lasting ecological damage in their operating regions.

Another impact of droughts caused by a depletion of water in an area is an increase in an area's vulnerability to wildfires. A study of Glacier National Park demonstrated that droughts and the subsequent lessening in water for forested areas led to an increase in forest fires in the park. The droughts were caused primarily by reduced rainfall and snowpack, both green water sources.[42] The threat of wildfires as a downstream effect of AI data centers' intensive consumption of both green water and blue water resources poses a large concern, as their impact extends beyond environmental damage to potentially threatening human life.

Finally, depleting a region's water supply could make operating an AI data center unfeasible. A constant loop of taking water from a region, specifically green water, which may not be returned properly to the source is not sustainable in the long run. So not only would AI data centers deplete the resources from an area, but they might also force themselves out of operation.

Energy Consumption

Although these data centers support the immense computational demands of AI-driven applications, their substantial energy consumption, greenhouse gas emissions, and water usage create serious sustainability challenges beyond water usage concerns. As AI models grow in complexity, the energy required for their training and deployment escalates dramatically. Large-scale AI models like OpenAI's GPT-3 consume approximately 1,287 megawatt-hours (MWh) of electricity, leading to carbon emissions of about 502 metric tons, equivalent to the annual emissions of 123 gasoline-powered passenger vehicles.[43] The energy consumption of AI-driven data centers is poised to increase further, with estimates suggesting that they could account for up to 12% of total U.S. power demand within the next three years.[44] This rise in consumption worsens climate change by increasing the reliance on fossil fuel-based power generation, particularly in regions where renewable energy sources are not sufficiently integrated into the grid. This trend signals a growing dilemma where technological advancement is directly at odds with environmental sustainability.

The issue is not simply one of raw energy consumption but of efficiency and the long-term trade-offs. The core issue is the balance between the benefits of AI-driven development and the ecological costs of sustaining the hardware that powers it. Without proper interventions, AI-driven data centers could contribute to a feedback loop where increasing computational power demands lead to a greater need for energy-intensive cooling, resulting in more emissions and heightened strain on scarce water resources.

Figure 6

Cooling System Impact

In addition to energy consumption, data centers exert considerable pressure on water resources due to their intensive cooling requirements. Traditional cooling systems rely on water to dissipate heat generated by servers, with a mid-sized data center consuming hundreds of thousands of gallons daily for cooling purposes. This is particularly problematic in water-scarce regions, where the diversion of water for industrial use can worsen drought conditions and strain local ecosystems. In California, for instance, the diversion of water to support the needs of Silicon Valley's data centers has been implicated in worsening drought conditions, leading to increased competition between industrial and residential users.[45] The reliance on evaporative cooling towers, which can lose approximately 8.55 gallons per minute through evaporation, further compounds the problem, as this equates to over 12,000 gallons of water lost daily.[46]

Moreover, the quality of water used in these cooling systems is another factor, as utilizing reclaimed or recycled water introduces risks such as increased corrosion, scaling, and microbiological growth within the equipment, requiring rigorous water quality management to ensure the longevity and efficiency of cooling infrastructure.[47] While alternative cooling technologies such as liquid cooling and direct-to-chip cooling have been explored to enhance sustainability, challenges remain in implementing these systems at scale. Liquid cooling, which directly absorbs heat from server components, can improve energy efficiency and reduce water usage, but potential risks such as coolant leaks and the complexity of system setup require further refinement before more widespread adoption can be realized.[48]

Impact of Indigenous and Localized Communities

The environmental effects of data centers extend beyond direct energy and water consumption, as their operations also have broader implications for regional water cycles. In regions already experiencing water stress, such as the southwestern United States the high water demands of data centers can disrupt local hydrological balance. This has led to significant community opposition, prompting calls for the adoption of alternative cooling methods such as air-based systems to mitigate environmental impacts. In North America, existing water treaties such as the Colorado River Compact and the Arkansas River Compact were established based on historical water usage patterns, but the emergence of water-intensive industries like data centers threatens to disrupt these allocations. The growing industrial demand for water, along with the effects of climate change, may require the renegotiation of these agreements to account for the changing landscape of water consumption.[49]

AI-driven data center expansion and Indigenous rights presents another dimension of the issue, as large-scale industrial projects often encroach upon Indigenous lands without adequate consultation. The Sturgeon Lake Cree Nation has voiced strong opposition to Kevin O'Leary's proposed $70 billion AI data center project in northern Alberta, citing concerns over treaty rights and environmental degradation.[50] The project, located on traditional Indigenous territory, raises critical questions about the rights of Indigenous communities in decision-making processes related to industrial development. Chief Sheldon Sunshine has emphasized the lack of consultation with the First Nation, highlighting broader systemic issues regarding land use policies and environmental justice – not just a risk in Canada, but the U.S. as well. As AI-driven data centers continue to expand, it must also be ensured that Indigenous and localized voices are included in discussions regarding land development, resource allocation, and environmental impact assessments.

Mitigation Strategies

A potential strategy to mitigate the risk of environmental impacts would be for localized and Indigenous communities to lobby government agencies across the world, like the United States' Environmental Protection Agency, to develop policies and fund grants for research into potential risk mitigation – perhaps in tandem with the legislative mitigations mentioned previously. The EPA already "funds climate change research grants to improve knowledge of the health and environment effects of climate change, and provide sustainable solutions for communities to effectively manage and reduce the impact of climate change."[51] Water scarcity is an emerging issue that is directly linked to climate change, and over usage of water resources by industries such as AI, making research grants for water conservation in AI development a logical and necessary step forward.

Another risk mitigation strategy can be found in the Oil and Gas Sector. CEOs of 12 of the top petroleum companies have united to form the Oil and Gas Climate Initiative, which "focuses on leading the industry's response to climate change and accelerating action towards a net zero future consistent with the Paris Agreement."[52] Since its inception, OGCI partners have taken concrete action on reducing their climate impacts through reductions in their climate impacts, such as greenhouse gas emissions. AI partners in North America, and potentially globally, could form a similar third-party, industry-based coalition to collectively reduce their impact on water systems by committing to fund research and development aimed at minimizing water usage in AI data centers.

Alternative Cooling Technologies

Focusing on the specifics of individual data centers, as outlined in the 'Economic Risks' section, chiller-less and waterless cooling systems are also emerging as sustainable alternatives to traditional data center cooling, aiming to reduce water consumption while maintaining thermal efficiency.[53] Chiller-less systems leverage economizers, utilizing outdoor air to cool IT equipment, significantly cutting water usage compared to evaporative cooling. However, exposure to outdoor air introduces contaminants such as dust and wildfire smoke, necessitating filtration, which can diminish efficiency. Waterless cooling systems, on the other hand, employ closed-loop designs, where fluid is recirculated instead of evaporated, eliminating water loss. DX CRAC (Direct Expansion Computer Room Air Conditioning) systems rely on dry coolers and air-to-refrigerant heat exchangers, reducing water dependency but often requiring more electricity.[54] While these technologies help alleviate water scarcity concerns, they introduce trade-offs between water conservation and energy efficiency, particularly in regions where electricity generation still depends on fossil fuels. The challenge lies in integrating these cooling methods without inadvertently increasing carbon emissions, highlighting the need for further innovation in low-energy, water-efficient cooling solutions.

Figures

Figure 1*:* "The Voice of Data Centre Operators in Asia-Pacific." *Asia-Pacific Data Centre Association*, n.d. https://www.apdca.org/.

Figure 2: "USA Data Centers." *Data Center Map*, 2025, https://www.datacentermap.com/usa/.

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