
AI, DATA CENTRES, AND FRESHWATER SCARCITY: THE ROLE OF INTERNATIONAL ENVIRONMENTAL LAW IN PROTECTING THE HUMAN RIGHT TO WATER

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ABSTRACT

Artificial intelligence and its rapid advancement have resulted in the unprecedented expansion of data centres worldwide, serving the world while posing environmental challenges beyond conventional concerns of carbon emissions and energy consumption. Amongst these existing challenges, the freshwater requirement for data centre cooling systems is quite intensive, and surprisingly, it has received limited attention at the international level. In this research, we have examined the intersection of AI infrastructure, freshwater scarcity, and the human right to water, where we have analysed whether ecological impacts associated with digital technologies can be addressed or catered to by the existing frameworks of international environmental law. It is a known fact that the water footprints of AI-driven data centres are growing at an alarming pace, so this research is carried out critically to understand and evaluate the applicability of principles that serve as the fundamentals of environmental law, which include the no-harm principle, sustainable development, the precautionary principle, the polluter-pays principle, and common but differentiated responsibilities. Here we have explored the relationship between environmental protection obligations and international human rights law, specifically narrowing our focus on the aspect of its impact on fundamental human rights and whether access to safe and sufficient water will be recognised as one. The paper highlights, through doctrine analysis of various international environmental regimes, transboundary water management regimes, and business and human rights regimes, that there are serious regulatory gaps regarding the governance of private technological actors whose activities create considerable freshwater requirements. From the analysis of the literature review presented, it is possible to argue that nowadays international law is fragmented and state-centric and thus creates obstacles with respect to the accountability, transparency, and enforcement of the environmental impacts of the AI-related infrastructure. There is no set of obligatory regulations in the field of international environmental law related to the duty of technology firms to report water usage, to conduct environmental due diligence and to sustainably manage their operations. At the same time, the problem becomes

even more acute when the issue of water-stressed regions arises, as the industrial usage of water by data centres might collide with the interests of nature and people. The focus of the paper is on the issues of environmental justice in relation to the freshwater consumption by the infrastructure connected to the AI technology and the need for an integrated approach to its governance involving the combination of technological innovation and sustainability, as well as human rights protection. In terms of the suggested recommendations, it is necessary to develop a set of international standards, which are rights-based, including corporate water disclosure, human rights-based environmental assessment, sustainability and regulation of the digital infrastructure to avoid intensive resource consumption and water scarcity.

Keywords: Artificial Intelligence; Data Centres; Freshwater Scarcity; International Environmental Law; Human Right to Water; Sustainable Development; Environmental Justice; Environmental Responsibility; Water Governance; Business and Human Rights.

I. INTRODUCTION

The 21st century has undergone two substantial advancements:

- Swift growth of Artificial Intelligence and digital technology
- Escalating global freshwater crisis

Whereas AI helps in solving international problems, it can also help in creating new environmental issues as well. AI relies upon data centres which extract large amounts of water and electricity so as to keep servers cool. Therefore, AI also promotes degradation of water resources. Earlier researches have considerably determined the influence of AI and data centres from the outlook of international environmental law. This article highlights that the environmental challenge should also be determined via the human right to water. The right to water is acknowledged under:

- Article 11(1) and Article 12 of the International Covenant on Economic, Social and Cultural Rights (ICESCR); and
- General Comment No. 15 of the Committee on Economic, Social and Cultural Rights.

These human rights commitments are different yet interconnected with environmental law

obligations like preventing environmental damage and sustainable development.¹

AI depends upon water in substantial amounts. For example, a vast data centre may consume 1–5 million gallons of water every day—sufficient to meet the needs of 30,000–50,000 people. Just one AI conversation can consume 500 millilitres to 1 litre of water for cooling servers, and training a single language model can consume 700,000 litres of freshwater.²

These data highlight that AI has a substantial environmental impact. This problem becomes more severe because the world itself is experiencing a significant water shortage.

As per the United Nations:

- By 2025, around two-thirds of the world's population may live in water-scarce areas; and
- Around 1.8 billion people may encounter extreme water shortage.

Regardless of this, tech companies still build data centres where electricity is cheaper or where tax benefits are available instead of places where water is in abundance.³

There are various data centres established in water-scarce areas:

- South-western United States,
- Chile, and
- Parts of India.

This can endanger the capacity of local communities to avail their right to water.⁴

This article determines various questions like:

- Which treaties or principles of international environmental law and human rights law

¹Committee on Economic, Social and Cultural Rights, General Comment No. 15: The Right to Water (Arts. 11 and 12 of the Covenant), U.N. Doc. E/C.12/2002/11 (Jan. 20, 2003).

²Pengfei Li et al., Making AI Less “Thirsty”: Uncovering and Addressing the Secret Water Footprint of AI Models, arXiv:2304.03271 (2023).

³U.N. World Water Development Report 2024: Water for Prosperity and Peace (UNESCO 2024).

⁴Shaolei Ren & Adam Wierman, The Uneven Distribution of AI's Environmental Impacts, Harv. Bus. Rev. (2024).

apply to data centres?

- How do current international treaties govern water usage by digital infrastructure?
- Which role can soft law, courts, and corporate accountability frameworks play?
- Which legal reforms are needed to address these new challenges?

This article is structured as follows:

- Part II determines how data centres consume water and impact our environment;
- Part III explores the principles of international environmental law;
- Part IV examines treaties such as the UN Watercourses Convention and regional water agreements;
- Part V analyses the human right to water and landmark court decisions;
- Part VI addresses business and human rights principles and voluntary industry standards;
- Part VII discusses case studies from water-scarce areas;
- Part VIII recommends legal and institutional reforms; and
- Part IX concludes the article by reviewing the future of international law in the digital era.

II. THE WATER FOOTPRINT OF DATA CENTRES: TECHNICAL AND ENVIRONMENTAL DIMENSIONS

A. Cooling Requirements and Water Consumption Mechanisms

Data centres must be kept cool at all times for optimum performance of servers and to avoid breakdown of equipment. Most of the cooling technologies utilized by big companies are majorly dependent on water usage, mostly through evaporative cooling technology using cooling towers and direct evaporative cooling. This happens through the evaporation of water in order to dissipate heat, thus leading to consumptive water use whereby water is taken away from the hydrological cycle locally and therefore out of the pool of resources meant to provide

for the basic human right to water.

The Water Usage Effectiveness (WUE) measure, established by The Green Grid, assesses data centre efficiency of water use as the quotient of yearly water usage relative to IT equipment energy use. State-of-the-art facilities have WUE measurements of around 1.2 to 1.8 litres per kilowatt-hour, whereas other facilities can show significantly higher water usage numbers.⁵

Given that hyperscale data centres use up to 50 to 100 megawatts of electrical power non-stop, their water demands become significant.

Water consumption increases due to the computational demand of AI tasks. Training large-scale language models requires high-level computations for long periods of time, causing much heat generation. Research carried out by Pengfei Li et al. shows that training GPT-3 used about 700,000 litres of fresh water, while additional computations during inference were causing extra demands on water supplies.⁶

Due to the increasing number of AI applications in different spheres of the economy, water consumption will only be growing, along with pressure on water that is necessary for the basic needs of the local population.

B. Geographic Distribution and Water Stress Implications

Dynamics associated with the location of data centres' infrastructure hold significant implications for water governance as well as the right to water. The decision to locate a data centre is made based on different variables, such as cost of electricity, availability of renewable sources of energy, cost of real estate, availability of tax breaks, as well as climatic conditions related to the use of air for cooling of data centres. Water scarcity and consequently the safety of water for local communities has been considered insignificant in the decision-making process.

Hyperscale development of data centres has occurred in the American Southwest, which includes Arizona and Nevada, although these areas have experienced serious droughts and

⁵The Green Grid, Water Usage Effectiveness (WUE): A Green Grid Data Centre Sustainability Metric, White Paper No. 35 (2011).

⁶Pengfei Li et al., Making AI Less "Thirsty": Uncovering and Addressing the Secret Water Footprint of AI Models, arXiv:2304.03271 (2023).

reduced Colorado River allocations. In addition, investment into data centres has taken place in the Atacama region of Chile—one of the driest places on Earth—due to low energy cost and infrastructure for communication. Residents of Goodyear, Arizona, have protested the construction of Microsoft data centres due to issues related to water availability.

C. Indirect Water Footprint: Energy Production

Apart from direct cooling needs, data centres make huge indirect water withdrawals via electricity usage. Electricity production by thermoelectric plants is among the biggest sources of water withdrawal in many places. When data centres rely on water-intensive electricity production systems for their electricity, then their water footprint becomes much higher than the direct water consumption they are making.⁷

III. FOUNDATIONAL PRINCIPLES OF INTERNATIONAL ENVIRONMENTAL LAW AND THEIR APPLICATION

A. The No-Harm Principle (Sic Utere Tuo Ut Alienum Non Laedas)

The most important principle of international environmental law is that a country must make sure that activities within its territory do not impact the environment of another country. This principle was first acknowledged in the case of *Trail Smelter Arbitration (United States v. Canada, 1941)* in which pollution from a Canadian smelter deteriorated property in the United States.⁸

This principle was later used in:

- Principle 21 of the Stockholm Declaration (1972); and
- Principle 2 of the Rio Declaration (1992).

These declarations stated that even though countries have full authority to use their own natural resources, they also have the obligation to make sure that their activities do not impact the environment of other countries.⁹

⁷Int'l Energy Agency, Water-Energy Nexus: Excerpt from the World Energy Outlook 2016 (IEA 2016).

⁸*Trail Smelter Arbitration (U.S. v. Can.)*, 3 R.I.A.A. 1905 (1941).

⁹Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration), U.N. Doc.

The International Court of Justice (ICJ) affirmed that the no-harm principle is a rule of customary international law. In:

- *Legality of the Threat or Use of Nuclear Weapons* (Advisory Opinion, 1996), the ICJ acknowledged it as a fundamental principle of international environmental law;¹⁰
- *Pulp Mills on the River Uruguay (Argentina v. Uruguay, 2010)*, the Court reasoned that countries are obligated to perform their duty of due diligence, i.e., they must take measurable steps to avoid environmental damage caused by activities within their territory.¹¹

Conventionally, the no-harm principle applies when one country's activities cause damage to another country. Nevertheless, the environmental impacts of data centres—like extensive water consumption—affect people within the same country where the data centre is established instead of another country. In such cases, human access to water becomes important since it protects the rights of people living in that region. Various legal scholars like Patricia Birnie and Alan Boyle have highlighted that the no-harm principle should be understood more generally to preserve shared water resources not only between countries but in such a way that acknowledges a government's duty to safeguard the right to water of people living under their territory.¹²

B. The Principle of Sustainable Development

Sustainable development is defined as fulfilling the necessities of people without jeopardising the ability of future generations to meet their own needs. It was provided under the Brundtland Commission report, *Our Common Future* (1987).¹³

This definition was later acknowledged in:

- the Rio Declaration (1992);
- the Johannesburg Declaration (2002); and

A/CONF.48/14/Rev.1, Principle 21 (June 16, 1972); Rio Declaration on Environment and Development, U.N. Doc. A/CONF.151/26 (Vol. I), Principle 2 (June 14, 1992).

¹⁰Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. 226 (July 8).

¹¹Pulp Mills on the River Uruguay (Arg. v. Uru.), 2010 I.C.J. 14 (Apr. 20).

¹²Patricia Birnie, Alan Boyle & Catherine Redgwell, *International Law and the Environment* (3d ed. 2009).

¹³World Commission on Environment and Development, *Our Common Future* (Oxford Univ. Press 1987).

- the Sustainable Development Goals (2015), mainly SDG 6, which ensures that everybody has access to clean water and sanitation and that water resources are managed efficiently.

The ICJ addressed sustainable development in the case of the *Gabčíkovo-Nagymaros Project*. The Court stated that both economic development and environmental protection must be balanced.¹⁴

However, Christopher Weeramantry contended that sustainable development is not just a political aim but an enforceable and binding principle that mandates countries to acknowledge both protection and human development. This principle applied to data centres means that governments should:

- carefully determine the environmental impact of new data centre projects;
- help them use water sustainably; and
- ensure that they consume water efficiently.

The intergenerational equity principle also raises certain concerns: Is it rational for tech companies to consume water in abundance if that water can be used to meet the basic needs of local communities whose right to water is safeguarded under international human rights law?

C. The Precautionary Principle

It is understood that governments must take necessary measures to avoid severe environmental damage even though there is no scientific proof that damage will occur. This is acknowledged in Principle 15 of the Rio Declaration (1992).¹⁵

Treaties like:

- the Convention on Biological Diversity (1992); and
- the UN Framework Convention on Climate Change (1992)

¹⁴Gabčíkovo-Nagymaros Project (Hung. v. Slov.), 1997 I.C.J. 7 (Sept. 25).

¹⁵Rio Declaration on Environment and Development, U.N. Doc. A/CONF.151/26 (Vol. I), Principle 15 (June 14, 1992).

incorporate this principle. This principle does not mandate governments to completely restrict activities; rather, it obligates them to take preventive actions to decrease environmental impacts. In respect of data centres, it means that governments can:

- ask for a comprehensive environmental impact assessment before finalising a project;
- constantly assess the water consumption of the project and its effects;
- adjust regulations if new risks occur;
- help data centres prove that they use water effectively; and
- help them prepare drought contingency plans so they are prepared on how to reduce the usage of water at times of water scarcity.

D. Common but Differentiated Responsibilities

This principle means that all countries have responsibility to protect the environment but not at the same levels. This is done because:

- generally, developed countries have contributed more to environmental problems over time; and
- they also have financial support, resources, and technological capability to address these problems.

Principle 7 of the Rio Declaration (1992) supports this, and it is widely applicable in the UN Framework Convention on Climate Change.¹⁶

When applicable to data centres, it means that:

- developed countries should take greater accountability if their tech companies establish data centres in water-intensive regions of developing countries;
- they must also take into account that these data centres follow high environmental

¹⁶Rio Declaration on Environment and Development, U.N. Doc. A/CONF.151/26 (Vol. I), Principle 7 (June 14, 1992); United Nations Framework Convention on Climate Change, opened for signature May 9, 1992, 1771 U.N.T.S. 107 (entered into force Mar. 21, 1994).

standards and respect the human right to water regardless of where they are located; and

- they should also share advanced water-effective cooling technologies with developing countries so that they use less water and do not cause environmental harm.

IV. TREATY REGIMES AND DATA CENTRE WATER GOVERNANCE

A. The UN Watercourses Convention

The Convention on the Law of the Non-Navigational Uses of International Watercourses (1997) is considered the main international treaty that regulates rivers, lakes, and other freshwater resources shared between multiple countries.¹⁷

It contains various important provisions:

- Article 5: water must be shared equitably and rationally between all the countries;
- Article 6: while assessing how much water should be allocated, social and economic needs of every country and needs of people dependent on water must also be taken into account;
- Article 7: countries must prevent inflicting substantial damage to other countries through their use of shared water; and
- Article 12: a country developing a project that may impact shared water must notify the other affected countries in advance.

When data centres utilise large amounts of water from a shared river or water source, as per Article 6, basic needs of local communities should receive greater importance as compared to commercial data centres. This is done since availability of water for drinking and other daily needs develops the core of the human right to water. Article 7 mandates that data centre operations do not cause substantial damage to:

- another country sharing the watercourse; or
- water security of people living in the impacted area.

¹⁷Convention on the Law of the Non-Navigational Uses of International Watercourses, opened for signature May 21, 1997, 2999 U.N.T.S. 77 (entered into force Aug. 17, 2014).

Although Article 7(2) creates an exception. It allows for some of the harmful effects until the water usage is held fair and reasonable. This exception makes the rules vague, and tech companies may benefit from it as they can argue that their water consumption is rational even though it has negative effects.

B. Regional Water Agreements

The UNECE Water Convention (1992) mandates countries sharing rivers, lakes, and other freshwater resources to avoid, govern, and decrease activities that could adversely impact shared water resources.¹⁸

Countries must ensure that projects like data centres do not cause water scarcity or pollution that affects neighbouring countries. The Colorado River Compact and Drought Contingency Plan (2019) developed some regulations for sharing water to the US states that rely on the Colorado River. At the time of drought, allocations of water are decreased in phases. This means that data centres may face restrictions on their water usage.

The European Union's Water Framework Directive (2000/60/EC) obligates member states to sustain and accomplish "good ecological status" of lakes, rivers, and groundwater.¹⁹

It also obligates river basin management plans to protect water resources. Hence, new data centres must adhere to these environmental regulations and water management commitments before they are fully developed.

C. Other Relevant Environmental Instruments

The Ramsar Convention on Wetlands (1971) and the Convention on Biological Diversity (1992) mandate countries to safeguard wetlands, biodiversity, and ecosystems.²⁰

If a data centre draws water in large quantities, it can lead to wetlands drying up or damaging plants, animals, and the rest of the ecosystem that relies on that water. These international

¹⁸Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Water Convention), opened for signature Mar. 17, 1992, 1936 U.N.T.S. 269 (entered into force Oct. 6, 1996).

¹⁹Directive 2000/60/EC of the European Parliament and of the Council Establishing a Framework for Community Action in the Field of Water Policy, 2000 O.J. (L 327) 1.

²⁰Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention), opened for signature Feb. 2, 1971, 996 U.N.T.S. 245 (entered into force Dec. 21, 1975); Convention on Biological Diversity, opened for signature June 5, 1992, 1760 U.N.T.S. 79 (entered into force Dec. 29, 1993).

treaties and agreements mandate governments to take preventive actions to reduce environmental harm.

The International Law Commission's Draft Articles on the Law of Transboundary Aquifers (2008) apply the same principles to groundwater allocated to multiple countries.²¹

They obligate countries to:

- use shared groundwater rationally and equitably; and
- refrain from producing substantial damage to other countries via extensive groundwater extraction.

These regulations are mainly important for data centres established in dry areas like Arizona (USA) and the Atacama Desert (Chile), where groundwater is very limited and is mainly used for human and environmental needs.

V. THE HUMAN RIGHT TO WATER AND THE AI-DATA CENTRE NEXUS

The primary contribution made by this article is an examination of the human right to water as an autonomous concept that can serve as a basis for regulating AI-powered freshwater use, along with existing international environmental law.

A. Normative Foundations of the Right to Water

While the Universal Declaration of Human Rights (1948) and the ICESCR (1966) have not explicitly recognized a right to water, the Committee on Economic, Social and Cultural Rights, in General Comment No. 15 (2002), has deduced this right on the basis of Articles 11(1) (the right to an adequate standard of living) and 12 (the right to health) of the ICESCR.²²

The definition of the right to water in General Comment No. 15 is that it allows all people to enjoy sufficient, safe, acceptable, physically accessible, and affordable water for personal and domestic use, and describes the three categories of state obligations: respect (abstain from actions that would hinder access to it), protect (prevent third parties, including companies, from

²¹Int'l Law Comm'n, Draft Articles on the Law of Transboundary Aquifers, U.N. Doc. A/63/10 (2008).

²²Committee on Economic, Social and Cultural Rights, General Comment No. 15: The Right to Water (Arts. 11 and 12 of the Covenant), U.N. Doc. E/C.12/2002/11 (Jan. 20, 2003).

hindering access to it), and fulfil (facilitate and help in accessing it).

The United Nations General Assembly Resolution 64/292 (2010) and Human Rights Council Resolution 15/9 (2010) specifically recognize the right to safe and clean drinking water and sanitation as a human right vital for the fulfilment of life and other human rights, thus establishing the right within the framework of international human rights law despite the ongoing controversy surrounding the customarily accepted status of the right.²³

The right is additionally guaranteed under Article 24(2)(c) of the Convention on the Rights of the Child (1989), requiring governments to fight diseases by providing clean drinking water, and Article 14(2)(h) of the Convention on the Elimination of All Forms of Discrimination against Women (1979), which ensures that rural women have adequate water sources.²⁴

B. The Obligation to Protect: Regulating Corporate Water Abstraction

The duty to protect is the most relevant branch of the right to water for the purposes of the current discussion, since it involves the requirement on states to take the necessary and appropriate legislative and other steps to prevent third parties—including technology firms that have data centres—from depriving people of equal access to adequate water and from unsustainable extraction of water resources, such that their access to water is restricted physically. General Comment No. 15, paragraphs 23 and 44(a), specifically contemplates state obligations to prevent third parties from obstructing equal, affordable, and physical access to sufficient, safe, and acceptable water.

If the granting of data centre permissions leads to consumption which results in a measurable reduction in the availability of water for personal and domestic use—typically thought to be between 50 to 100 litres per capita per day according to WHO/Committee guidelines—then the failure of the host state to condition, limit, or deny these permissions may arguably be considered a violation of the duty to protect.²⁵

²³G.A. Res. 64/292, The Human Right to Water and Sanitation, U.N. Doc. A/RES/64/292 (July 28, 2010); Human Rights Council Res. 15/9, Human Rights and Access to Safe Drinking Water and Sanitation, U.N. Doc. A/HRC/RES/15/9 (Oct. 6, 2010).

²⁴Convention on the Rights of the Child, opened for signature Nov. 20, 1989, 1577 U.N.T.S. 3 (entered into force Sept. 2, 1990), art. 24(2)(c); Convention on the Elimination of All Forms of Discrimination against Women, opened for signature Dec. 18, 1979, 1249 U.N.T.S. 13 (entered into force Sept. 3, 1981), art. 14(2)(h).

²⁵World Health Organization, Domestic Water Quantity, Service Level and Health (WHO 2003).

Thus, the right to water provides a concrete rule of priority which is missing from traditional international environmental law: in times of scarcity, personal and domestic use must take precedence over industrial and commercial uses, including water used for AI training and inference.

C. Comparative and International Jurisprudence

Comparative constitutional jurisprudence, although not legally binding in international law, has greatly influenced the interpretive content of the right to water and constitutes a body of persuasive precedent in international dispute resolution with respect to the conflict of data centres.

The Constitutional Court of South Africa decision in *Mazibuko v. City of Johannesburg* (2009) found a free basic water allocation policy adequate, declaring that the right to water under Section 27 of the South African Constitution must be reasonably progressively realized and does not entail an immediate minimum quantum enforceable right, but recognizing that water allocation regulation by the state is subject to judicial review for reasonableness.²⁶

In India, the Supreme Court, in *Subhash Kumar v. State of Bihar* (1991) and later in *Narmada Bachao Andolan v. Union of India* (2000), has recognized the right to water as an aspect of the right to life, guaranteed by Article 21 of the Constitution of India, which Indian courts, including the National Green Tribunal, have relied upon when adjudicating upon cases involving industrial extraction of groundwater, and which is relevant to the regulation of data centres' groundwater extraction in Hyderabad and Bangalore.²⁷

At the international level, the judgment of the International Court of Justice in *Gabčíkovo-Nagymaros*, as well as in the cases of *Certain Activities Carried Out by Nicaragua in the Border Area / Construction of a Road in Costa Rica along the San Juan River* (*Costa Rica v. Nicaragua*; *Nicaragua v. Costa Rica*, 2015), has reinforced the duty to conduct environmental impact assessment concerning activities that may lead to significant damage to water resources shared with another State, an obligation interpreted by many scholars as including the assessment of the impact of such activity on the right to water of the population living in that

²⁶*Mazibuko v. City of Johannesburg* 2010 (4) SA 1 (CC) (S. Afr.).

²⁷*Subhash Kumar v. State of Bihar*, AIR 1991 SC 420 (India); *Narmada Bachao Andolan v. Union of India*, (2000) 10 SCC 664 (India).

area.²⁸

Also, the Inter-American Court of Human Rights, through its judgments in *Comunidad Indígena Yakye Axa v. Paraguay* (2005) and *Lhaka Honhat Association v. Argentina* (2020), has further defined the right to water as a stand-alone right derived from Article 26 of the American Convention on Human Rights, which links water access rights to the right to a healthy environment and to the relationship of indigenous peoples with their ancestral lands.²⁹

D. Extraterritorial and Corporate Dimensions of the Right to Water

The extraterritoriality issue is particularly relevant in relation to the right to water where data centres are owned by companies registered in one state but operating and using water in another.

In its General Comment No. 24 (2017) on State Obligations under the International Covenant on Economic, Social and Cultural Rights in the Context of Business Activities, the Committee on Economic, Social and Cultural Rights stated that home states have specific extraterritorial obligations in terms of preventing violations of human rights by companies registered in their territories.³⁰

In particular, such obligations may be fulfilled via regulation, supervision, and providing remedies. Such provisions are consistent with the idea that states hosting the headquarters of major cloud and AI companies—mostly based in the US and the EU—have some extraterritorial obligations in relation to the use of water by their corporate nationals' data centres overseas.

E. Limits of the Right-to-Water Framework

There are also limits to the right to water framework. This approach takes into account priority uses, which are those that deal with personal and domestic consumption, and does not create an absolute ranking of all water uses. Thus, there are no restrictions on industrial uses, which

²⁸Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v. Nicar.); Construction of a Road in Costa Rica along the San Juan River (Nicar. v. Costa Rica), 2015 I.C.J. 665 (Dec. 16).

²⁹*Comunidad Indígena Yakye Axa v. Paraguay*, Inter-Am. Ct. H.R. (ser. C) No. 125 (June 17, 2005); *Lhaka Honhat Association (Our Land) v. Argentina*, Inter-Am. Ct. H.R. (ser. C) No. 400 (Feb. 6, 2020).

³⁰Committee on Economic, Social and Cultural Rights, General Comment No. 24: State Obligations under the International Covenant on Economic, Social and Cultural Rights in the Context of Business Activities, U.N. Doc. E/C.12/GC/24 (Aug. 10, 2017).

include data centres, but they need to be accommodated after the satisfaction of the priority uses. In addition, the limitation of the realization of the right progressively, the lack of an optional individual complaint system in many of the countries that ratified the ICESCR (apart from the Optional Protocol to the ICESCR, which was introduced in 2013), as well as the reluctance of tribunals to take into account the right when it conflicts with investors' rights, limits its effectiveness.

VI. EMERGING GOVERNANCE MECHANISMS: SOFT LAW AND CORPORATE ACCOUNTABILITY

A. The UN Guiding Principles on Business and Human Rights

The UN Guiding Principles on Business and Human Rights (UNGPs, endorsed by the Human Rights Council in 2011) established three fundamental pillars, which include: the state duty to protect; the corporate responsibility to respect; and access to remedy.³¹

Principle 17 of the human rights due diligence requirement states and obliges technology corporations operating data centres to actively identify and assess all the potential water-related human rights risks, then integrate these findings into their upcoming corporate decision-making, and then provide remedy wherever harms to community water access occur.

Technology corporations must undergo due diligence in order to foster human rights; this can be enforced and administered under human rights due diligence legislations, such as the EU Corporate Sustainability Due Diligence Directive and France's Loi de vigilance (2017).³²

These emerging laws are prime examples of how companies are obligated to examine human rights and environmental risks in their supply chains and also serve as potential binding obligations on data centres as well.

B. Industry Standards and Voluntary Initiatives

Various industry standards that foster water usage effectiveness by providing voluntary benchmarks include The Green Grid's metric and the Alliance for Water Stewardship, which

³¹ Human Rights Council, Guiding Principles on Business and Human Rights: Implementing the United Nations "Protect, Respect and Remedy" Framework, U.N. Doc. A/HRC/17/31 (Mar. 21, 2011).

³² Surya Deva, Mandatory Human Rights Due Diligence Laws in Europe: A Mirage for Rightsholders?, 23 Hum. Rts. L. Rev. 1 (2023).

address and regulate water governance, water quality, and water balance.³³

Corporate commitments like Microsoft's "water positive by 2030" pledge and Google's commitment to 120% water replenishment by 2030 are usually satisfied via geographically distant offsetting rather than reductions at the point of community impact, limiting their value as a substitute for enforceable right-to-water protections and also lack binding force.³⁴

C. Environmental and Human Rights Impact Assessment

In the *Pulp Mills* case, the ICJ confirmed that an environmental impact assessment is a customary obligation for activities involving substantial transboundary environmental damage.³⁵

There has been a growing number of researchers who promote human rights impact assessment as a parallel approach, which explicitly assesses the impacts of development projects upon the right to water of affected people, but which is currently not systematically applied for the purpose of data centre permitting in any major hosting jurisdictions.

VII. CASE STUDIES: REGULATORY RESPONSES IN WATER-STRESSED REGIONS

A. The American Southwest: Arizona and the Colorado River Basin

The Colorado River Basin supplies seven states and Mexico with water used by 40 million people. Climate change, the increased demand for water, and over-allocation put them under even more strain. Active Management Areas were created by Arizona's Groundwater Management Act of 1980 with conservation goals. However, the Act provides little to no restrictions against the development of data centres.

On top of that, Arizona's Department of Water Resources announced, in 2023, that certain parts of the Phoenix metropolitan area were not able to depend on projected groundwater for

³³Alliance for Water Stewardship, International Water Stewardship Standard (Version 2.0, 2019).

³⁴Microsoft, 2024 Environmental Sustainability Report (Microsoft Corp. 2024); Google, 2024 Environmental Report (Alphabet Inc. 2024).

³⁵*Pulp Mills on the River Uruguay* (Arg. v. Uru.), 2010 I.C.J. 14 (Apr. 20).

new developments.³⁶

Therefore, new developments in those parts of Phoenix would not be able to satisfy the 100-year assured water supply determination, and that would potentially affect the plans of some data centres. On the other hand, facilities that already exist with water allocation would not be affected completely.

B. Chile: The Atacama Region and Mining-Tech Competition

Chile has a market-based system of water rights, created by the Water Code (Código de Aguas, 1981, reformed 2022). The 2022 reform added prioritization of human consumption and sanitation (Article 5) and ecological flow requirements (Article 129 bis 1), providing textual support to the claim that data centre consumption must give way to priority human needs.³⁷

Ratification of the Escazú Agreement (2018) by Chile imposes additional procedural obligations (disclosure of information, public participation, and access to justice) in environmental decision-making that affects data centre approvals.³⁸

C. India: Hyderabad and Groundwater Stress

The Central Ground Water Authority (CGWA) was constituted under the Environment (Protection) Act 1986. It regulates extraction of groundwater through a No Objection Certificate regime but is limited in effectiveness due to capacity constraints. Telangana's incentives for data centre investment have not incorporated water sustainability requirements systematically. The National Green Tribunal established under the National Green Tribunal Act 2010 and the jurisprudence of Article 21 discussed in Part V are remedial avenues that are underutilized but exist for communities affected by industrial groundwater depletion tied to digital infrastructure.

³⁶Ariz. Dep't of Water Res., Phoenix Active Management Area: Groundwater Model and Assured Water Supply Determination (2023).

³⁷Ana María Daza-Clark, Water Stress, Mining and Energy: Reconciling Competing Water Demands under Chile's Reformed Water Code, 35 J. Envtl. L. 247 (2023).

³⁸Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (Escazú Agreement), opened for signature Mar. 4, 2018 (entered into force Apr. 22, 2021).

VIII. RECOMMENDATIONS: TOWARD EFFECTIVE, RIGHTS-COMPATIBLE GOVERNANCE

A. Treaty-Level Reforms

Countries which have joined the UN Watercourses Convention must create a separate agreement (protocol) that especially handles the water utilised by digital equipment like AI data centres. These new regulations must make it explicitly clear that drinking water and household chores must always be given primacy over commercial purposes as given under General Comment No. 15, which acknowledges availability of water as a human right. Institutions and bodies that administer rivers shared by various countries (like Colorado or European rivers) must recognise data centres and other digital equipment as a distinct class of water users. While determining how water will be shared, specifically at the time of droughts, water needs of these equipment and machinery must also be taken into account and some regulations need to be set for it. The ICESCR must establish new rules clarifying what governments must do to govern the large volumes of water used by private companies managing digital infrastructure. These recommendations should be developed upon its previous clarifications in General Comment No. 15 (right to water) and General Comment No. 24 (responsibilities of states regarding business and human rights).

B. Soft Law and Institutional Development

The CEO Water Mandate (a United Nations programme that promotes businesses to administer water sustainably) should develop specialized recommendations for tech companies, specifically those dealing with data centres.³⁹

These recommendations should obligate companies to publicly disclose how much water their data centres consume. Rather than reporting their total worldwide consumption, companies must also highlight how their water usage impacts the local river basin and neighbourhood communities—especially whether it jeopardises local water security. The International Organization for Standardization (ISO) should include a new international standard or update ISO 14001 (environmental management standard) especially for handling water usage in data centres. This standard should also develop explicit and quantifiable criteria that independent auditors can assess. It should also safeguard that data centre water management upholds the

³⁹U.N. Global Compact, CEO Water Mandate, Guidance on Corporate Water Disclosure (2022).

human right to water so that commercial water usage does not compromise people's access to safe and adequate amounts of water.

C. Domestic, Judicial, and Corporate Measures

In countries or regions where various data centres are established, they should mandate every data centre to publicly disclose how much water they consume. They should also introduce regulations such as:

- water recycling and reuse must be obligatory;
- set maximum water usage effectiveness limits; and
- determine how data centres' water usage impacts neighbourhood communities before granting them permission to operate.

Furthermore, national courts and human rights commissions must carefully examine decisions that allow data centres to be established or broadened. They should also assess whether these regulations are rational and in accordance with the right to water—just like Article 21 of the Indian Constitution, which protects the right to life. Tech companies should implement enforceable water use targets that are:

- independently assessed by third parties;
- based on actual water conditions of the local river basin; and
- established to safeguard the water security of neighbourhood communities.

Rather than making general and global promises regarding decline in water usage or neutralizing their impact, companies must make specific and enforceable obligations for the local areas in which their data centres operate.

IX. CONCLUSION: INTERNATIONAL LAW AT THE DIGITAL FRONTIER

This paper has explored the possibility of international environmental law, in tandem with international human rights law, to provide an adequate regulatory framework for controlling freshwater consumption that results from data centres built through the aid of AI technology,

for purposes of ensuring the human right to water. It is evident from the discussion above that there is potential for regulation within these international legal frameworks but also significant weaknesses.

International environmental law principles such as no-harm, sustainable development, precaution, and common but differentiated responsibilities offer normative grounds for regulating freshwater consumption resulting from data centres but not enough treaty obligations and enforcement power to make it a reality. By contrast, the human right to water provides not only a clear substantive hierarchy principle—giving priority to individual and household water use over industrial consumption—but also a growing corpus of case law, from *Mazibuko* to *Lhaka Honhat*.

Regimes of treaties governing transboundary freshwater resources as well as the ICESCR—together with the interpretation of the ICESCR set forth in General Comment No. 15—create a set of obligations in substance and procedure that have applicability to data centres that is, if anything, underused. New modes of governance such as the UN Guiding Principles on Business and Human Rights, mandatory due diligence laws, and human rights impact assessments offer an additional means of accountability that can apply to the private corporate actors that are not covered by state-oriented treaty obligations.

In conclusion, it can be argued that international law, in its present form, is not yet capable of regulating the impact that AI will have on the consumption of freshwater in such a way that would fully safeguard the human right to water. In order for it to become adequate, there needs to be innovation at the treaty level that takes into account the issues surrounding digital infrastructure, the development of how the right to water applies to corporations in judicial and treaty bodies, soft law that establishes rights-sensitive sectoral standards, and corporate accountability mechanisms that will hold private actors accountable for their impact on water.

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