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Making water use in global trade more sustainable

The challenge to improve supply-chain resilience and water security in the context of geopolitical change

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Summary

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- The direct and indirect water use associated with today's global supply chains is a major driver of water pollution and water scarcity. In theory trade has the ability to, in effect, 'redistribute' access to water resources in mutually beneficial ways by enabling countries with abundant freshwater to export water-intensive commodities and goods (such as crops or manufactured products) to countries that are relatively lacking in water resources. In practice, however, this is seldom the case.
 - The reality is that trade often has negative impacts for water security and sustainability. Modern patterns of trade often indirectly deplete and degrade water resources in economically vulnerable sectors, as well as in water-stressed locations within producer countries, while exposing destination markets to potential supply shocks and related stresses arising from unsustainable water use.
 - This paper seeks to address these challenges. It explores how supply chains can be understood in terms of the trade in 'virtual water' – essentially, the water use required to produce, process and transport goods – they embody; how the dynamics of such trade often create perverse incentives and economic inequities; and how the intrinsically international dimension of virtual water trade requires global solutions at a moment when prospects for multilateral cooperation in service of the common good are hostage to geopolitics to an extraordinary degree.
 - This geopolitical dimension is all the more salient because current trade patterns and dependencies disproportionately cause harmful exploitation of water resources in countries and communities in the Global South. Recent corporate disclosure data demonstrate how the *de facto* 'outsourcing' of water stress from one location to another is a major problem: among Global North-headquartered companies that disclosed their 2025 water use data to CDP – an independent non-profit organization specializing in environmental reporting – almost 80 per cent of supply-chain facilities with substantive water-related challenges were in the Global South.
 - Despite the risks such dynamics create, the embedded water content of traded commodities and products is largely overlooked in supply-chain sourcing decisions. Though a critical input into the supply chain, water itself is frequently undervalued or not accounted for at all by exporters and importers (or indeed by policymakers working on trade). Put another way, water can be thought of as the 'forgotten input' in global trade: the fact that water impacts are often all but invisible to markets merely further encourages unsustainable water use.

- As a result of the multiple pressures on water use, the world finds itself in an era of emerging ‘water bankruptcy’, in which freshwater systems are being depleted faster than they can be replenished. Water-intensive production and processing of goods and commodities increasingly take place in regions affected by water resource stress, failing infrastructure, poor regulation and intense competition for limited resources.
- Cooperative efforts to tackle these problems face significant obstacles. Geopolitical tensions and climate volatility are causing some countries to re-evaluate their dependencies on natural resources through a securitization lens. This context makes it harder to address collective water-related risks through multilateral mechanisms. It can motivate governments to take defensive geo-economic measures rather than to engage in collective risk reduction and water stewardship.
- At the same time, slower-moving environmental risks – including those associated with water insecurity – continue to accumulate. What distinguishes the present moment is that the tools and conventions previously relied upon to address such risks are being undermined just as the need for mitigation intensifies. Today’s geopolitical environment does not alter the *origins* of trade’s unsustainable water footprints, but it further constrains the already limited pathways through which these impacts may be addressed.
- Options nonetheless exist to reduce water-related risks in global supply chains. This paper presents a set of 10 recommendations, aimed variously at governments, policymakers, international institutions, corporations, financial institutions and civil society organizations (CSOs). The measures we advocate fall into the following categories:
 - **Multilateral trade processes, plurilateral discussions, regional and bilateral agreements, and trade-related standards and due diligence regulations must explicitly address the water use embedded in global trade.** Forums such as the Trade and Environmental Sustainability Structured Discussions (TESSD) could build consensus on removing barriers to the adoption of water sustainability technologies. World Trade Organization (WTO) technical committees and processes could integrate water-related issues into discussions on technical barriers to trade, and could boost access to water-saving technologies. Water-related provisions in trade agreements should be strengthened, for instance through more targeted sustainability impact assessments. The EU’s Corporate Sustainability Due Diligence Directive (CSDDD) also offers a potential lever for enforcing compliance with water sustainability goals, despite recent legislative changes that narrow its remit. Finally, new and existing national and international standards can offer a framework for alignment and conformity in approach.
 - **Whether independently or in partnership, producer and consumer countries can strengthen their resilience to water risks and do more to protect local communities.** The agency of producer countries is particularly critical, given the need to scale up sustainable and equitable management of sovereign water resources. Consumer countries, in turn, can recognize water stresses in their supply chains as structural risks to economic

development. They can mitigate these risks by managing demand for products that rely on water-intensive imports, and by enacting regulations that mandate sustainable water use in public procurement. Collaboration between producer and consumer countries should include adoption of the Glasgow Declaration principles into reporting frameworks and regulations.

- **Corporate investment and sourcing decisions must account for factors such as basin-level water stress, ecosystem health and supply-chain exposure to water-related risks.** Companies have an opportunity to use their market influence to support collective water stewardship with suppliers, municipalities and communities. Strengthening transparency about water impacts, building capacity among suppliers in water-stressed regions, and aligning commercial operations with national and regional resilience strategies can reduce the risks of disruptions to revenues while supporting more equitable outcomes in supplier countries. Financial institutions should be encouraged to treat risks to water security as a material factor in their analysis and decision-making across their lending and investment portfolios. This should include considering water risk metrics when determining capital allocation and engaging with clients.
- **CSOs have a role to play in advocating for a ‘just transition’ to water security, and in monitoring supply-chain compliance with regulations and principles on sustainable water use.** CSOs can provide evidence of business impacts on water sustainability, support inclusive stakeholder engagement, and explore mechanisms likely to encourage a ‘race to the top’ in terms of sustainable business practices – such mechanisms potentially include the bringing of legal cases against companies whose activities cause harm, the triggering of OECD accountability guidelines, or the use of frameworks such as the UN’s ‘Access to Justice in Environmental Matters’ instrument to support communities whose water security is adversely affected by supply-chain investment decisions. Special attention should be given to supporting marginalized groups such as women, people with disabilities, and ethnic minorities.

01

Introduction

Water plays a vital but largely unrecognized role in the global economy. Today's supply chains often rely on – and exacerbate – unsustainable water use. Reforming how water is used at every stage along supply chains is vital for enhancing environmental and community resilience, and for ensuring reliable flows of critical goods.

'Virtual' water – that is, the water used in supply chains to produce and deliver goods and services – is of huge but often unrecognized importance to the global economy, environmental sustainability, and social and community resilience. Take China, for example. Before it joined the World Trade Organization (WTO) in 2001, China imported 2 million tonnes of soybeans a year from Brazil. Today, Brazil exports over 50 million tonnes of soybeans a year to China.¹ The expansion of this activity has massively increased water stress in the Amazon basin, the largest freshwater system on Earth.² China is now the world's largest importer of virtual water; external water resources account for one-third of the total water required to produce the goods and services that the country consumes each year.³ This in turn increases water use in supplier countries and has sustainability impacts on their communities and environments.

China's strategy of, in effect, 'outsourcing' its water needs to other countries exemplifies how international trade can redistribute environmental benefits and harms globally. Growth in Chinese imports of soybeans (especially from the US and Brazil) and palm oil (especially from Indonesia and Malaysia) since the start of the century has conserved water in China but resulted in deforestation in locations

¹ Chatham House (2025), resourcetrade.earth, <https://resourcetrade.earth>; Grieger, G. (2026), *China's WTO accession: 15 years on – Taking, shaking or shaping WTO rules?*, EPRS Briefing PE 593.570, European Parliamentary Research Service, [https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/593570/EPRS_BRI\(2016\)593570_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2016/593570/EPRS_BRI(2016)593570_EN.pdf); Permanent Mission of China to the WTO (2011), *China in the WTO: Past, Present and Future*, https://www.wto.org/english/thewto_e/acc_e/s7lu_e.pdf.

² Piccinini, M. (2026), 'Brazil's growing water crisis', *The Ecologist*, 19 February 2026, <https://theecologist.org/2026/feb/19/brazils-growing-water-crisis>.

³ Calculated for the blue and green water requirements of agricultural commodities, from Stockholm Environment Institute York and the Joint Nature Conservation Committee (2026), 'The Global Environmental Impacts of Consumption (GEIC) Indicator', <https://www.commodityfootprints.earth>.

such as Indonesia and the Brazilian Amazon.⁴ Soybean cultivation has historically contributed to significant deforestation in the Amazon, in turn affecting rainfall by reducing moisture released into the atmosphere – this has led to less rain, longer dry spells and increased drought risk. Although the pattern of China’s bilateral trade with Brazil has evolved in the past decade – Chinese demand for beef imports is now a more significant factor in Amazonian deforestation⁵ – cultivation of Brazilian soybeans to meet Chinese demand has continued. The industry has simply shifted location, predominantly to the Cerrado region of central Brazil, and continues to contribute to deforestation risk and environmental/social pressures associated with land-use change.⁶

These trends pose significant risks to Brazil’s domestic water users, who are reliant on the same resources for household use, industry and energy generation. The health and resilience of Brazil’s water resources are also critical to ecosystem integrity. At the same time, depletion and degradation of these resources are of concern to Brazil’s trading partners, for whom heavy dependence on any one supplier creates strategic supply-chain vulnerabilities. Risks in Brazil mean risks for its customers in importing countries, as Brazil is a significant player in the global production of water-reliant commodities. Brazil holds 12 per cent of the world’s freshwater reserves.⁷ In short, Brazil’s systemic importance to global agricultural trade means that a water crisis in the country could rapidly affect commodity supplies and prices worldwide.

Water risks in key production regions are now entangled with broader geo-economic shifts as politicians and policymakers increasingly scrutinize supply-chain dependencies in relation to security, national resilience and geopolitical competition.

While water use in the production of goods has noticeable localized impacts, unsustainable virtual water trade – aggravated by ineffective water stewardship – also has systemic impacts. The example of Brazil’s soybean sector illustrates how trade relies on strategic pockets of water reserves that are unevenly distributed around the world. Those reserves are being damaged and depleted, to the detriment of local populations and ecosystems in producer countries. Any type of disruption – such as the threat that deforestation poses to Brazil’s water system – could create enormous cascading consequences for global markets. The Brazil–China example described above also illustrates how water risks in key production regions are now entangled with broader geo-economic shifts (such as the use of economic tools

⁴ King, R. (2025), *The water footprints of global food and agriculture trade: Why the ‘virtual water’ use hidden in supply chains is critical to sustainability*, Research Paper, London: Royal Institute of International Affairs, <https://www.chathamhouse.org/2025/12/water-footprints-global-food-and-agriculture-trade>.

⁵ Vasconcelos, A., Titley, M. and Gardner, T. (2026), ‘The Beijing–Brasília effect: A new paradigm for sustainable commodity trade?’, Trase, <https://doi.org/10.48650/23BZ-VK60>.

⁶ Yang, H. et al. (2026), ‘Closing deforestation loopholes in the China–Brazil soy trade’, *Nature Food* 7, pp. 116–17, <https://doi.org/10.1038/s43016-026-01311-6>; Zero Carbon Analytics (2025), *Deforestation in Brazil’s Cerrado reduces soy production and threatens supply chains*, November 2025, <https://zerocarbon-analytics.org/insights/briefings/deforestation-in-brazils-cerrado-reduces-soy-production-and-threatens-supply-chains>.

⁷ Piccinini (2026), ‘Brazil’s growing water crisis’.

to advance geopolitical objectives), as politicians and policymakers increasingly scrutinize supply-chain dependencies in relation to security, national resilience and geopolitical competition.

Historically, consideration of the sustainability (or lack thereof) of water use has rarely factored into policy thinking and commercial strategy on trade. Rising water scarcity and pollution in supplier countries have had little impact on trade patterns, nor have such concerns prompted buyers in destination markets to change their sourcing strategies. Global value chains have instead been shaped largely by input availability, labour costs and other macroeconomic factors. However, as geopolitical competition sharpens and as climate-related water stress intensifies – by 2030, the world could face a 40 per cent shortfall in freshwater supply⁸ – long-standing assumptions about trade-related water risks, and about the criticality of virtual water to supply chains, are beginning to shift.

While concern is growing over the vulnerability of globalized supply chains to water risk, less evident are discussions of how these supply chains are adding to water stress in locations already severely affected by climate change. Production regions in the Global South are particularly at risk. Prevailing trade relationships continue to enable importer markets – not only China, but rich countries in the Global North – to avoid environmental degradation at home.⁹ This *de facto* outsourcing of water stress is an increasing concern for governments and business: among Global North-headquartered companies that disclosed water use data to CDP – a non-profit organization that focuses on environmental footprint reporting – in 2025, almost 80 per cent of supply-chain facilities with substantive water-related challenges were in the Global South.¹⁰

With geopolitical relationships fracturing, and new alliances potentially set to form as countries attempt to advance their national interests, supply-chain resilience is increasingly a geostrategic concern. In the UK, recent reports have suggested that Britain's food supply, underpinned by international trade networks, is 'almost certain' to be 'on a decline and collapse trajectory'.¹¹ It is becoming increasingly vital to recognize the vulnerability of globalized supply chains to water risk.

These pressures are part of a wider transformation affecting how water-related risks emerge and are addressed. Fragmentation in the international system, the weakening of multilateral institutions, and the growing use of trade and technology policy as instruments of strategic rivalry are reshaping the conditions under which supply-chain vulnerabilities can be addressed. Such dynamics increasingly influence not just how water risks are experienced, but whether they are visible, manageable and shared across borders.

⁸ United Nations Environment Programme (2016), *Options for Decoupling Economic Growth from Water use and Water Pollution*, <https://www.un-ilibrary.org/content/books/9789210600958>.

⁹ Vos, J. (2025), 'The political ecology of our water footprints: Rethinking the colours of virtual water', *World Development*, Vol. 185, <https://doi.org/10.1016/j.worlddev.2024.106801>.

¹⁰ Based on data available from question 9.3.1 of CDP's Corporate Questionnaire, CDP Data: 2025. In 2025, close to 10,000 companies (including small and medium-sized enterprises) made disclosures to CDP on their water use.

¹¹ Cooke, B. (2026), 'Britain's food supply 'at risk of catastrophic failure by 2030'', *The Times*, 24 March 2026, <https://www.thetimes.com/uk/environment/article/britains-food-supply-at-risk-of-catastrophic-failure-by-2030-bxbgzkmlp>.

About this paper

This research paper aims to drive a rethinking of ‘virtual water’ trade and its role in supply chains, examining the topic in the context of today’s increasingly challenging conditions for global cooperation. As businesses and governments continue to reorganize supplier relationships, in part to reduce costs and boost longer-term supply-chain security, we argue that physical water scarcity and water degradation challenges must not be overlooked. This matters, more than ever, because the world is entering an era of ‘water bankruptcy’, in which global freshwater resources are being depleted beyond renewal.¹² Unsustainable water use, linked to and amplified by trade, is behind the emergence of production chokepoints where drought, floods and other water-related challenges threaten supply chains, globally connected communities and the environment with increasing regularity and severity.

Unsustainable water use, linked to and amplified by trade, is behind the emergence of production chokepoints where drought, floods and other water-related challenges threaten supply chains, globally connected communities and the environment with increasing regularity and severity.

Addressing these intertwined factors requires attention to risk assessment and due diligence at all points along the supply chain, both in producer and consumer countries. It requires system-wide collaboration among actors facing similar challenges. It also requires governmental, institutional and corporate commitment to the principles of fair and sustainable water footprints. Reforms can be supported by improving general understanding of the ‘cascading’, compounding and often unintended impacts of unsustainable water use on interlinked socio-ecological and trade systems.

Previous research by Chatham House¹³ has demonstrated the challenges of developing coherent responses to water stress in supply chains for key commodities – specifically food and agricultural products, textiles and minerals. This research has illustrated the extensive dependencies of selected Global North countries on water-intensive imported goods, and how these dependencies are driving water insecurity in different regions of the world (including, but not only, in less developed countries). As these pressures intensify, the vulnerabilities associated with embedded water use

¹² Madani, K. (2026), *Global Water Bankruptcy: Living Beyond Our Hydrological Means in the Post-Crisis Era*, Richmond Hill: United Nations University Institute for Water, Environment and Health, <https://unu.edu/inweh/collection/global-water-bankruptcy>.

¹³ Weko, S. and Lahn, G. (2024), *Tackling trade-related water risks: How importing countries can address water stress from global commodity production*, Research Paper, London: Royal Institute of International Affairs, <https://www.chathamhouse.org/2024/03/tackling-trade-related-water-risks>.

in global value chains cannot be understood purely in environmental or hydrological terms. They also reflect and reinforce a wider geopolitical shift, in which cooperation is harder to sustain and supply chains are increasingly securitized.

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- Result in zero water pollution;
- Rely on sustainable and equitable water withdrawals and use;
- Be consistent with protecting nature;
- Ensure workers have full access to safe water, sanitation and hygiene; and
- Support planning for droughts and floods.

Box 1. 'Virtual water', 'water footprints' and their relevance to globalized supply chains

The term 'virtual water' refers to the volume of freshwater required to produce and deliver a good or service, and includes all production and processing steps along the value chain.¹⁵ The concept requires consideration of the 'hidden' water use involved in bringing goods to market, and is essential for understanding the environmental, economic and community impacts of water use in supply chains. 'Virtual water trade', in this context, can be understood as the exchange of goods and services based on their embedded water content.

'Water footprints' are a measure of direct and indirect water use by consumers and producers of goods or services. Where direct and indirect water footprints are distinguished from one another, the direct water footprint refers to the water consumed or polluted by the specific actor or as a result of the specific activity in question, whereas the indirect footprint refers to the water consumed or polluted at earlier or later stages in the supply chain (for example, in relation to the production of inputs needed for the activity in question). A water footprint can be calculated for a particular product (e.g. for a type of food, textile or critical material, etc.) in relation to any well-defined category

¹⁴ Fair Water Footprints (2021), 'The Glasgow Declaration for Fair Water Footprints for Climate-Resilient, Inclusive, and Sustainable Development', p. 3, https://fairwaterfootprints.org/resource/declaration-in-full/fwf_glasgow_declaration_rebrand_proof_01.

¹⁵ Taylor & Francis (undated), 'Virtual water', https://taylorandfrancis.com/knowledge/Engineering_and_technology/Chemical_engineering/Virtual_water.

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of consumer of that product (e.g. a person, family, village, business, city, province or nation), as well as in relation to any producer of that product (e.g. a public organization, private enterprise or economic sector).¹⁶

A water footprint is a geographically explicit indicator and can be used to understand the water interdependencies that arise between countries through the export and import of goods. However, because it is a purely volumetric measurement, a water footprint does not directly convey the sustainability or impacts on water scarcity of water consumption. But the water footprint can be used alongside other measures to ascertain whether water use in a specific location – whether affecting an aquifer, river basin or nation – is sustainable. In this way, the impacts of water use on environmental water requirements and water quality can be assessed.

¹⁶ Fair Water Footprints (2021), *The Glasgow Declaration for Fair Water Footprints for Climate-Resilient, Inclusive, and Sustainable Development*, p. 16.

02

The ‘virtual water’ trade conundrum – how local and remote agendas collide

Companies that trade internationally seldom consider the true cost or impacts of water use when deciding where to locate production. Until this practice changes, markets will continue to rely disproportionately on imports from water-stressed regions insufficiently equipped to support water-intensive agriculture or manufacturing.

Prioritizing between competing water uses often presents difficult trade-offs for policymakers and corporate decision-makers in today’s globalized trading system, as supply-chain efficiency and financial considerations may be at odds with imperatives to support environmental sustainability, community resilience and social justice. Should a factory or farm producing water-intensive goods or crops for export, for example, operate in an arid location that suffers from major water stresses? (Or indeed, in a location with abundant water resources but where that water is best allocated to other purposes, even if these uses are less profitable?) How will the investment in question affect the local water resource balance

(i.e. its natural renewal) and ecology, even if the operation promises to generate substantial export revenues? Will the investment lead to competing needs for water, and detract from a public duty to ensure access to water and sanitation for local populations?

These are the sorts of questions that should underpin any assessment of the impacts of water use in international supply chains. The challenge is all the greater because water is often undervalued – or its use not accounted for at all – by policymakers and corporate planners. This affects the accuracy of the assumptions on which governments and commercial actors base their trade planning and policy. Water can be thought of as the ‘forgotten input’ in global trade. Despite water being a critical input in the production, processing and delivery of almost all traded commodities and goods, from crops to textiles to critical minerals, the true costs of water use are not adequately reflected in supply-chain policies.

Water can be thought of as the ‘forgotten input’ in global trade. Despite water being a critical input in the production, processing and delivery of almost all traded commodities and goods, from crops to textiles to critical minerals, the true costs of water use are not adequately reflected in supply-chain policies.

This, of course, encourages unsustainable practices. A failure by policymakers and markets to price in invisible costs and impacts can lead governments and investors to prefer investments that are detrimental to local environments and communities. Supply-chain sourcing decisions may prioritize financial motivations (such as the availability of low-cost labour and transport infrastructure), regulatory arbitrage, or geopolitical calculations relating to resource security or the choice of a preferred trade partner. Consequently, significant water-dependent production often occurs in regions where water access and availability are poor, where appropriate infrastructure is lacking, where urban populations are growing and compete for limited water supplies, and where water governance and regulatory oversight can be insufficient.

Governments must consider many competing pressures when determining whether to allow new production facilities in areas experiencing (or at risk of) water stress. Policymakers may prioritize the pursuit of economic growth, or they may support other political or social priorities (e.g. ensuring the supply of water for households). But while wider metrics that include sustainability and equitability might be desirable, the reality is that water use in today’s globalized trading system tends to reflect – and perpetuate – structural imbalances in countries’ political power, economic power and natural endowments. This means that virtual water flows – i.e. flows occurring as a result of trade – often increase to countries that *already have* relatively sufficient water supplies but enjoy the financial and technical resources to manage water risks. At the same time, water-related stresses often increase for countries *less able* to manage such risks.

The irony is that this outcome occurs despite trade's theoretical potential to allow for a more balanced use of global water resources by enabling water-scarce countries to access water-intensive products from water-plentiful regions – and for both parties to profit from the exchange. The concept of fair water footprints (described in Chapter 1) marks an attempt to address such imbalances by promoting the equitable and sustainable redistribution of virtual water.

Box 2. Case study – drought impact, water allocation and semiconductor production in Taiwan

In 2021, amid the worst drought Taiwan had experienced in more than half a century, the island's government faced a dilemma as it sought to balance competing demands for water. Officials had to decide where to impose the strictest water-saving measures: on households, the agricultural sector, or the island's high-value, export-oriented technology manufacturing industries. In the event, the government elected, among other measures, to halt agricultural irrigation.¹⁷ This decision affected over one-fifth of irrigated land, but it permitted semiconductor manufacturing to continue (although that sector also faced certain water restrictions in relation to the drought).¹⁸

This example of water allocation at the government level exemplifies how high-value sectors can impact sectors deemed less strategically significant when water is underpriced or not priced at all.

Taiwan's decision arguably merits special attention because of the internationally strategic importance of its semiconductor sector, the risks to which have the potential to cause cascading economic impacts around the world. Taiwan produces over 90 per cent of the world's advanced semiconductors.¹⁹ This market dominance creates global dependencies and presents material risks to consumer countries in the event of Taiwan's semiconductor exports being disrupted.

Drought risk will remain significant for the sector – and thus for global technology supply chains – both because semiconductor manufacturing is water-intensive, due to the high consumption of ultrapure water (UPW) required to maintain extreme purity levels in manufacturing; and because the island's hydrological balance relies on seasonal typhoons to replenish groundwater. These weather patterns are becoming more unpredictable and intense as the climate changes.²⁰ Future droughts in Taiwan could affect production of high-end semiconductors, leading to global shortages of components and to price hikes in a range of in-demand technologies, from smartphones to data centre servers used in artificial intelligence (AI) applications.

¹⁷ Zhong, R. and Chien, A. C. (2021), 'Drought in Taiwan Pits Chip Makers Against Farmers', *New York Times*, 8 April 2021, <https://www.nytimes.com/2021/04/08/technology/taiwan-drought-tsmc-semiconductors.html>.

¹⁸ Ibid.; United Nations University (2022), *The Taiwan Drought*, UNU-EHS Technical Report, https://collections.unu.edu/eserv/unu:9027/TR_220830_TaiwanDrought.pdf.

¹⁹ International Trade Administration (2025), 'Taiwan – Semiconductors including chip design for AI', Country Commercial Guide, 1 December 2025, <https://www.trade.gov/country-commercial-guides/taiwan-semiconductors-including-chip-design-ai>.

²⁰ British Geological Survey (2023), 'Groundwater in Taiwan under a changing environment', blog post, 15 December 2023, <https://www.bgs.ac.uk/news/groundwater-in-taiwan-under-a-changing-environment>.

While context-dependent water distribution (e.g. involving allocation plans, permitting and enforcement) is crucial – alongside reducing water consumption, treating wastewater and augmenting existing water sources – for managing Taiwan’s water risks, there also needs to be more strategic governance of growth in activities associated with high levels of water stress.

The climate- and water-related risks that Taiwan faces could exacerbate the geopolitical risks that relate to its semiconductor manufacturing. The latter risks are acute, given that shifting tariff policies and heightened risk of military conflict with China are factors relevant to the supply of chips to markets such as the US.²¹ Disruption of Taiwanese semiconductor production would destabilize the global economy.²² To prepare for such an eventuality, the US is taking measures to reduce external dependencies.²³ In recent years, for example, in a move also intended to revitalize domestic manufacturing, the US has reshored certain elements of water-intensive high-tech manufacturing to hubs in Arizona and southeast Texas.²⁴ The bipartisan CHIPS and Science Act included investment into high-value semiconductor manufacturing and AI infrastructure.²⁵ However, many of the apparent target locations for such investment face water scarcity themselves, potentially pitting local communities against industry.

Models of geoeconomic decision-making and virtual water use

Given transnational dependencies and the potential impacts on distant communities, effective water stewardship and supply-chain action require international-level governance. Countries benefiting from water resources beyond their national borders have the opportunity to adopt more sustainable models of cooperation with external partners. Whether they choose to do so in practice is another matter. Figure 1 presents three indicative models of how governments sometimes approach foreign relations to achieve water security goals, and outlines the factors that shape these choices.

The models range from (1) a relatively straightforward (and less politicized) reliance on importing water-intensive products, to (2) an emphasis on foreign direct investment (FDI) or other investments, to (3) aggressively securitized resource nationalism. In reality, many countries will combine approaches and vary their strategy over time (e.g. there can be tendencies of securitization in all models). Yet as the figure shows, many of the tactics countries currently employ are likely to cause geopolitical tensions and/or contribute to water uses that are unsustainable in aggregate.

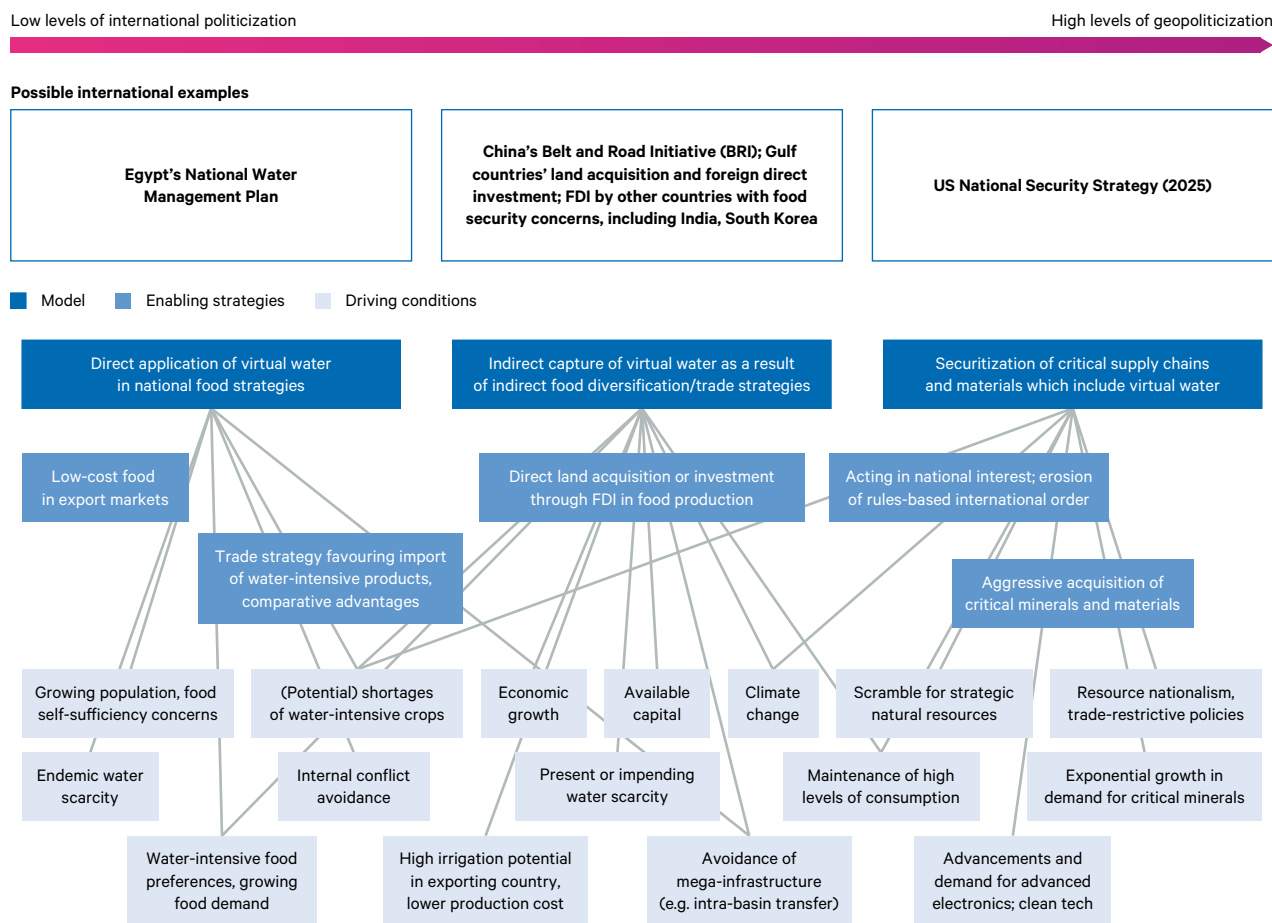
²¹ Mickle, T. (2026), ‘The Looming Taiwan Chip Disaster That Silicon Valley Has Long Ignored’, *New York Times*, 24 February 2026, <https://www.nytimes.com/2026/02/24/technology/taiwan-china-chips-silicon-valley-tsmc.html>.
²² Ibid.

²³ Roy, D. (2024), *The CHIPS Act: How US Microchip Factories Could Reshape the Economy*, New York: Council on Foreign Relations, 25 April 2024, <https://www.cfr.org/articles/chips-act-how-us-microchip-factories-could-reshape-economy>.

²⁴ Ibid.; and Siripurapu, A. and Berman, N. (2023), ‘Is Industrial Policy Making a Comeback?’, Backgrounder, Council on Foreign Relations, 18 September 2023, <https://www.cfr.org/backgrounders/industrial-policy-making-comeback>.

²⁵ US Congress (2022), *H.R. 4346 – CHIPS and Science Act*, 117th Congress, Washington, DC: Government Publishing Office, <https://www.congress.gov/bill/117th-congress/house-bill/4346>.

Figure 1. Potential geopolitical models of virtual water trade



Source: Developed and elaborated by authors, based initially on Roth, D. and Warner, J. (2025), 'The sound of silence: the politics of virtual water policies', *World Development*, Vol. 196, December 2025, 107180, <https://www.sciencedirect.com/science/article/pii/S0305750X25002669>.

At the more depoliticized end of the spectrum, where virtual water trade dynamics are directly applied in national policies, countries can choose to externalize their water scarcity and pollution impacts, and protect national water security, by capitalizing on water-intensive food imports; this in turn enables the countries to focus instead on exporting goods that make more strategic sense in terms of their natural assets and climate. For example, the Middle East and North Africa (MENA) region has long relied on food imports to overcome water scarcity resulting from dry climates and challenging hydrogeology – in effect, some MENA countries treat imports as an outsourced supply of virtual water creating what is sometimes termed a ‘second Nile’.²⁶

Ensuring the sustainability and resilience of agricultural trade (the biggest drain on water resources) is becoming a pressing national security concern for an increasing number of countries.²⁷ Relying on virtual water imports has become more widespread

²⁶ Roth, D. and Warner, J. (2025), 'The sound of silence: the politics of virtual water policies', *World Development*, Vol. 196, December 2025, 107180, <https://www.sciencedirect.com/science/article/pii/S0305750X25002669>.

²⁷ King (2025), *The water footprints of global food and agriculture trade*.

in countries with large populations and substantial food security concerns. In China, this has become a *de facto* national water-saving strategy, as illustrated by the nature of some foreign investments and resource projects associated with the Belt and Road Initiative (BRI).²⁸ Although the BRI was not explicitly developed by the Chinese government with water saving in mind, it can nonetheless be seen as part of a framework through which China seeks to achieve long-term 'hydro-stability' using domestic, regional and global interventions and infrastructure investments.²⁹

China is not alone in seeking to shore up its virtual water supplies through FDI in other countries. Gulf Cooperation Council (GCC) countries are increasingly developing partnerships in the form of land acquisitions and/or FDI projects in Africa;³⁰ this activity is a growing factor in virtual water flows globally. For the arid GCC countries, these partnerships provide a vehicle for securing land overseas and extracting resources from it.³¹ It is also a means to develop productive trade relationships with countries that can provide low production costs and abundant land and water resources, enabling Gulf markets to access agricultural products³² and minerals that are unavailable domestically.³³

At the most securitized end of the spectrum, there has recently been evidence of increasingly aggressive national positioning – notably by the US – around resource access and land acquisition.

At the most securitized end of the spectrum (see Figure 1), there has recently been evidence of increasingly aggressive national positioning – notably by the US – around resource access and land acquisition. This trend, though not yet explicitly water-directed, has potentially negative implications for cooperative resource management and could undermine efforts to optimize virtual water trade for sustainability and water security. Skyrocketing demand for rare earths and other minerals appears to have been one of the drivers for this shift in US foreign policy, as seen in the recent US threats to take over Greenland.³⁴ The Danish territory's own water reserves could also become a focus of geopolitical contestation. Water is increasingly viewed as a strategic resource, as climate change and rising demand

²⁸ Ganeshpandian, P. (2024), 'Dams, hegemony and beyond: China's hydro-stability in the evolving world order', *Discover Global Society*, Vol. 2, Article 9, <https://link.springer.com/article/10.1007/s44282-024-00036-w>.

²⁹ Ibid.

³⁰ Procopio, M. and Čok, C. (2025), *Diversification nations: The Gulf way to engage with Africa*, Policy Brief, Berlin: European Council on Foreign Relations, <https://ecfr.eu/publication/diversification-nations-the-gulf-way-to-engage-with-africa>; Munyati, C. (2024), 'A new economic partnership is emerging between Africa and the Gulf states', World Economic Forum, 28 April 2024, <https://www.weforum.org/stories/2024/04/africa-gcc-gulf-economy-partnership-emerging>.

³¹ Procopio and Čok (2025), *Diversification nations*.

³² Khumalo, E. (2025), 'The Race for Africa's Farmland: Investment, Food Security, and Geopolitics', FurtherAfrica, 12 August 2025, <https://furtherafrica.com/2025/08/12/the-race-for-africas-farmland-investment-food-security-and-geopolitics>.

³³ Procopio and Čok (2025), *Diversification nations*.

³⁴ Schwartz, M. and Baskaran, G. (2026), *Greenland, Rare Earths, and Arctic Security*, Analysis, Washington, DC: Center for Strategic and International Studies, 8 January 2026, <https://www.csis.org/analysis/greenland-rare-earths-and-arctic-security>.

put pressure on valuable water resources.³⁵ Investors are looking with interest to the vast water reserves located in Greenland; it is estimated that these sources could account for 10 per cent of global freshwater reserves.³⁶ Greenland itself has recognized the strategic potential of its water reserves as an asset to capitalize on.³⁷

As countries respond to pressures affecting their water security, for example by diversifying their imports, they are developing new relationships through bilateral trade agreements. Yet while this sort of diversification may boost countries' short-term resilience, it also risks increasing resource competition and undermining collective efforts to ensure fair and equitable access to water. A reduction in the resilience of food supply chains and trading relationships is increasingly a strategic risk, especially for countries with significant food import dependencies.

While the approaches outlined above and in Figure 1 are, at a country level, often rational responses reflecting calculations of short-term national self-interest, they are problematic for the global collective good. Nationally focused strategies are often insufficient for, or even undermine, effective management of water as a common global resource. Policies intended to help countries diversify their virtual water supplies and guard against risky external dependencies may at some point result in fierce competition with other countries for productive land and associated water resources, especially as such assets are likely over time to be required to produce ever more food. The demand for freshwater – and competition for control of the territory on which freshwater resources are located – will potentially lead to an acute water supply 'crunch' in which water scarcity drives geopolitical tension.³⁸

The answer, we argue, is for countries to work together (see Chapters 3 and 4), but there is currently no clear framework for collective action to ensure virtual water is managed sustainably. A number of barriers exist to closer common alignment on sustainable water management. Exporter countries can be reluctant to impose environmental regulations or enforcement measures on businesses crucial to export earnings, fearing that companies will relocate to jurisdictions with more lax environmental standards.³⁹ At the same time, even if importing countries have an interest in addressing the environmental and social impacts of water use in producer countries, they may lack the authority to do anything about it.⁴⁰

The following sections outline how the dynamics of virtual water trade are evolving in two key areas of geopolitical interest: national food security, dependent on (often water-intensive) agricultural production abroad; and advanced electronics, dependent on global exploration for critical minerals. Policy conversations on these topics are taking place in a context in which countries, companies and international

³⁵ Lockwood, T. (2026), 'Greenland's freshwater reserves seen as 'frozen capital' as water becomes a national security issue', CNBC, 20 January 2026, <https://www.cnbc.com/2026/01/20/greenland-freshwater-reserves-national-security-capital.html>.

³⁶ Government of Greenland (2020), *Greenlandic Ice and Water – A Legal Framework*, https://govwater.gl/emner/groenlandsk-vand?sc_lang=en.

³⁷ Ibid.

³⁸ For a parallel with land-use pressures, see King, R. et al. (2023), *The emerging global crisis of land use: How rising competition for land threatens international and environmental stability, and how the risks can be mitigated*, Chatham House Report, London: Royal Institute of International Affairs, <https://www.chathamhouse.org/2023/11/emerging-global-crisis-land-use>.

³⁹ Gustafsson, M., Schilling-Vacaflor, A. and Pahl-Wostl, C. (2024), 'Governing transnational water and climate risks in global supply chains', *Earth System Governance*, Vol. 21, No. 100217, <https://doi.org/10.1016/j.esg.2024.100217>.

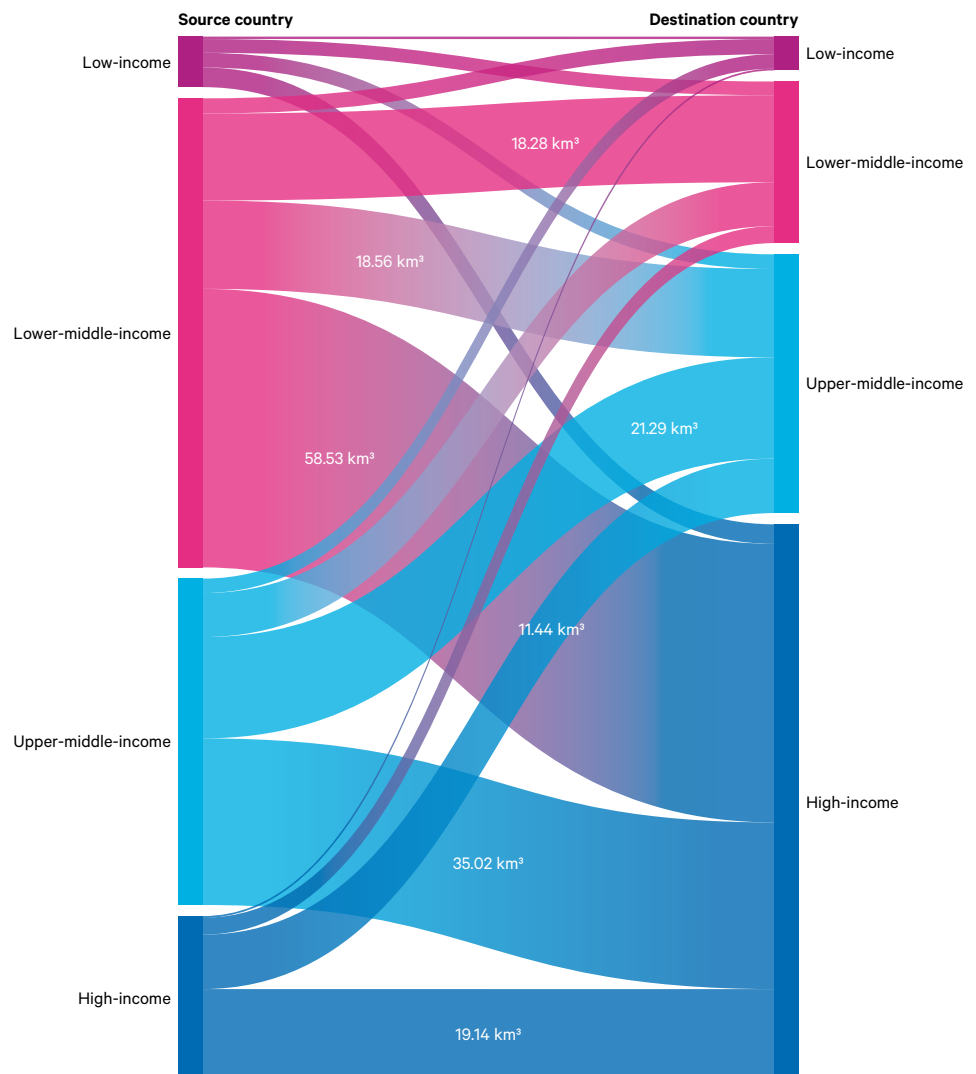
⁴⁰ Ibid.

organizations are grappling with the tensions associated with resource security, the climate crisis, and shifting geopolitical and geo-economic conditions.

Sector spotlight: food security and virtual water

Food systems are the dominant users of water resources, accounting for around 70 per cent of global freshwater withdrawals.⁴¹ International trade in food and agricultural products effectively transfers vast volumes of virtual water from producer countries to consumer markets. The water footprints of foreign-supplied food are largely invisible to end consumers, however.

Figure 2. Virtual water flows in international agricultural trade, by income classification



Source: Calculated from Stockholm Environment Institute York and the Joint Nature Conservation Committee (2026), 'The Global Environmental Impacts of Consumption (GEIC) Indicator', <https://commodityfootprints.earth>.

⁴¹ A recent study has revealed a less clear contribution of irrigation to water withdrawal, indicating that the figure could vary more widely than previously estimated and could be in the region of 45–90 per cent: Puy, A. et al. (2025), 'Widely cited global irrigation statistics lack empirical support', *PNAS Nexus*, Vol. 4, No. 11, pgaf323, <https://academic.oup.com/pnasnexus/article/4/11/pgaf323/8320029>.

To illustrate the asymmetries in the flows of virtual water in global agricultural trade, 81 per cent of so-called ‘blue water’⁴² embedded in this trade is associated with consumption in upper-middle-income and high-income countries.⁴³ Virtual water flows from lower-middle-income countries to high-income countries are particularly significant (Figure 2). Consumption in the 19 countries of the G20 is responsible for 55 per cent of the blue water embedded in all international trade involving agricultural commodities.⁴⁴

These dynamics are both exacerbating water stress in producer regions and creating significant geopolitical and supply-chain risks. Although producer countries benefit by receiving income from export crops, they are also negatively affected by water pollution, diversion and depletion, all of which reduce societal resilience to the climate and biodiversity crises. This is by no means limited to developing countries. In Spain, for example, more intense and frequent heatwaves and water shortages are affecting the stability of the agribusiness sector, with knock-on consequences for Spain’s trading partners – as was illustrated by empty supermarket shelves in the UK following a 2022–23 Spanish drought.⁴⁵ In some countries, an increase in agricultural exports has driven deforestation, contributing to increased flooding and erosion.⁴⁶

These environmental factors are interacting with turbulent geoeconomic dynamics – including export restrictions, supply-chain fragmentation and the use of tariffs. Increasing protectionism can restrict the flow of food products to international markets at the same time as droughts, floods and competition for water reduce harvests and worsen food security. Export restrictions in response to societal or political pressure to improve local food security can push up international prices, as was seen in many countries when food-price inflation surged owing to concerns around grain supplies following Russia’s full-scale invasion of Ukraine in 2022.⁴⁷ Similar inflationary and supply issues are beginning to be realized as the US and Israeli conflict with Iran disrupts shipping through the Strait of Hormuz, triggering a global fertilizer crisis.

⁴² The term ‘blue water’ refers to surface and groundwater stores and flows (springs, rivers, lakes, reservoirs, aquifers). Groundwater includes both renewable and fossil resources, the latter of which are not replenished by the hydrological cycle; this means that fossil water extraction results in a permanent depletion of that resource. King (2025), *The water footprints of global food and agriculture trade*.

⁴³ An estimated 40 per cent of this blue water embedded in trade for consumption in richer countries comes from low-income and lower-middle-income countries, and 41 per cent from trade between countries classified as upper-middle-income and high-income. Some 80 per cent of ‘green water’ – essentially, soil moisture – embedded in global agricultural trade is associated with consumption in the richer cohort of countries, and 20 per cent results from consumption in the two lower-income categories. 2023 values, calculated from Stockholm Environment Institute York and the Joint Nature Conservation Committee (2026), ‘The Global Environmental Impacts of Consumption (GEIC) Indicator’, <https://commodityfootprints.earth>.

⁴⁴ An estimated 25 per cent is transferred from non-G20 countries, and 30 per cent is from trade between G20 countries, not including EU and African Union countries without direct sovereign G20 membership. For green water, 60 per cent of trade-embedded water flows are associated with consumption in G20 countries, and 40 per cent of flows are for consumption in non-G20 countries. 2023 values, calculated from: Stockholm Environment Institute York and the Joint Nature Conservation Committee (2026), ‘The Global Environmental Impacts of Consumption (GEIC) Indicator’.

⁴⁵ Díaz, S. (2023), ‘The challenge for Spain’s agrifood sector of remaining competitive in the face of adverse conditions’, CaixaBank Research, 18 October 2023, <https://www.caixabankresearch.com/en/sectoral-analysis/agrifood/challenge-spains-agrifood-sector-remaining-competitive-face-adverse>.

⁴⁶ UN-REDD (2024), ‘Forest loss and agricultural expansion: a point of no return for ecosystems and rainfall patterns’, 17 December 2024, <https://www.un-redd.org/post/forest-loss-and-agricultural-expansion-point-no-return-ecosystems-and-rainfall-patterns>.

⁴⁷ Russell, R. (2022), *Price Wars: How Chaotic Markets are Creating a Chaotic World*, London: Weidenfeld & Nicolson.

Such crises tend to deepen global inequalities, while creating conditions for political upheaval and broader geopolitical tension as countries with greater fiscal capacity potentially wield their economic influence and soft (or even hard) power to exploit other countries' natural resources, including water.

Sector spotlight: critical minerals, advanced electronics and virtual water

As developments in the artificial intelligence (AI) sector progress rapidly, there is growing scrutiny of virtual water's role in advanced electronics. The direct operational water use of data centres has attracted attention, as it visibly affects and creates tensions with local communities and nearby industrial and agricultural water users.⁴⁸ However, advanced electronics of all kinds also carry significant *indirect* globalized water footprints from water use in the supply chain. A wide range of products – consumer electronics, advanced weapons systems, electric vehicles (EVs), green technology infrastructure – are all reliant on, and pollutive of, water at various stages of raw-material extraction and manufacturing.

Multiple water-intensive supply-chain stages often leave significant per-product water footprints in the electronics sector. Supply chains in this sector are characterized by their complexity, as they can involve hundreds of regionally clustered suppliers – each using and degrading water in their own operations as well as inheriting the water use in upstream extraction, processing and fabrication stages. Such supply chains can start with water-intensive mining for critical raw materials in arid, potentially water-stressed countries or regions (such as parts of the US, Australia, South Africa and India).⁴⁹ Sixteen per cent of critical mineral deposits and mines are located in highly water-stressed areas.⁵⁰ Lithium – used in both EV batteries and solar panels – is particularly water-intensive. Over half of the global reserves of lithium are found in South America's 'lithium triangle', a region experiencing severe water stress.⁵¹ Impacts from mining operations can include contamination from hazardous materials, for example through acidic mine drainage or stored tailings (waste material) that leach into groundwater due to improper treatment.⁵²

Mining operations can threaten local needs, including basic access to water and sanitation. In the Democratic Republic of the Congo (DRC), which has the world's largest reserves of cobalt⁵³ but where basic water and sanitation access is low, poor water quality around mining sites has sometimes led to higher prevalence of disease including diarrhoea, hepatitis and cholera.⁵⁴ (Cobalt is essential to many

⁴⁸ Direct water use in this case refers to water use within a data centre, i.e. water consumed on site such as for cooling.

⁴⁹ Luo, T. and Kölbl, J. (2024), 'More Critical Minerals Mining Could Strain Water Supplies in Stressed Regions', World Resources Institute, 10 January 2024, <https://www.wri.org/insights/critical-minerals-mining-water-impacts>.

⁵⁰ Ibid.

⁵¹ Ibid.

⁵² Ibid.

⁵³ International Trade Administration (2026), 'Democratic Republic of the Congo – Mining and Minerals', Country Commercial Guide, 20 February 2026, <https://www.trade.gov/country-commercial-guides/democratic-republic-congo-mining-and-minerals>.

⁵⁴ Ahadi Ireng, C. et al. (2023), 'Participative epidemiology and prevention pathway of health risks associated with artisanal mines in Luhihi area, DR Congo', *BMC Public Health*, Vol. 23, No. 121, <https://doi.org/10.1186/s12889-023-15020-3>.

industrial processes, and to production of batteries for the green transition.) Mining operations in the DRC have sometimes contaminated groundwater and soil, affecting the supply of clean water for local populations.⁵⁵

The centrality of these industries to the global economy creates potentially significant supply-chain dependencies and geopolitical tensions around the geographic concentration of resource extraction and processing capabilities. The US's aggressive statements in early 2026 in relation to Greenland are one such example, and may have been motivated by a desire to access the Danish territory's abundant critical minerals as a counter to China's status as the majority supplier of the world's rare earth minerals.⁵⁶

The semiconductor sector (see also Box 2) illustrates some of these challenges. High volumes of water are used in advanced electronics manufacturing, due to the need for ultrapure water (UPW) to ensure high manufacturing standards. Given massive global demand for sophisticated semiconductors, we can expect the electronics sector's consumption of water generally, and UPW specifically, to increase further in the future.

Water use by data centres is also a concern. Over 40 per cent of such facilities are projected to face high or extremely high water stress between 2030 and 2040.⁵⁷ Moreover, with investment in AI skyrocketing, the global number of data centres in operation, planned or under construction is rising dramatically.

While security of water supply may not currently be a significant factor in the geopolitical jockeying of countries to control electronics supply chains, the sector's high consumption of water, the geographic concentration of resources and processing capacities, and the growing climate change impacts and water stressors associated with electronics manufacturing suggest that sustainable water use deserves to be a more central consideration throughout the value chain. The water-intensive stages of critical-mineral and semiconductor supply chains are intersecting with strategic competition over technological leadership, industrial resilience and raw-material security. As countries adjust their geo-economic strategies and diversify or onshore water-intensive production, water risk – hitherto often underacknowledged – will become an increasingly important factor shaping national resilience and global economic stability. This linkage between industrial policy, resource security and geopolitical fragmentation is examined further in Chapter 3.

⁵⁵ Kamara, J. and Bumba, S. (2025), 'Protecting Miners' Health in Democratic Republic of Congo', Think Global Health, 10 February 2025, <https://www.thinkglobalhealth.org/article/protecting-miners-health-democratic-republic-congo>.

⁵⁶ GlobalData (2025), 'China currently controls over 69% of global rare earth production', Mining Technology, 18 January 2025, <https://www.mining-technology.com/analyst-comment/china-global-rare-earth-production>; and Schwartz and Baskaran (2026), *Greenland, Rare Earths, and Arctic Security*.

⁵⁷ Lepawsky, J. (2024), 'Climate change induced water stress and future semiconductor supply chain risk', *iScience*, Vol. 27, No. 2, 108791, <https://doi.org/10.1016/j.isci.2024.108791>.

03

A crisis in need of global solutions – water governance as a challenge of geopolitics

Geopolitical change is reshaping the visibility, distribution and management of water insecurity in global value chains. The trend complicates attempts to agree and implement international measures promoting responsible and sustainable water use.

The global order is undergoing a structural transition away from the post-Cold War period dominated by the US to a more contested multipolar international system. This geopolitical fragmentation has implications for trade policy, investment decisions and supply-chain configurations – and in turn for efforts to trade virtual water more sustainably and equitably.

Over the past few decades, the expansion of global trade and investment has embedded virtual water ever more deeply in cross-border supply chains, concentrating water use, pollution and ecosystem pressure in upstream production

regions, while much of the value capture has primarily gone to consumer countries. The scale and environmental implications of globalized virtual water trade are well documented, and pre-date the current phase of geopolitical realignment.⁵⁸

Yet even at the high point of post-Cold War multilateralism and expanding international development cooperation, these water risks were only weakly addressed in regulatory frameworks and the policies of international institutions, despite growing recognition of other shared environmental challenges. Whereas climate change, desertification and biodiversity loss were each anchored in dedicated UN treaty regimes, challenges around sustainable water use *per se* never acquired a comparable multilateral governance architecture. Instead, responsibility defaulted to voluntary disclosure and coalition-based initiatives.

The current fractured geopolitical environment does not alter the extent or prevalence of unsustainable water footprints in trade, but it further constrains the already limited pathways through which these impacts may be addressed. In particular, the operating assumptions that once enabled collective action on long-term environmental risks are eroding. The US's withdrawal from its role as the principal guarantor of the rules-based international order is reshaping the conditions under which cooperation between states occurs. This reflects a deeper structural shift, in which coordination on environmental risks must increasingly contend with rivalry and transactionalism among major and lesser powers alike.

Geopolitical fragmentation as a driver of water risk

The transition away from a predominantly unipolar international system has sharpened geopolitical rivalry and weakened the institutional foundations that previously supported collective responses to shared risks. Power is now more diffusely distributed, with the US and China exerting influence through competing economic, technological and security strategies, while middle and regional powers also pursue more transactional forms of alignment. As this fractured, multipolar environment becomes more established, cooperation on addressing long-term, geographically distant risks – such as water stress embedded in global supply chains – will be harder to initiate and sustain.

At the same time, rivalry among major powers has intensified competition over trade, technology and strategic resources. The rise in China's economic might and international status, alongside the country's pursuit of regional hegemony, industrial dominance and control over critical inputs, has contributed to an international environment in which supply chains are instrumentalized for geopolitical purposes. The US, as demonstrated in its 2025 National Security Strategy, has increasingly framed trade and industrial policy through a national security lens.⁵⁹

⁵⁸ Mekonnen, M. M. et al. (2024), 'Trends and environmental impacts of virtual water trade', *Nature Reviews Earth & Environment*, Vol. 5, No. 12, pp. 890–905, <https://doi.org/10.1038/s43017-024-00605-2>.

⁵⁹ The White House (2025), *National Security Strategy of the United States of America*, November 2025, <https://www.whitehouse.gov/wp-content/uploads/2025/12/2025-National-Security-Strategy.pdf>.

In this context, consumer countries are more likely to externalize the water-related risks embedded in production systems or to defer efforts to address those risks, particularly where impacts are geographically distant from centres of consumption and decision-making. At the same time, water-scarce producer countries may increasingly prioritize domestic production of staple foods in order to remain independent from external suppliers – a strategy that makes a certain sense from a national self-sufficiency standpoint but risks, among other consequences, tightening supply in export markets or encouraging domestic agricultural policies unsuited to local conditions.

These dynamics interact with, rather than displace, long-standing pressures on multilateral cooperation. The authority and financial base of the UN system are under unprecedented strain. Aid budgets across G7 economies have declined sharply as a share of GDP, while bilateral and multilateral development finance is being redirected towards security. For water-stressed regions in developing countries, this reduces investment in institutional capacity and risk management at precisely the moment when climate change-aggravated exposure to water scarcity, flooding and pollution is intensifying.

As geopolitical rivalry deepens and institutional support weakens, the range of available mechanisms for addressing ‘upstream’ water impacts – i.e., impacts that have accumulated in producer regions while remaining weakly prioritized in consuming economies – is narrowing.

Regulatory retrenchment and geo-economic competition

Geo-economic competition is increasingly reshaping the regulatory environment through which environmental risks are identified and managed. In Europe, concerns over competitiveness, industrial strategy and strategic autonomy have altered the trajectory of sustainability regulation. The European Green Deal initially sought to extend corporate responsibility beyond territorial borders, including making EU companies responsible for environmental impacts traced to global supply chains. Subsequent political choices and regulatory change, however, have narrowed the scope and ambition of the strategy as well as those of other key instruments.

In particular, the EU Corporate Sustainability Due Diligence Directive (CSDDD) has been significantly weakened. The CSDDD came into force in 2024, requiring multinational companies to identify and address adverse human rights and environmental impacts – including excessive water consumption and water pollution – across their value chains.

However, a recent European Parliament vote on a simplification package⁶⁰ established higher thresholds for companies to be covered by the CSDDD, limited civil liability provisions, and reduced due diligence requirements in relation

⁶⁰ The Omnibus decision that was voted on by the European Parliament in December 2025 has updated rules, significantly reducing directives on scope, requirements and timelines. European Parliament (2025), ‘Simplified sustainability reporting and due diligence rules for business’, 16 December 2025, <https://www.europarl.europa.eu/news/en/press-room/20251211IPR32164/simplified-sustainability-reporting-and-due-diligence-rules-for-businesses>.

to outsourced suppliers so that requirements focused on companies' direct suppliers. This change reflects a broader ongoing recalibration of regulatory priorities due to geo-economic pressure. There have also been repeated delays in implementing the directive, along with pushback from some member states and companies concerned about compliance costs and trade impacts. As a result, the revised CSDDD's roll-out has been delayed to 2027, smaller companies have been excluded, and the supply-chain focus is now on a company's own operations, subsidiaries and direct partners, with suppliers occupying secondary or more distant tiers in supply chains only covered if risks are deemed 'significant'.⁶¹

Similarly, the Corporate Sustainability Reporting Directive (CSRD) – designed to standardize and strengthen corporate disclosure of sustainability risks, impacts and dependencies – has faced mounting resistance from some EU member states. This aligns with wider debates on European competitiveness and economic performance, most clearly articulated in the so-called 'Draghi review' (prepared by Mario Draghi, a former Italian prime minister and former president of the European Central Bank); the review has exerted growing influence over the political framing of sustainability regulation in the EU.⁶²

Comparable pressures are evident in the renewed urgency policymakers are attaching to international trade agreements. An example is the EU–Mercosur trade agreement, concluded in early 2026 after more than two decades of intermittent negotiations. Political leaders from both blocs have been explicit that the agreement serves the geo-economic purpose of diversifying trade relationships and reducing strategic dependencies.⁶³ Despite opposition from green parties and civil society organizations (CSOs), which argue that the agreement risks environmental harm and sits uneasily with elements of the European Green Deal, political decision-makers have proceeded on the basis that geopolitical positioning and market access take precedence.⁶⁴

This reflects a political choice under constrained circumstances. While the EU–Mercosur agreement includes sustainability language, the environmental provisions remain limited. Much of the expanded trade which the agreement enables centres on agriculture and raw materials – sectors with substantial water footprints and well-documented risks of significant abstraction, pollution and ecosystem degradation impacts in producer regions. Concerns raised by some critics over the risks of deforestation and water stress have not prevented the deal from being concluded, underscoring the extent to which geo-economic hedging and supply-chain diversification are now prioritized over mitigation of upstream environmental externalities.

⁶¹ European Commission (undated), 'Corporate sustainability due diligence', https://commission.europa.eu/business-economy-euro/doing-business-eu/sustainability-due-diligence-responsible-business/corporate-sustainability-due-diligence_en.

⁶² Draghi, M. (2024), *The future of European competitiveness: Part A – A competitiveness strategy for Europe*, Brussels: European Commission, https://commission.europa.eu/topics/strengthening-european-competitiveness/eu-competitiveness-looking-ahead_en.

⁶³ Mackrael, K. and Hancock, E. (2026), 'In a Boost for Free Trade, EU Backs Controversial Pact With South Americans', *Wall Street Journal*, 9 January 2026, <https://www.wsj.com/world/europe/eu-approves-long-awaited-south-american-trade-deal-sources-say-2b498f8e>.

⁶⁴ Servia F. (2026), 'Why critics see the EU-Mercosur agreement as an environmental disaster', Euractiv, 19 January 2026, <https://www.euractiv.com/news/why-some-see-the-eu-mercrosur-trade-deal-as-an-environmental-disaster>.

These regulatory and trade-related shifts have direct implications for water risk in global supply chains. Narrower due diligence requirements and weakened accountability reduce incentives to identify and address unsustainable upstream water footprints. Where regulatory frameworks were originally intended to strengthen visibility of, and accountability for, geographically distant environmental impacts, political recalibration has limited their reach. In terms of the implications for water scarcity, the consequence is that responsibility for sustainable practices has been shifted to producer regions that are already hydrologically stressed, while consumer economies retain the benefits of trade but with fewer formal obligations to address associated risks.

Elements of this pattern are evident in the EU's approach to water security. The European Water Resilience Strategy represents a significant step in elevating water risk within the EU's strategic agenda, yet its primary focus remains internal.⁶⁵ Despite Europe's substantial dependence on water embedded in external supply chains,⁶⁶ the strategy gives limited attention to upstream water dependencies and impacts beyond EU borders. In this sense, the strategy reinforces rather than resolves one of the central structural disconnects addressed by this paper: the fact that water resilience is increasingly treated as a domestic security concern, while water-related risks generated through global production systems remain weakly governed.

Displacement of the international aid regime

Alongside regulatory retrenchment, the international aid architecture that has historically supported water risk mitigation is undergoing a sharp and unprecedented retrenchment. While aid budgets have been politically vulnerable for more than a decade, recent declines in aid commitments reflect a more explicit reallocation of public spending towards defence in response to changing security priorities. Across G7 economies, official development assistance (ODA) has fallen as a share of GDP, the result of political choices to prioritize military readiness and strategic autonomy. In Europe, commitments to increased defence spending – reinforced through the NATO spending target of 5 per cent of annual GDP – have been financed in part through reductions to aid budgets, including through the repurposing of development spending to support security objectives.⁶⁷

This reallocation of financial support reflects a broader global shift in public spending priorities. Annual global military expenditure reached an all-time high of \$2.7 trillion in 2024, with defence budgets rising across more than 100 countries, while fiscal space for development spending has continued to narrow.⁶⁸

⁶⁵ European Commission (2025), *European Water Resilience Strategy*, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2025) 280 final, 4 June 2025, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52025DC0280>.

⁶⁶ Ercin, A. E. and Hoekstra, A. Y. (2016), 'European Water Footprint Scenarios for 2050', *Water*, 8, No.6, 226, <https://doi.org/10.3390/w8060226>.

⁶⁷ Loft, P. and Brien, P. (2026), *UK aid: Reducing spending to 0.3% of GNI by 2027/28*, Research Briefing No. 10243, London: House of Commons Library, 24 February 2026, <https://commonslibrary.parliament.uk/research-briefings/cbp-10243>.

⁶⁸ United Nations (2024), *The Security We Need: Rebalancing Military Spending for a Sustainable and Peaceful Future*, Report of the Secretary-General, https://front.un-arm.org/Milex-SDG-Study/SG_Report_TheSecurityWeNeed.pdf.

The posture of the US has been particularly consequential. The effective dismantling of USAID and the US's withdrawal from development-focused multilateral institutions have removed a major source of finance and coordination for water infrastructure and governance in low- and middle-income countries. This retrenchment risks creating cascading effects across the development assistance ecosystem, including reduced funding and weakened institutional capacity, alongside greater reliance on ad hoc or bilateral arrangements.

Reduced investment in early-warning systems and flood protection increases exposure to hydrological shocks, while underinvestment in pollution control and basin-level planning compounds longer-term vulnerability.

For water-stressed regions, the consequences are significant. Reduced investment in early-warning systems and flood protection increases exposure to hydrological shocks, while underinvestment in pollution control and basin-level planning compounds longer-term vulnerability. Where water risks are embedded in export-oriented production systems, the contraction of aid further entrenches asymmetries between producers and consumers.

Changes to the international aid regime therefore interact with geopolitical rivalry and regulatory retrenchment to narrow the space for preventive action.

Future water risks under sustained geopolitical fragmentation

In Figure 3, below, we set out scenarios for how water insecurity and shifting geopolitics may plausibly interact in the future. The defining assumption in each scenario is continued global geopolitical fragmentation and realignment: rivalry between major powers will persist, multilateral capacity will remain constrained, and international cooperation will become more selective and uneven.

At the World Economic Forum in January 2026, Canadian prime minister Mark Carney described the international system as having entered a period of 'rupture', arguing that middle powers must move beyond performative support for a fading rules-based order towards a 'variable geometry' of pragmatic, issue-based coalitions capable of operating under sustained geopolitical rivalry.⁶⁹

⁶⁹ Carney, M. (2026), 'Principled and pragmatic: Canada's path', speech delivered at the World Economic Forum Annual Meeting, Davos, 20 January 2026, <https://www.pm.gc.ca/en/news/speeches/2026/01/20/principled-and-pragmatic-canadas-path-prime-minister-carney-addresses>.

Within this context, the future of water risk in global supply chains will likely depend on two main factors: the trajectory of resource use and water stress; and the extent to which coordination between states emerges despite geopolitical competition. A further factor is how committed countries are to measures to allocate and manage water sustainably.

Recent global risk assessments help to situate these dynamics across various time horizons. The World Economic Forum's *Global Risks Report 2026* identifies geo-economic confrontation as the most severe risk facing the international system over the next two years.⁷⁰ At the same time, the report finds that environmental risks continue to dominate the long-term global risk outlook. This divergence highlights a central feature of the current fracturing of international order. While geopolitical realignment absorbs political attention in the short term, slower-moving environmental risks, including water insecurity, continue to accumulate. What distinguishes the present moment is that the tools previously relied upon to mitigate those risks – notably development finance and multilateral norms – are weakening just as the need for mitigation intensifies.

A January 2026 national security assessment by the UK's Department for Environment, Food & Rural Affairs reinforces this view. The document examines the security implications of global biodiversity loss and ecosystem collapse, and concludes with high confidence that environmental degradation will pose escalating risks to national and international security beyond 2050.⁷¹ The assessment identifies pressures on freshwater systems, food security and land use as key channels through which these risks are transmitted, and anticipates that state responses are more likely to prioritize security and strategic autonomy than renewed multilateral cooperation.

This bleak assessment supports the plausibility of scenarios in which water use acts as a risk multiplier amid conditions of sustained geopolitical fragmentation: environmental stress continues to accumulate, while responses remain uneven and reactive, driven primarily by security imperatives rather than by collective risk reduction. As water systems are among the principal vectors through which the impacts of climate change are felt, changes in water use increasingly translate climate impacts into economic and social stress through water scarcity, pollution, flooding and ecosystem degradation.

Taken together, these dynamics define the space within which future trajectories of water risk and governance are likely to unfold. To explore how outcomes may vary under sustained geopolitical fragmentation, in Figure 3 below we adopt a simple futures matrix structured around two interacting dimensions: the form and extent of coordination that may occur over water access and governance; and the trajectory of water use and resource stress.

Across all four scenarios, producer-country agency remains critical, reflecting the sovereign role of governments in determining how to manage and allocate their own water supplies. While consumer countries can manage demand, producer-country

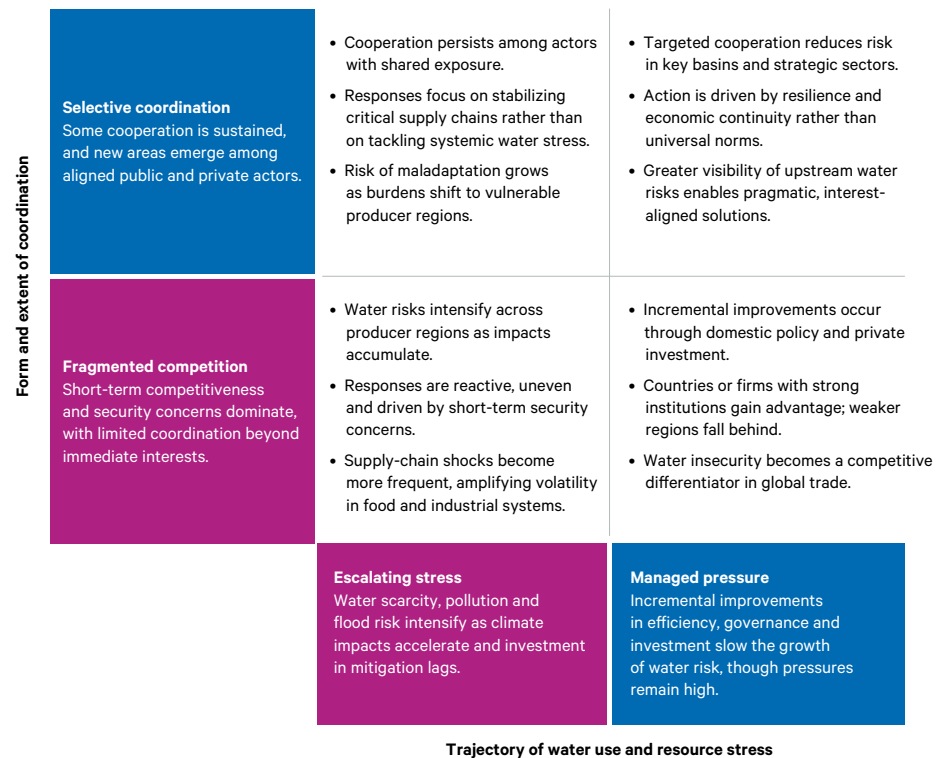
⁷⁰ World Economic Forum (2026), *The Global Risks Report 2026*, <https://www.weforum.org/publications/global-risks-report-2026>.

⁷¹ HM Government (2026), *Biodiversity loss, ecosystem degradation and national security: A national security assessment*, Department for Environment, Food & Rural Affairs, <https://www.gov.uk/government/publications/nature-security-assessment-on-global-biodiversity-loss-ecosystem-collapse-and-national-security>.

agency is the bigger factor in supporting geopolitical equity – as a state has sovereignty over its own territorial natural resources, including water, and governs those resources according to its own principles and goals. The political economies of water-stressed exporting regions will thus continue to be the principal factor shaping outcomes, although choices by importing states, foreign companies and investors will have a supporting impact. In short, the futures outlined here do not absolve consumer economies of responsibility, but nor do they assume that water insecurity can be resolved through external pressure and demand adjustments alone.

The broader implication is that future cooperation on water security will look markedly different from the norm-driven multilateralism of the 2010s. Action is more likely where water risk is made visible as a constraint on economic stability, supply-chain resilience and long-term economic growth.

Figure 3. Water risk and policy coordination under different scenarios of international coordination or geopolitical fragmentation



Key: blue = resource pressures and governance coordination drivers are more positive; purple = drivers are more negative.

Source: Compiled by the authors.

04

Looking forward – models for more cooperative water governance

Despite the difficulties that beset the multilateral system, action is still possible to improve sustainable water use in international supply chains. Options include expanding plurilateral discussions, exploiting technical forums on narrow areas of mutual interest, and using compliance rules in public procurement to support best practice.

The geopolitical scenarios outlined in Chapter 3 will in part determine how effective trade-related mechanisms are at mitigating water risks. In a context of intensified strategic rivalry, weakening multilateral institutions and growing pressures on regulatory frameworks, broad-based reforms are unlikely to advance. However, targeted interventions – within existing WTO committees, and through plurilateral groupings, bilateral agreements and supply-chain due diligence frameworks – remain politically realistic pathways to strengthening the visibility and management of water risks embedded in global trade.

Pragmatically, the key is to ensure such interventions are compatible, to the extent possible, with countries' sovereign agendas around securing supplies of vital goods. While mitigating water risks, as mentioned, does far more than just benefit the environment and local communities, committed political and corporate action is nonetheless more likely where such measures visibly and explicitly reinforce supply-chain resilience and security.

Policy recommendations

To this end, this chapter presents recommendations in 10 principal areas for increasing cooperation on sustainable water use in supply chains. Our recommendations target a combination of governments, policymakers, international institutions, corporations, financial institutions and CSOs. All of these constituencies have roles to play – individually and collaboratively – in addressing the challenges this paper has outlined. The measures we propose are as follows:

1. Expand plurilateral trade discussions such as the TESSD

Plurilateral trade discussions should explicitly address, through relevant committees, the trade of embedded water. One possibility is to expand existing initiatives – involving smaller groups of committed WTO members – that have been established to further discussion amid the lack of progress on binding agreements on trade and the environment at the WTO. These arrangements include the Trade and Environmental Sustainability Structured Discussions (TESSD),⁷² which provide a platform for discussing (a) trade-related environment and climate measures and (b) best practice for aligning trade with environmental sustainability. TESSD participants have recently begun to explore water issues, and a related environmental goods and services (EGS) working group discussed water supply and wastewater management at meetings in 2024.

Progress within the TESSD's EGS working group on water issues would support further multilateral action. This could enable countries to identify consensus-based approaches for removing barriers to the adoption of technologies that can improve sustainable use of water in the production of traded goods. Progress could also serve as a basis for addressing risks related to embedded water in global supply chains in WTO-compatible ways.

2. Leverage multilateral WTO technical committees and processes

The founding principles of the WTO allow consideration of environmental issues such as water use in setting trade rules. Article XX of the General Agreement on Tariffs and Trade (GATT) permits tailored measures, such as standards and testing of products, where these are necessary to protect human, animal or plant life or to conserve 'exhaustible natural resources', including freshwater.⁷³ However, in the current geopolitical environment, the WTO is gridlocked and any progress on rules and standards is slow. Competitiveness concerns, accusations of 'green protectionism'⁷⁴ and great power rivalry limit the scope for new rule-making.

To address this, governments could promote more sustainable water use through channels such as the WTO's Committee on Trade and Environment (CTE). While progress has been limited due to fears of green protectionism, specific technical discussions are still possible. These are most viable when focused on liberalizing

⁷² World Trade Organization (undated), 'Trade and environmental sustainability', https://www.wto.org/english/tratop_e/tessd_e/tessd_e.htm.

⁷³ World Trade Organization (undated), 'WTO rules and environmental policies: GATT exceptions', https://www.wto.org/english/tratop_e/envir_e/envt_rules_exceptions_e.htm.

⁷⁴ Where countries use trade policies such as tariffs or subsidies that benefit domestic producers to promote environmental goals such as reducing carbon emissions.

trade in a narrow set of water-relevant technologies – such as precision irrigation, wastewater treatment and monitoring systems – where there is shared interest in reducing supply-chain vulnerability and where geopolitical sensitivities are low.

There is also potential to integrate water considerations into the WTO's Technical Barriers to Trade (TBT) discussions. The aim of these discussions is to remove tariffs and quotas, thereby allowing wider access to water-related technologies that can improve water management and reduce water use in the production of traded goods. However, negotiations on so-called 'environmental goods' – which can include wastewater management and water treatment technologies – stalled in 2016 and have not been restarted. The negotiations were initiated with the rationale that lowering trade-related barriers can help countries to deal with water scarcity. But geopolitical tensions and the limited capacity of many low-income countries impeded engagement with the TBT process.⁷⁵

That said, there remains potential to revive cooperation through the TBT Committee (which oversees the WTO's TBT Agreement) and/or plurilateral mechanisms, particularly where a small group of countries shares exposure to water risk in specific value chains. The TBT Agreement also encourages members to use international standards and support developing-country compliance, a principle that could be operationalized for water treatment, monitoring and circular water-use technologies.

3. Strengthen water provisions in existing and future trade agreements

Bilateral and regional trade agreements increasingly include sustainability provisions, albeit with limited and variable coverage of water use. The political space for ambitious new provisions is constrained by current geopolitical dynamics. However, there remains scope for trading partners to strengthen explicit virtual water provisions in the environmental chapters of existing and future bilateral and regional trade agreements.

There remains scope for trading partners to strengthen explicit virtual water provisions in the environmental chapters of existing and future bilateral and regional trade agreements.

For instance, the EU has demonstrated an interest in including sustainability provisions in its trade agreements. Its required trade and sustainable development chapters and sustainability impact assessments (SIAs) could, in principle, offer a route to integrating upstream water risks and impacts. New SIAs should propose measures to deal with identified water risks, as was the case in the 2022 UK–New

⁷⁵ Reinsch, W. A., Benson, E. and Puga, C. (2021), *Environmental Goods Agreement: A New Frontier or an Old Stalemate?*, Washington, DC: Center for Strategic and International Studies, <https://www.csis.org/analysis/environmental-goods-agreement-new-frontier-or-old-stalemate>.

Zealand free-trade agreement (FTA), which incorporated dispute settlement provisions on environmental issues, including those relevant to water such as forestry and fisheries.

However, SIAs often omit key sectors for water sustainability such as agriculture. In addition, policies need to be enforced to drive real change in practice, otherwise there is little point in having the provision in the first place. The UK is increasingly incorporating environmental stipulations into its post-Brexit trade deals, though the strength and enforceability of these provisions remain uneven.

4. Enhance support for supply-chain due diligence regulations

In addition to international trade rules established with or governed by the WTO, in recent years a growing number of trade-related due diligence measures have been introduced to support sustainability. These mechanisms remain important tools, even as geopolitical pressures reshape their scope and ambition.

The EU, for example, has developed a number of regulations as part of the European Green Deal (see also Chapter 3). These include the CSRD, CSDDD, the Regulation on Deforestation-Free Products (EUDR) and the EU Sustainable Batteries Regulation. These frameworks provide potential leverage on companies to address water risk throughout their supply chains, but the effectiveness of such mechanisms is increasingly restricted by political pushback and regulatory recalibration.

Relevant EU supply-chain regulations still serve as an important framework, nonetheless. They have the potential to increase recognition of the role of embedded water in international trade. They stipulate that significant water impacts must be reported. However, the weakening of the European Sustainability Reporting Standards has made water reporting voluntary unless companies deem it necessary, raising risks of inconsistency and selective disclosure.

The EUDR requires importers of key commodities into the EU to prove compliance with country-of-origin laws, including human rights provisions. As deforestation is directly linked to reduced water security through groundwater depletion and negative impacts on flood prevention and erosion control, compliance with the EUDR could indirectly improve water sustainability, especially in regions where deforestation drives hydrological stress. The EU Sustainable Batteries Regulation requires OECD-aligned due diligence in relation to the supply of minerals from high-risk regions, and covers environmental risks that include water impacts from extraction and processing.

While the EU is leading the way on sustainability due diligence regulation, other countries including China, Japan and India are also exploring the development of regulations.⁷⁶ However, some countries are concerned that unilateral approaches, whether promoted by one country or a small group of countries, could fail to take on board different perspectives. An initiative launched by the Brazilian government when it hosted the COP30 climate negotiations in Belém in November 2025 could help to address some of these tensions. The initiative, called the Integrated Forum

⁷⁶ amfori (2025), 'How Asia is strengthening ESG due diligence in practice', blog post, 7 July 2025, <https://www.amfori.org/how-is-asia-strengthening-esg-due-diligence-in-practice>.

on Climate Change and Trade (IFCCT), is being promoted as a new, international ‘non-negotiating’ platform. It is designed to bring together government officials from trade and climate domains to bridge the gap between WTO rules and climate change goals. By addressing the intersection of trade and climate policy, the IFCCT could indirectly influence how embedded water is managed and tracked in global supply chains.

5. Leverage national and international standards

International standards can support consensus where there is fragmentation and divergence in understanding across jurisdictions, by providing shared reference frameworks for alignment and conformity in approach. This can then allow for a combination of national and local interpretations of good practice in water use and management to shape context-specific definitions of desirable approaches. One possibility is that governments could regulate the trade of goods to ensure fair and sustainable water usage by referencing international standards that are deemed to be relevant.

Jurisdictional approaches to standards and assurance – particularly those that assess how effectively water is governed at catchment, basin or national scale – require further exploration.⁷⁷ However, a limitation is that operationalizing jurisdictional approaches depends on sufficiently robust traceability to the basin level, which has not yet been achieved. The catchment-level context is particularly crucial for jurisdictional approaches; the use of standards can support geography-based assessments of traded products by attaching catchment-level water outcomes (at the point of production) to products as an assessed attribute. New standards should complement existing standards that are widely considered to be good practice, such as the Alliance for Water Stewardship (AWS) Water Stewardship Standard (current version 3.0).⁷⁸ It serves as a framework for companies to act on water risks, and provides an understanding of the common challenges faced by stakeholders sharing water resources.

Other common product standards that incorporate requirements for fair water usage could also be used to address water sustainability in trade. For example, standards set by the International Organization for Standardization (ISO) are recognized as removing technical barriers to trade, and for making processes, products and services compatible across borders.⁷⁹ The development of ISO standards relies on consensus-based processes; there are currently 175 national standards bodies that can contribute through technical committees to develop and agree ISO standards. Within the WTO’s TBT Committee, there is a higher focus on product standards, as opposed to other standards (e.g. management system standards), as these directly address traded goods.

⁷⁷ An example in the UK context is the Sustainable Water Management (SWM) metric developed by WWF. The metric is designed to assess whether the enabling conditions for sustainability are in place, i.e. whether governance mechanisms are effective at protecting ecosystems and communities through credible environmental flow implementation and management.

⁷⁸ The Alliance for Water Stewardship (AWS) Standard: <https://a4ws.org/aws-standard>.

⁷⁹ International Organization for Standardization (ISO) (undated), ‘ISO and policy makers’, <https://www.iso.org/iso-and-policy-makers.html> (accessed 5 May 2026).

However, there is currently no agreed framework for accounting for and determining when a product's water impacts can be treated as 'trade-relevant' in the same way that greenhouse gas emissions are set out under the Greenhouse Gas Protocol. Because water impacts are inherently context-specific, the water impacts of a given set of practices in one catchment cannot be assumed to be comparable to those in another. This makes the development of indirect water use across an organization's value chain difficult to define and quantify, making fair water footprints conceptually challenging to scale. This is an area that requires continued exploration. A recently launched process to co-develop Corporate Guidance for Assessing Water Scopes 1–3 in Value Chains, creating common terminology and guidance for assessing and addressing water in the value chain, holds promise in this regard.⁸⁰

Existing standards, such as ISO 14046:2014 on water footprints, provide a foundation for the development of comprehensive oversight by considering upstream and downstream processes within defined system boundaries (i.e. establishing the scope to be considered in the assessment). But this approach does not resolve the issue of cross-catchment comparability.

6. Align public procurement with water sustainability goals

Where clear policy objectives exist throughout the governance system, public procurement can provide an opportunity to promote sustainability requirements and monitor compliance. In OECD countries, government procurement accounts for up to 20 per cent of GDP,⁸¹ with some governments using procurement to decarbonize supply chains. An example of this is the UK's Procurement Policy Note system,⁸² under which government departments, executive agencies and public sector bodies procuring goods and/or services with an expected annual value of over £5 million have needed, since 2021, to show evidence of commitment to achieving net zero by 2050 in their UK operations.

Governments could set conditions for procurement that meet well-defined and relevant water standards.

Similar measures could be explored for water use. Governments could set conditions for procurement that meet well-defined and relevant water standards. Conditions could, for instance, require suppliers bidding for government contracts to publish details of their water management practices and organizational commitment to water sustainability. The Global Commission on the Economics of Water (GCEW) has noted that public procurement presents an opportunity

⁸⁰ A process to scope guidance was launched on 30 April 2026: Walker, S., Enright, L., Brill, G. and Morgan, A. (2026), 'Laying the Groundwork to Unleash Water and Climate Resilience Across Value Chains: Water Scopes 1-3', World Resources Institute (WRI), <https://www.wri.org/technical-perspectives/water-scopes-1-3-value-chain-framework> (accessed 5 May 2026).

⁸¹ OurWorldInData (undated), 'Government procurement spending as share of GDP', <https://ourworldindata.org/grapher/government-procurement-share-gdp> (accessed 10 Mar. 2026).

⁸² Cabinet Office (2021), *Procurement Policy Note – Taking Account of Carbon Reduction Plans in the procurement of major government contracts*, PPN 06/21, https://assets.publishing.service.gov.uk/media/62066d5ae90e077f7dec749e/PPN-0621-Taking-account-of-Carbon-Reduction-Plans-Jan22__1_.pdf.

to explore demand-side policies.⁸³ Governments could require water footprint disclosures from vendors, only buying from those who meet sustainability standards, or could prioritize cutting-edge water-saving technology such as water-recycling systems.

However, as product standards alone can be a weak proxy for sustainability, it is important to link these requirements to where, not just how, products are made. Here, WTO principles of non-discrimination can be explored: for instance, using tiered obligations on importers and targeted incentives.

7. Improve cross-government and inter-government regulatory cooperation

Governments should recognize water stress abroad (*vis-à-vis* supply chains for food, raw materials and critical manufactured goods) as structural risks to their own economic development, food security and trade strategies. Acting on these risks, and investing in water resilience broadly, is an issue of national self-interest that requires a joined-up approach to policy development across government. It entails bringing together finance, environment, trade and relevant sector ministries (e.g. for agriculture or industrial development).

In addition to cooperation *between* domestic government agencies and departments, multilateral trade-related initiatives such as the IFCCT (described above) offer a forum for consumer- and producer-country governments to build consensus on trade-related measures on embedded water.

Food security is increasingly a strategic vulnerability for states. The UK government should set an example to similar countries with significant external water footprints by setting mandatory traceability and data standards for international sourcing (e.g. geolocation of production volumes to production landscape/basin), requiring aggregated reporting to assess system-level exposure and intervening where risks arise. Consumer governments, with relevant national industry partners, have a major role to play in managing demand for food in ways that are appropriate for national and regional contexts.

For producer and consumer governments, where there are significant trade flows of embedded water (e.g. from Spain to the UK for fruits and vegetables), and where there is interest to collaborate bilaterally, alignment can take place through the mutual endorsement of principles such as those in the Declaration for Fair Water Footprints. Alliances can also be cultivated through national initiatives taken by a producer or consumer country.⁸⁴ In the UK, implementation of the WRAP Water Roadmap⁸⁵ should be strengthened in relation to food and drink supply chains, with joint programmes of work specifying the action needed where risks have been identified.

⁸³ Global Commission on the Economics of Water (2024), *The Economics of Water: Valuing the Hydrological Cycle as a Global Common Good*, <https://economicsofwater.watercommission.org/report/economics-of-water.pdf>.

⁸⁴ An example of a national platform in Spain is FIAB (*Federacion Espanola Industrias de la Alimentacion y Bebidas*).

⁸⁵ WRAP (undated), 'UK Food and Drink Pact: The Water Roadmap', <https://www.wrap.ngo/take-action/uk-food-drink-pact/water-roadmap>.

Where there is interest but perhaps not the capacity to cooperate bilaterally, consumer countries should provide compliance support to producer countries that seek to enact regulations on sustainable water use. This is important for low-income, water-stressed producer countries that might otherwise respond to tighter regulation by redirecting their exports to markets with less stringent sustainability requirements – a shift that would result in further environmental damage domestically and potentially interrupt the supply of critical materials and goods in consumer countries.

Research also indicates that the burden of compliance costs falls most on primary producers.⁸⁶ Joint research through national universities and institutions, for instance using the OECD's 'Co-operative Research Programme: Sustainable Agriculture and Food Systems',⁸⁷ could support more informed policy decisions by public sector actors. Other sectoral partners (e.g. agriculture and water operators, as well as national or local CSOs) could join capacity-building efforts to transfer innovations and technology and share best practice.

In recognition of the geopolitical and environmental risks of dependency for critical inputs or supplies on states that are experiencing water stress, governments should develop regulation to boost their own national resilience and diversify the supplies of critical raw materials. For example, the EU's Critical Raw Materials Act (2023) stipulates that no more than 65 per cent of any key raw material should come from any single country.⁸⁸ Such regulations could lead to less concentrated water stress hotspots.

By including virtual water in wider natural resource strategies, governments will be able to make more informed decisions, better assess hidden water dependencies embedded in trade and production systems, strengthen resource security planning, and anticipate cross-border water risks. Attention should focus, in particular, on significant international flows of virtual water, so that policymakers can identify hotspots of water use associated with the production of raw materials and goods. Virtual water should be part of the agenda at the International Resources Panel, through its Global Resources Outlook (GRO); and for any potential International Materials Agency, the establishment of which is increasingly being called for as a means of addressing concerns over rising global competition for critical minerals.⁸⁹

8. Adopt and scale supply-chain best practice at business level

Corporations should implement requirements around water availability, basin-level stress and local governance capacity into their procurement, supplier selection and investment decisions. By doing so, they can anticipate production disruptions, evaluate alternative sourcing options where needed, and strengthen long-term supply-chain resilience.

⁸⁶ Guarín, A. et al. (2022), *Taking stock of smallholder inclusion in modern value chains: ambitions, reality and signs of change*, working paper, International Institute for Environment and Development, <https://www.iied.org/21086iied>.

⁸⁷ OECD (undated), 'Co-operative Research Programme: Sustainable Agriculture and Food Systems', <https://www.oecd.org/en/about/programmes/co-operative-research-programme>.

⁸⁸ European Commission (undated), 'European Critical Raw Materials Act', https://commission.europa.eu/topics/competitiveness/green-deal-industrial-plan/european-critical-raw-materials-act_en.

⁸⁹ Schröder, P. (2025), 'Rich Countries Stockpiling Critical Minerals Is Not a Plan', *Foreign Policy*, 15 July 2025, <https://foreignpolicy.com/2025/07/15/critical-minerals-governance-body-treaty>.

To achieve this, companies should ensure the traceability of the materials they use and treat supply chains as a means of leverage for promoting collective water stewardship. By coordinating with suppliers and local communities – including through co-financing of shared infrastructure, monitoring systems and ecosystem restoration – companies can reduce basin-level risks which they would be unable to address alone. Coalitions of buyers, producers and CSOs that are aligned on the issues could help to offset the effects of geopolitical fragmentation by developing practical methods between themselves to address water risks collectively and improve basin-level governance.

It is important that companies avoid opportunistic strategies that may worsen water impacts elsewhere.

It is important that companies avoid opportunistic strategies that may worsen water impacts elsewhere. While such strategies may secure short-term supply, they are likely to heighten local conflict in producer countries, undermine ecosystem health in those countries, and also erode the long-term operational resilience of the firms involved. The most environmentally and economically sustainable approach for companies is to pursue shared-benefit water strategies that respect both other water stakeholders and ecological boundaries.

Companies can offer training, financial support and technological assistance to help suppliers meet due diligence requirements and avoid exclusion from global value chains, and to strengthen upstream resilience where governance capacity is weak. Public reporting of water withdrawals, wastewater discharges, and broader water dependencies and impacts along the value chain would improve investor confidence, enable better risk evaluation and provide a model for good practice in transparency.

Companies can also support public sector efforts to align with national or regional water resilience strategies and targets. Where producer-country governments have developed water resilience plans or water allocation reforms, companies should harmonize their own operations with government practice.

9. Promote disclosure of water risks across financial portfolios

Financial institutions can improve the resilience of their investment portfolios by explicitly treating water stress as a material factor in financial analysis and decision-making. Integrating water risk and resilience metrics into credit assessments, loan terms and risk-pricing models would enable financial institutions to anticipate disruptions in exposed sectors and strengthen portfolio-wide resilience. It may also be helpful to integrate metrics on water stress into scenario analysis, stress testing and prudential supervision.

By engaging the companies that populate their portfolios – particularly in high-impact, high-risk sectors – financial institutions can use environmental stewardship to raise investor expectations of best practice in water-intensive value chains. This could support improved water governance and resilience outcomes, as well as materially strengthening investment risk mitigation.

Financial institutions can also support compliance and capacity-building for producers in water-stressed, low-income regions. Providing transition finance, blended-finance instruments and technical assistance could help producers meet due diligence requirements and avoid exclusion from global markets; this could strengthen upstream resilience where governance capacity is weak. Options to achieve this could include financing wastewater treatment, water-recycling technologies, circular water-use systems and catchment-level resilience projects; such measures could help to reduce systemic water risk in producer regions and protect the long-term financial performance of investments.

Financial institutions can also promote the disclosure of basin-level risks, water dependencies and mitigation strategies to improve the consistency and reliability of financial analysis, risk evaluation and market information.

10. Use CSOs for evidence-building, compliance monitoring and community inclusion

The Glasgow Declaration for Fair Water Footprints provides an opportunity for civil society organizations (CSOs) working on water security and social justice to gain access to technical and peer support from other parties to the underlying initiative. By signing up to the declaration, CSOs could gain a role in coalition-building at the national and local levels, and would more easily be able to demonstrate what is required for a ‘just transition’ to water security.

By providing evidence, monitoring operations and supporting inclusive stakeholder engagement, CSOs can help to connect understanding of upstream impacts with downstream decision-making. Special attention should be given to marginalized groups such as women, people with disabilities, and ethnic minorities. CSOs can thereby promote mechanisms that encourage a ‘race to the top’ in terms of sound water management practices and accountability. Specific work in this area could involve bringing legal cases, leveraging OECD complaints procedures,⁹⁰ or using frameworks such as the Access to Justice in Environmental Matters to support inclusion of affected communities. These frameworks enable non-governmental organizations and members of the public to challenge decisions or omissions – whether by public authorities or private entities – that violate environmental laws. Grounded in the Aarhus Convention,⁹¹ this engagement ensures fair, timely and affordable legal review, aiming to protect human health and the environment through enforceable legal mechanisms.

⁹⁰ OECD Watch (undated), ‘The OECD Guidelines and complaints’, <https://www.oecdwatch.org/oecd-ncps/the-oecd-guidelines-for-mnes/what-is-in-the-oecd-guidelines/the-oecd-guidelines-and-complaints>.

⁹¹ UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention). See: United Nations Economic Commission for Europe (undated), ‘Text of the Convention’, <https://unece.org/environment-policy/public-participation/aarhus-convention/text>.

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Making water use in global trade more sustainable

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and equitable way that recognizes both the challenges faced by low-income countries and the implications of the changing global landscape for the trade prospects for those countries. She has contributed to a special edition of *The Progressive Post*, the magazine of the Foundation for European Studies (FEPS), and to the Remaking Global Trade Project, coordinated by Yale University, Tufts University and the University of the West Indies.

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Cover image: A vegetation enhancement and dust mitigation project at Salton Sea lakebed, California, an area believed to hold one of the world's largest reserves of lithium, worth an estimated \$500 billion.

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