Sovereign Sustainability:

Rising Water Pressure

About
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Executive Summary: Liquid Sovereigns?

In this fifth edition of our Sovereign Sustainability results, we once again call on the sub-scores to examine a particular issue across the more than 120 countries we analyse. In previous editions, we have examined the interaction between climate goals and deforestation, climate goals and housing, and rule of law and US elections. With 50% of the citizens around the world going to the polls this year, we assure you that we are incorporating many of the governance elements of our model in our investment and risk analyses.

This year we take a deep dive into water stress and its consequences, a critical component of Natural Capital. Extreme weather events, unprecedented droughts, and water shortages are accelerating. The looming 'Day Zero' in Mexico City when the water taps are expected to run dry illustrates the immediate and profound impact that water scarcity can have on economies and communities.

Our four-pillar Sovereign Sustainability scoring emphasizes Natural Capital. Our model is dynamic, forward-looking, adapted to individual countries, and notably, it can be used to analyse topics across nations and through time. We use our inputs and sub-models to understand the broader implications of water stress, such as the connections between environmental degradation, social and political instability, and economic challenges. Increasing levels of water stress across the globe, and its effects on Human Capital, point to a complex and intertwined web of impacts.

The economic repercussions of water stress are becoming increasingly evident. As water resources dwindle, industries ranging from agriculture to manufacturing face escalating costs, straining productivity and increasing prices for consumers. The accelerating use by and impact on agriculture is particularly concerning. It is through these avenues that water stress has a significant impact on sovereign debt.

Water infrastructure is outdated across the globe, and higher interest rates add to the investment challenges. Developed and emerging nations alike require significant financial investments. In extreme cases, countries may need to allocate substantial portions of their budgets to importing water or building desalination plants, straining public finances and putting pressure on credit ratings. Faced with a pandemic and soaring energy prices, governments deficits ballooned in an attempt to limit the shocks. The 'whatever it costs' approach

during the pandemic has been followed by the 'whatever it costs' approach to protect against surging energy prices[1]. For emerging nations, the situation is more precarious as they may lack the long-term financial resilience to endure such crises, further hindering development.

Climate migration is reshaping political landscapes and societal structures worldwide. The correlation between water scarcity and migration, such as surges from North Africa to Europe, is a clear indicator of the far-reaching consequences of environmental and infrastructure neglect. As nations grapple with migration, it becomes evident that sustainable solutions are not just environmental imperatives but are crucial for global stability and security.

There is a clear need for robust investment in infrastructure and technology. The gaps in water management, especially in rapidly-growing urban areas, require long-term planning and innovative approaches. The need for comprehensive policies and international cooperation cannot be overstated. The first UN Water Conference in a generation, held in May 2023, marked a significant step forward. It must be the beginning of a sustained global effort.

The Candriam Sovereign Sustainability Framework.

Natural Capital is finite. Even regenerative natural resources such as water and forests are limited in the speed and extent to which they can recover. Our model is anchored to this limitation.

Our model is based on the widely-accepted four-pillar sovereign analysis used by the World Bank and others. It differs from most in that we place a limit on Natural Capital.

Our model restricts Natural Capital by using it as a multiplier of the score for each of the other three capitals. The overall sustainability score of a country is the average of the environmentally-efficient Human Capital, Social Capital, and Economic Capital. That is, we average these three, and use our Natural Capital score as a multiplier. Nations are evaluated on the efficiency with which they create well-being in the form of Human, Social, and Economic Capitals, by accounting for potential depletion of or damage to the natural environment the occurs in the creation of this well-being. Our approach aims to make it more difficult for a country score to compensate for environmental damage by creating another form of capital. Scores for expandable forms of capital are weighted by environmental inputs required to create them. We believe this helps address the issues of 'weak' versus 'strong' sustainability.

Our sustainability framework is dynamic, and changes as our understanding of the phenomena we are trying to capture evolves. Sovereign sustainability concepts have often been developed with a one-size-fits-all approach. This has resulted in often static results, which do not accurately reflect the changing circumstances and differing priorities of countries. Our framework evaluates each country depending on its level of development.

We also apply a set of exclusions. We exclude **Oppressive Regimes**, which we calculate using the Freedom House's Freedom in the World Index, World Bank's Voice & Accountability Index, and the Economist Intelligence Unit's Democracy Index. We also exclude all countries on the **Financial Action Task Force's** (FATF) List of High-Risk Jurisdictions subject to a Call for Action, as well as any country classified as Not Free by **Freedom House.** We use these to set minimum standards of democracy, and to exclude countries involved in money laundering and in financing terrorism. Countries present on any of those lists cannot be considered for Article 9 funds.
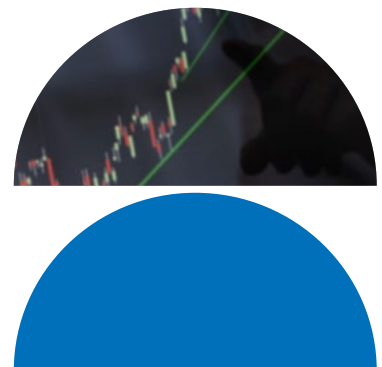
Candriam Sustainability Score:
The Four Capital Pillars

Natural Capital		Human Capital		Social Capital		Economic Capital		Candriam Sustainability Score
	X		+		+		=	
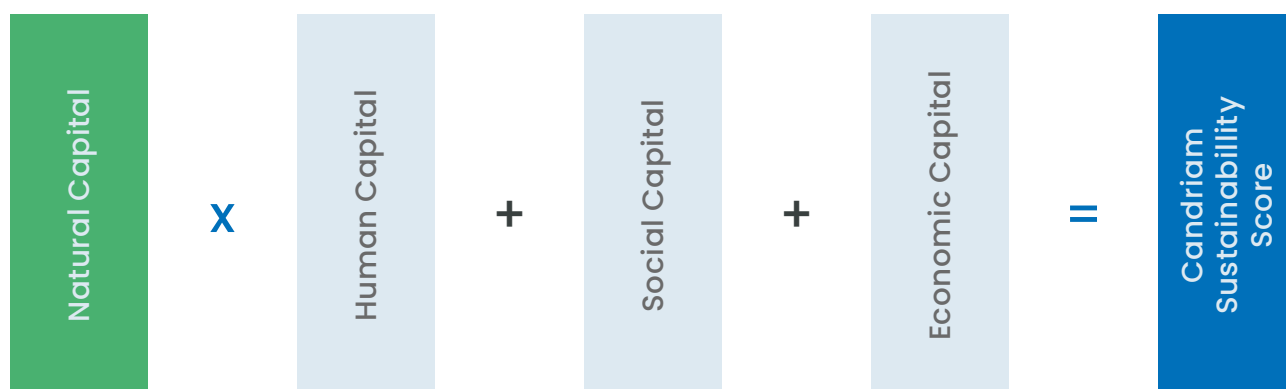
Source: Candriam.

Investment
performance?

Does a sustainable universe affect returns? Specifically, does a reduced universe necessarily sacrifice returns?

Our Candriam Solutions Development Team compared the credit spread return performance of our eligible emerging markets sustainable sovereign universe (based on Candriam's sovereign sustainability framework) with the broader JP Morgan Emerging Markets Bond Index Global Diversified™ index (EMBIGD). The spread return is calculated by the index provider, JP Morgan.

Our backtesting showed that the eligible sustainable universe, updated every year, would have outperformed the reference index by an annualised rate of 3 bps between April 2013 and July 2024 (that is, the full horizon of our traceable Candriam sovereign sustainability analysis). Further, many of the securities of excluded countries issue were riskier, as measured by their higher yields. This demonstrates over the medium term, higher yield did not translate to superior credit spread return within the EMBIGD universe.

Performance of EM Index vs Candriam Sustainable Eligible Universe
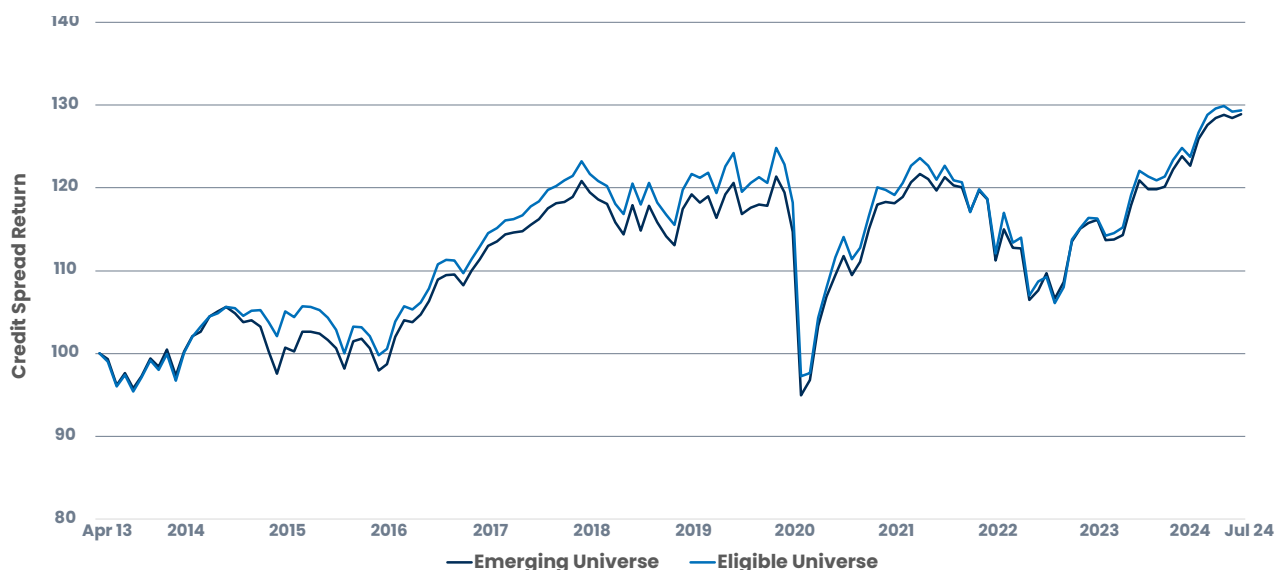
The scenarios presented are an estimate of past performance based on evidence from the past on how the value of this investment varies, and or current market conditions and are not exact indicators. Past performance is not a reliable indicator of future performance. Markets could develop very differently in the future.

Source: JP Morgan, Bloomberg, Candriam

Further analysis using the same comparison of universes, but applying an equally-weighted country approach, were more significant. This approach attempts to neutralise the influence of larger issuers that dominate traditional benchmarks. The eligible universe gained an additional annualised 41 bps over the benchmark under this construction.

In our view, the robust performance of this sustainable universe versus the broader benchmark supports our view that the selective exclusion of sovereigns where sustainability risks are underpriced, but materialise over time, can augment long-term performance.

These findings suggest that our positive screening not only aligns with sustainable goals but also can deliver superior financial performance over the medium term. When actively managed, we aim to add to performance of the sustainable universe through active management, further fundamental analysis and assessment of economic trends.

Natural Capital: Water stress.

The state of water resources is possibly the most urgent major threat to sustainability, as projected by our framework. Water availability has impacts on all capital pillars. Certainly the **greenhouse gases** we are emitting is our greatest long-term sustainability problem, but the **full impact will only be felt in 2030-2050,** while we sit like the proverbial frog in a gradually heating pot. **Deforestation,** is another major issue. (We addressed this in prior reports, including our November 2021 Sovereign Sustainability white paper, _Is the EU on Track for 2050?_) Forests absorb CO_2 from the atmosphere, provide vital ecosystems that are key to food chains, and help control the water cycle.

About half of the world's population experienced water scarcity for at least a part of the year in 2022 (the most recent comprehensive data available). A quarter experienced severe water stress, meaning that they used more than 80% of the available fresh water [II]. Population growth does not appear to be the main problem, as the countries with the most rapid growth are not the ones experiencing the most stress. Yet in low- and low-middle-income countries, 70-80% of jobs are water dependent (mostly in agriculture and industry)[III].

Cape Town, South Africa was the early warning of our water future. In late 2017, the city expected a 'Day Zero' by May 2018, when it would be completely out of water. [IV] While not the first water crisis in human civilization, this time studies from Stanford University and The National Oceanic and Atmospheric Administration (NOAA) show the overwhelming role of human activity in the crisis[V].

The 22 million people in Mexico City have long faced water scarcity, but high temperatures, low rainfall, deforestation, real estate development, and poor infrastructure are exacerbating the problem. Mexico City's looming 'Day Zero' has been a decade in the making through overuse of and lack of investment in infrastructure. Lower-income neighbourhoods are experiencing severe shortages, while condo expenses in wealthier neighbourhoods have risen 30% just to cover increased water costs.[VI]

The interlinkage is clear. Environmental issues, especially water, were central to Mexico's June

2024 election of President Claudia Sheinbaum, a climate scientist who won 60% of the vote[VII]. Polls showed water as the most important political issue – just behind corruption, security, violence and cartels.

The Persian Gulf region is experiencing a rising number of extreme weather events and flash floods. In April 2024, several Persian Gulf states recorded nearly a year's worth of rain in one day in 2024, causing floods, deaths, and hundreds of millions of dollars in damages and other economic costs[VIII].

The much lusher European continent experienced its worst drought for 500 years in 2022, according to Copernicus, the EU's Earth observation programme. A quarter of the area was simultaneously in an Alert category.

The issue is finally garnering notice, with the first UN Water conference in a generation held in 2023.

Figure 2 :

Global uses of water throughout the 20th century[IX]
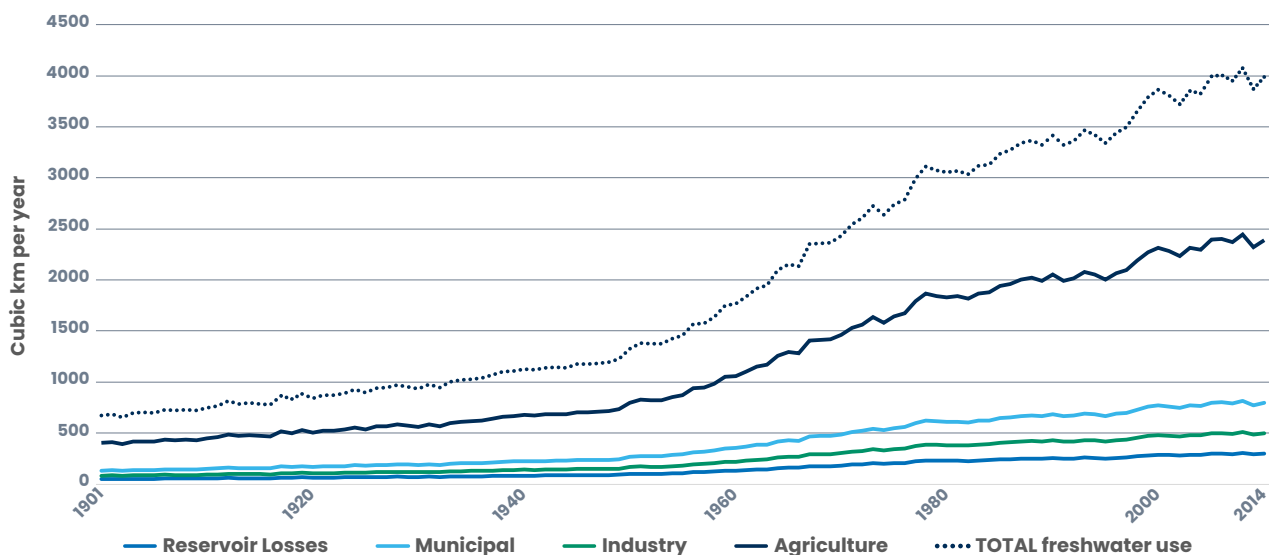
Source: FAO, Candriam

Insufficient water availability is a dynamic phenomenon. Some areas are experiencing water stress because too high a proportion of their available resources have already been allocated and water withdrawals are too high for the system. Others experience torrential rains and floods. Some suffer from both.

Water Crises:
What does the Future Hold?

Climate change will exacerbate water availability problems. Precipitation is becoming increasingly unpredictable (key for agriculture), while rising temperatures and sea levels prevent the formation of mountain glaciers (affecting rivers) and affect evaporation after a rainfall. Existing water pressure is likely to accelerate.

Figure 3 :

Number of people impacted by drought globally, average per decade[x]

Population in millions
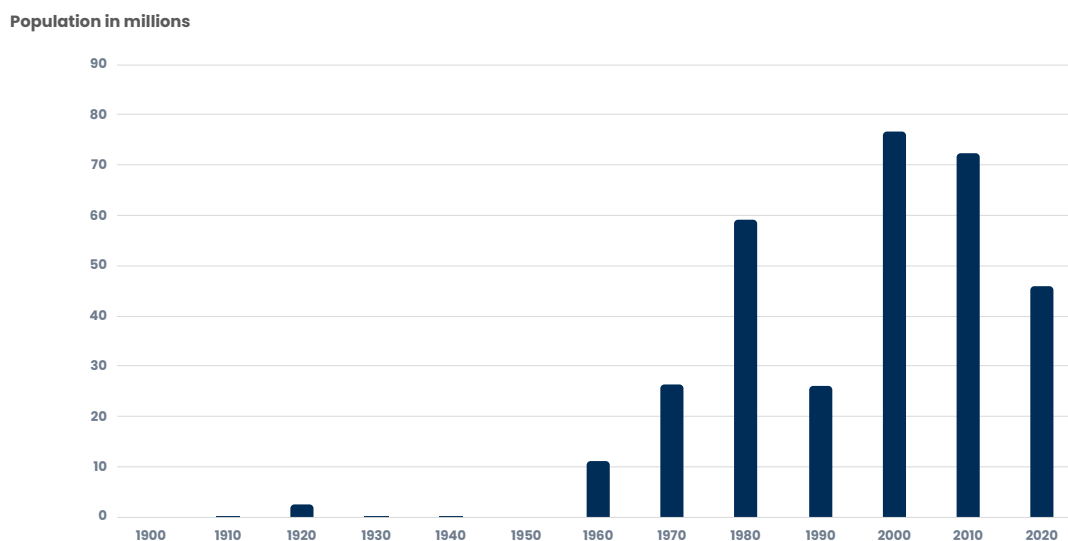
Source: Our World in Data, Candriam. Decade '2020' is for 2020 through 2023.

Our framework differentiates between **Water Stress** (more volatile and occurring today) and **Water Vulnerability** (the influence of climate change on available water region). Figure 4 shows some particular examples.

Figure 4 :
Water crises today and tomorrow
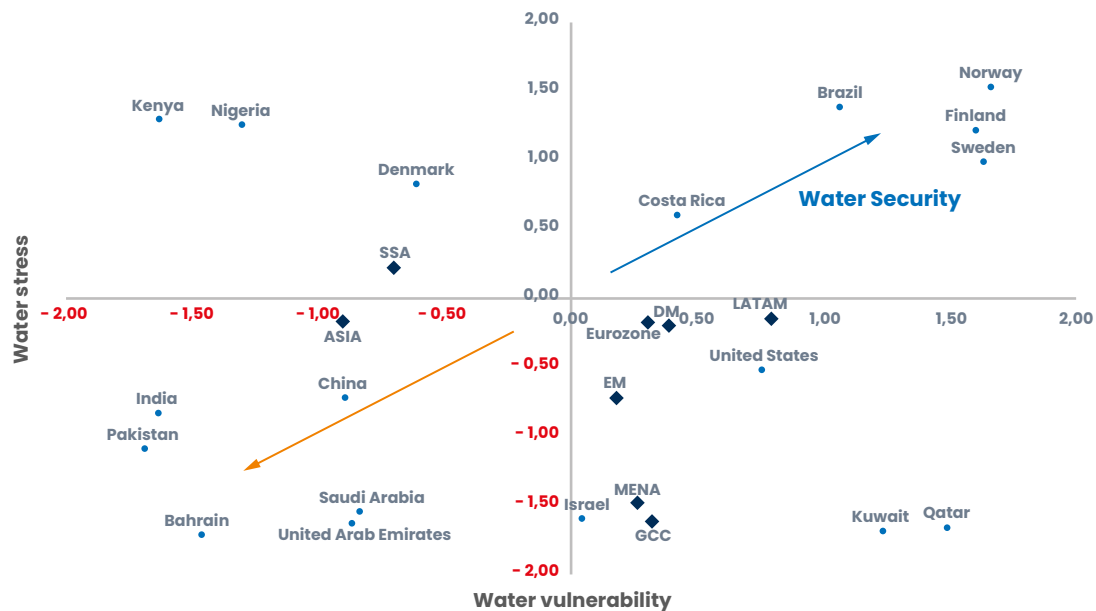
With Water Vulnerability and Water Stress shown as Z scores (the number of standard deviations away from the mean) of our scaled Sovereign Sustainability model results. Higher scores are better.
Source: Candriam, University of Notre Dame, Verisk Maplecroft

MENA (Middle East and North Africa) and GCC (Gulf Cooperation Council) are experiencing high levels of current Water Stress currently, but climate change should not change the situation much, so their Water Vulnerability is about average. Within these regions, Bahrain, the UAE, and Saudi Arabia are all vulnerable to worsening conditions caused by climate change, while Israel has average exposure to climate change. Kuwait and Qatar are currently less vulnerable.

Asia in aggregate is experiencing slightly above-average Water Stress today, but climate change will likely make the region very vulnerable in future. This especially worrisome for India, China and Pakistan. Although population growth has slowed, an enormous number of inhabitants will be exposed to rising water scarcity.

Despite its recent severe drought, the situation in Euro Area is relatively benign. Other developed countries, and Latin America, are also in reasonable shape in comparison to much of the developing world. This might cause lack of attention to the potential problems in most developed countries, and could become another potential source of political conflict in the future.

Water
Pollution

According to the UN World Water Development Report, the threat to water quality in low- and middle-income countries stems from insufficient wastewater treatment (from both residential and industrial sources), while in developed countries the biggest problem is runoff from agricultural activity[XI]. Contamination of underground aquifers reduces water quality in reservoirs. Another infrastructure problem is maintenance. A significant amount of the available water is lost to pipe leakage due to rapidly-ageing infrastructure in most nations, of any income level.

Figure 5 :
Water pollution lessens availability of clean water
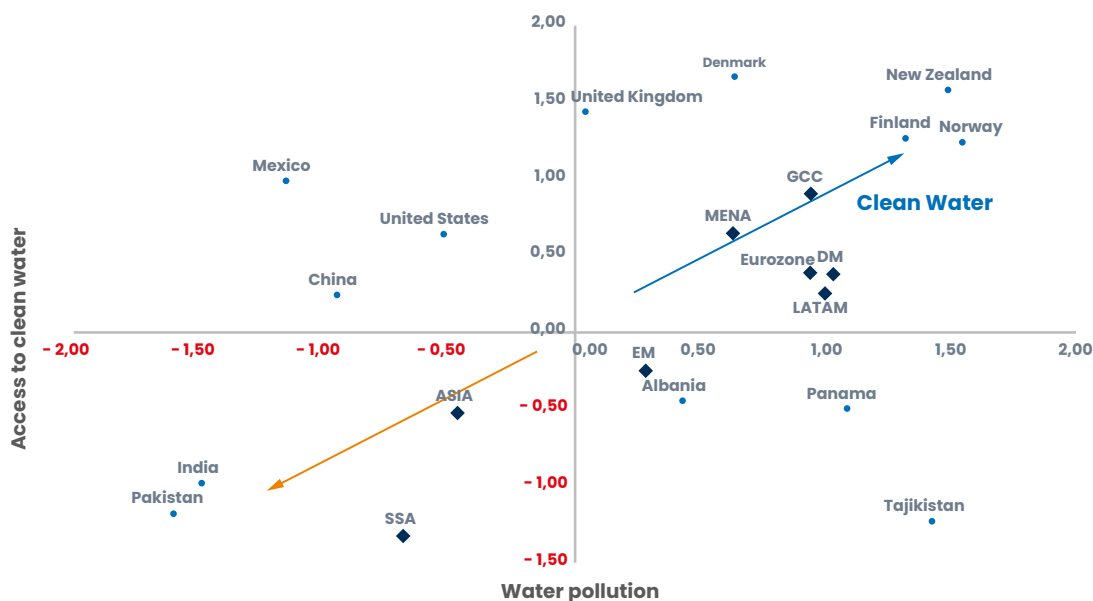
Water Pollution and Access to Clean Water shown as Z scores of our scaled Sovereign Sustainability model results. Higher scores are better.
Source: Candriam, World Bank, Verisk Maplecroft

While Sub-Saharan Africa (SSA) is not currently experiencing significant problems with water availability, the SSA suffers from high water pollution and low access for its population, along with potential Water Vulnerability from climate change. Asia has better access, but high levels of water pollution, may exacerbate medium-term risks from climate change.

India and Pakistan are of particular concern. The combination of insufficient access, high pollution, current Water Stress and the likelihood of worsening conditions in the future – that is, Water Vulnerability –– paint a grim picture for one of the most populous regions in the world.

The Interplay of Water and Deforestation

Deforestation disrupts the water cycle, increases surface runoff and soil erosion, and reduces water retention. It interferes with the recharging of groundwater aquifers and other stores (eg, reservoirs). The transpiration of trees releases moisture into the atmosphere, contributing to cloud formation and precipitation. Interrupting this balance and exposing soil reduces rainfall, increases evaporation, and leads to water stress.

A concentrated group of MENA and GCC countries achieve good model scores for deforestation but very poor scores for water stress. Why this apparent contradiction? Desertification is already underway, taking a considerable toll on water availability. Nations which are risking their water security through deforestation can be seen in the bottom left quadrant of Figure 6. And not just drinking water -- in China, half of the major cities are sinking because of the depletion of ground water[XII]. As regions, Asia and LatAm face the highest risk, particularly Mexico, India, and Spain. The US also stands out.

Figure 6 :
Deforestation links to water stress
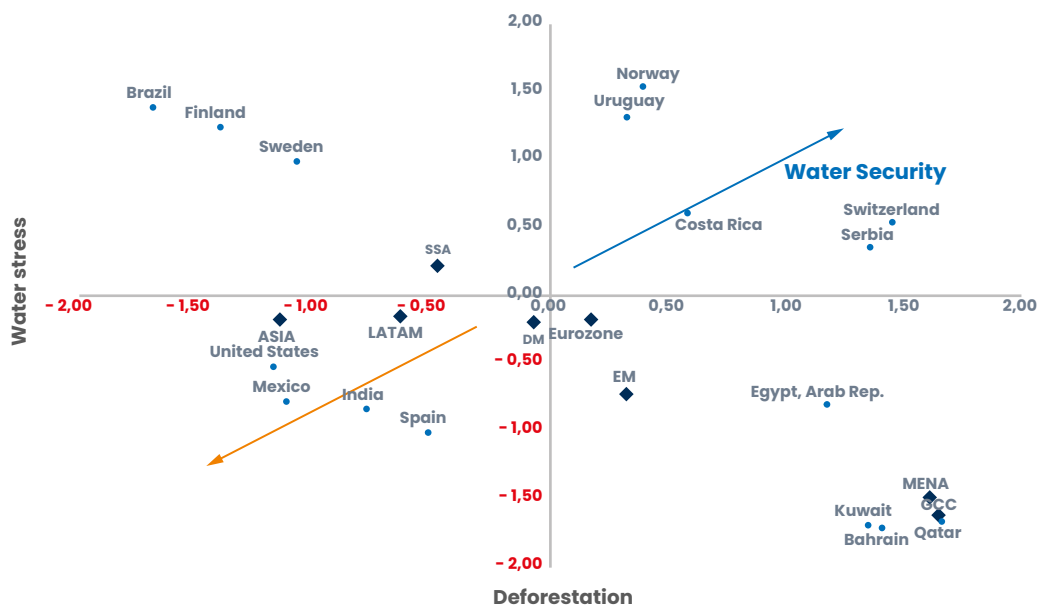
Deforestation and Water Stress are shown as Z scores of our scaled Sovereign Sustainability model results. Higher scores are better.
Source: Candriam, Verisk Maplecroft

The Mexico City 'Day Zero' scenario for a complete failure of municipal water is part of a national problem. Real estate development, infrastructure and coffee cultivation have accelerated deforestation, putting pressure on underground aquifers, increasing the vulnerability of the agricultural population, and triggering a negative feedback loop. The nation of Mexico has warmed by 1.5 degrees since pre-industrial times, while the large urbanised area of Mexico City has experienced warming around 3-4 degrees[XIII]. The city is sinking significantly.
Solutions must be both local, and large-scale.

With Crisis
comes opportunity?

Investors may find opportunities in both sovereigns and corporates as they realise efficiencies, benefit from infrastructure, or develop new products and services offerings in the clean water delivery chain. Resilience will be crucial to the integrity of global supply chains for agricultural goods, energy production, and many other sectors.
With unequal geographical distribution of the problem, opportunities are also unequal. The non-profit CDP (formerly the Carbon Disclosure Project) asks companies to describe opportunities they see in building resilience and developing their businesses in the face of water change. A multitude of opportunities identified are in Asia and Africa, which offer the highest potential mitigation for the lowest potential cost.

Figure 7 :
Potential financial impact of water risk and cost of response per region[XIV]

■ Maximum Potential Financial Impact (US$ billions) ■ Cost of Response (US$ billions)
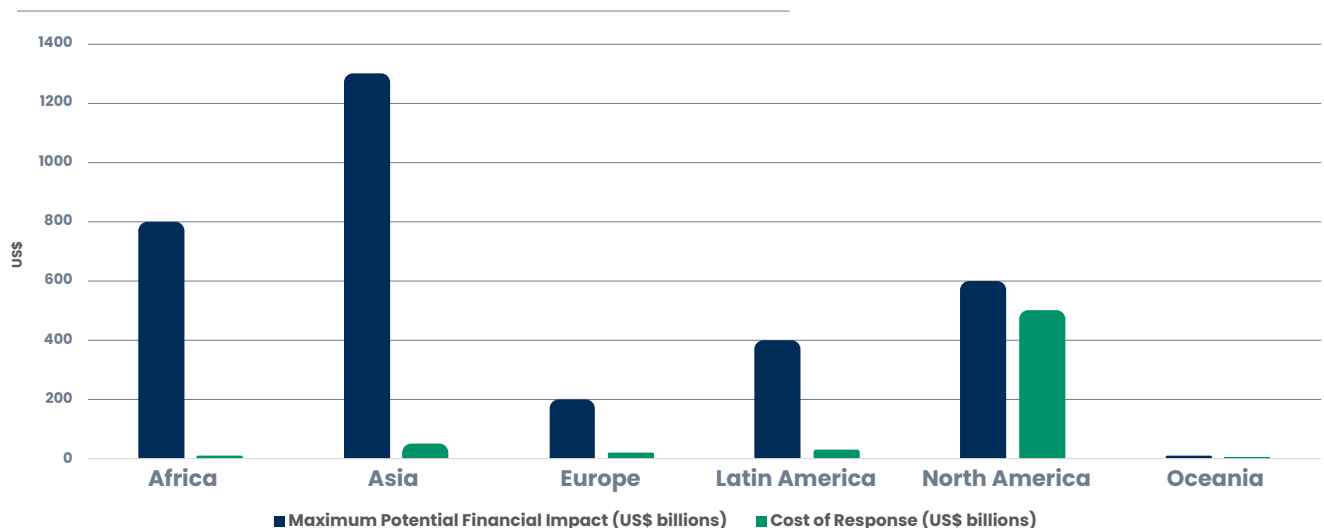
Source: CDP Global Water Report

Figure 8 :

Potential financial impact of water risk and cost of response by industry [xv]

■ Maximum Potential Financial Impact (US$ billions) ■ Cost of Response (US$ billions)
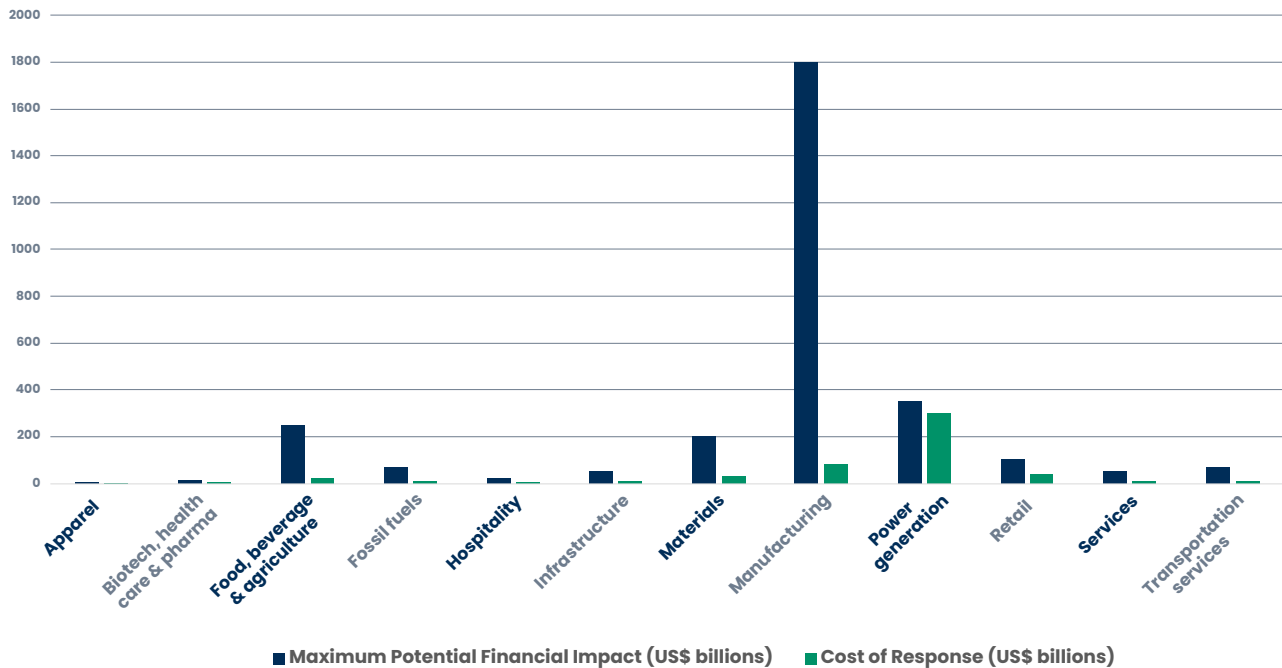
Source: CDP Global Water Report

Leaders
and laggards

Denmark, Switzerland, Sweden, Luxembourg, and Finland consistently emerge as the overall leaders in Natural Capital. Amongst the EMs, Uruguay, Costa Rica, Croatia and Chile stand out as top performers. However, China ranks 76th struggling particularly in carbon intensity and water pollution. Coal and oil contribute significantly to China's energy supply, while the dumping of toxic human and industrial waste has to the groundwater contamination of 90% of Chinese cities[xvi]. Amongst DMs, the United States ranks 38th, scoring below the DM average.

By peer group, the Eurozone and OECD countries achieve the best scores on this pillar. The GCC countries, while amongst the worst performing, show a slightly positive trend. LatAm and Central American countries are experiencing the most significant negative shifts. Amongst individual countries, Lebanon, Paraguay, and Venezuela are trending notably downwards, reflecting broader regional challenges.

Human Capital: Agriculture.

Food security is increasingly critical as global populations grow, climate change affects crop yields, and geopolitical tensions disrupt supply chains. The war in Ukraine brought the world's attention to the fragility of the global food system. Food inflation can increase economic instability and inequality, and strain on public assistance programs. Education, a crucial pathway out of poverty, is hindered by a lack of basic needs such as access to clean water. Around the world, children spend a combined total of 200 million hours each day collecting water[XVII], detracting from their education. Water scarcity exacerbates gender inequality, as women and girls are more likely to be tasked with collecting water for their families. These are key inputs in our Human Capital pillar.

Water availability and quality directly influence agricultural productivity and food security. Yet agriculture is by far the largest user of water,

accounting for over 70% of water withdrawals in 2020, as well as the fastest-growing major category (Figures 2 and 10). Irrigated agriculture supports about 40% of the world's food production[XVIII]. Water stress can limit the range of crops available, reducing diet variety and nutritional quality, and leading to malnutrition.

Socially, severe water stress can lead to migration from rural to urban areas or across borders, as people seek better living conditions, and competition over scarce water resources can exacerbate conflicts, both within and between communities and countries.

Figure 9 illustrates the relationship between model scores of water stress risk to rainfed land (where higher scores are better) (x-axis) and employment in agriculture (y-axis), highlighting countries most exposed to these risks.

Figure 9 :
Water stress risk of rainfed land vs employment in agriculture
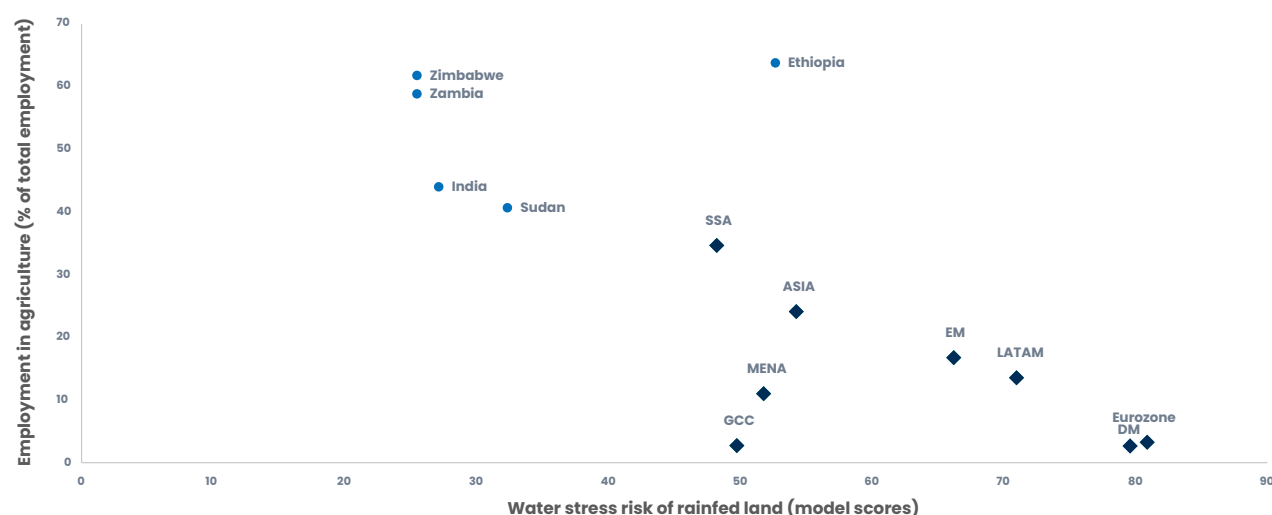
Source: Candriam, World Bank, Aqueduct

The relationship between water stress and employment shows the highest risk in countries such as India, Zimbabwe and Zambia. A highly agricultural economy implies a certain level of subsistence farming, where drought directly translates to hunger. Where agricultural production is exported, consequences include both loss of export revenue and increased domestic food prices.

With **Zambia's** highly agricultural workforce and risk of water stress, the current drought is driving food inflation to 16.2%[XIX], with overall inflation at 14.7% and rising. Drought has been a major variable in growth projections affecting the restructuring of Zambia's debt. In India, 80% of farmers are smallholder farmers of ten hectares[XX] or less. They are unable to invest in improved water management, exposing themselves to the increasingly severe climate risk and Water Vulnerability. The impacts of income inequality and food insecurity extend to politics. Farmers' discontent with Prime Minister Modi contributed to the loss of the parliamentary majority for the Bharatiya Janata Party in the 2024 elections.

In **Ethiopia,** with more than 60% of workers employed in the agricultural sector, water scarcity threatens the foundation of the economy. Drought and ethnic conflicts have pushed food inflation in Ethiopia to 30% year-on-year – and food is 53.5% of Ethiopia's CPI basket[XXI]. The Grand Ethiopian Renaissance Dam (GERD) on the Blue Nile river, a massive project to store water and generate electricity, endangers the water supply of downstream countries. It effectively exports the issue to Egypt and Sudan, potentially raising geopolitical tension.

The **developed world's** dietary preferences contributes to global food security issues, as eggs, dairy, and particularly beef are water-intensive product (Figure 10). In **emerging markets,** consumption of meat and other water-intensive products increases as GDP per capita grows and the middle class expands. As water becomes more scarce, rising prices for these items may drive dietary changes.

Figure 10 :
Food water footprints, water (in ltr) needed to produce 1 kg (global average)[XXII]

Food	Water (ltr)
Beef meat	15,415
Eggs	3,265
Cereals	1,644
Milk	1,020
Fruit	962
Vegteables	322
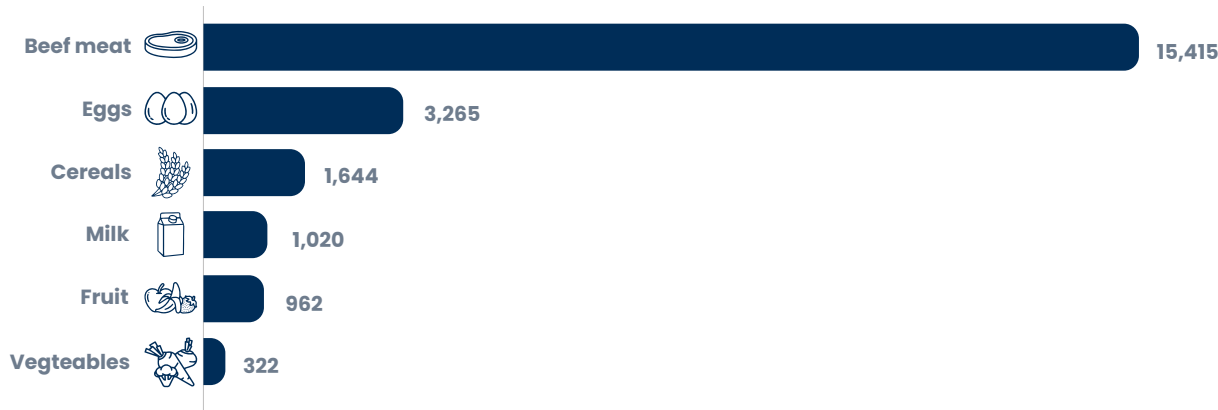
Source: WFN (2020), Vanhamet al. (2018), Mekonnen and Hoekstra (2012)

Leaders
and laggards

Denmark leads in the Human Capital scores, followed by Norway, Iceland, the United Kingdom, and Germany. These countries exhibit strong performance in aspects such as education, healthcare, and workforce skills.

Among EMs, China is the top Human Capital performer, ranking 31st overall in this pillar, with Chile following closely. Notable laggards include India and several SSA countries, which are the lowest-scoring peer group. There is optimism as the vast majority of countries show positive trends in Human Capital development.

Social Capital: Climate Migration and Geopolitics**.**

In *the* election year of 2024, half of the world's population is headed to the voting booth. Our framework is designed to discern medium-term trends and pressures created by national and global systems, which may be expressed through political processes. Some pressures are imperceptible in the short term until magnified by a catalyst.

A hard right turn in slow motion?

One might point to disappointments of the 2010-2011 Arab Spring as a catalyst for migrant surge into the EU, eventually testing German Chancellor Merkel's popularity. The AfD (Alternative fur Deutschland, a far-right party with anti-immigrant platform) rose. Far right parties registered significant gains in the 2024 European Parliament elections, and triggered a snap election in France, generating significant market volatility.

Will water pressure rise?

What does our framework suggest for the medium term? We chart irregular migrants into the EU (that is, excluding for reasons of family, employment, education etc) against water stress in North African countries such as Egypt, Jordan, Lebanon, Morocco, and Tunisia.

Figure 11 :

Migration flows into the EU and water stress in North Africa [XXIII]

Arab Spring

—— **Irregular migration into the EU (thousands, LHS)** —— **Water Stress (Inverted Score Percentile, RHS)**
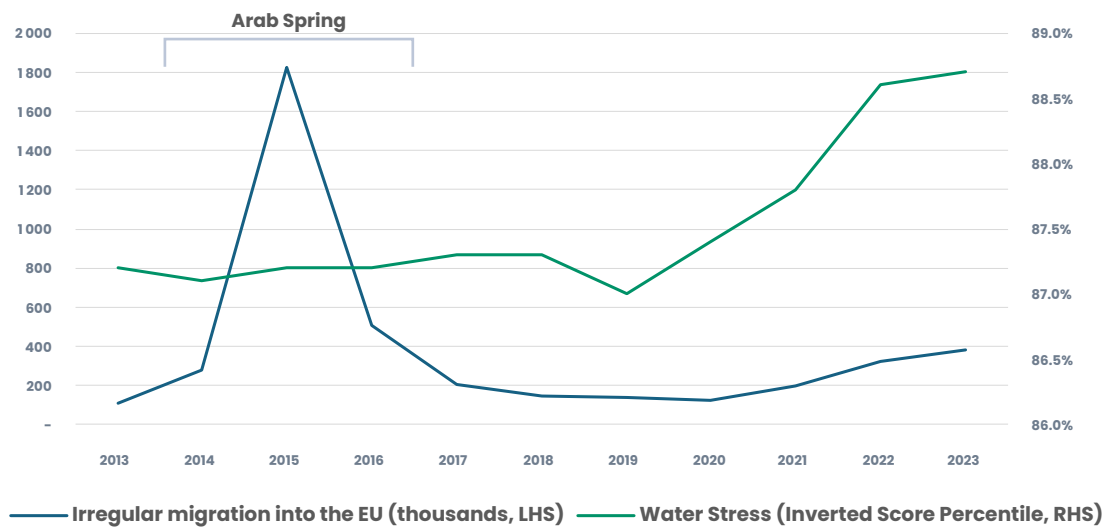
Where higher scores are better for Water Stress
Source: European Commission, Candriam

Water stress reduces crop yields, increases inequalities and famine, and can lead to internal or external migration. The World Bank projects that as many as 216 million people will be displaced by the impacts of climate change by 2050[XXIV], identifying interim 'hotspots' for 2030 in South and East Asia and Sub-Saharan Africa. Our framework is already flagging the areas of concern.

Of course, water stress is not the only cause of migration, but it exacerbates other elements. For a preview of the upheaval which awaits developed countries, consider the rapidly-changing immigration policies on the US-Mexico border.

Figure 12 :

Migration flows into the US and water stress in Mexico[XXV]

—— **US Southwest Border Apprehensions (thousands)**

—— **Mexico water stress (inverted score percentile, RHS)**
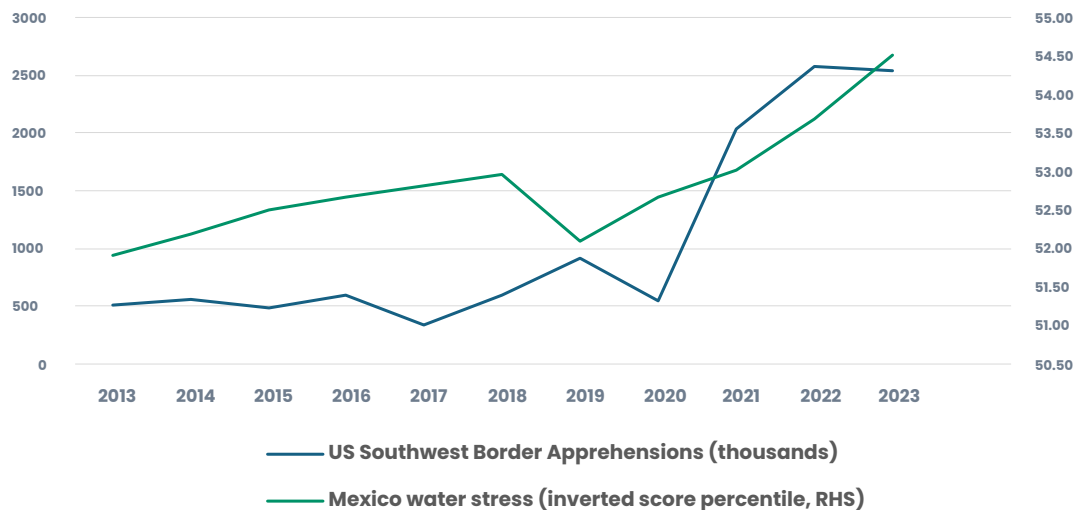
Where higher scores are better for Water Stress
Source: European Commission, Candriam

Transboundary agreements – or disagreements -- on access to fresh water that originates in another country are a rising problem. Close to 40% of the global population live in areas that rely on water originating abroad, while two thirds of the fresh water in Africa is transboundary. Yet only 20% of the countries in this situation have formal agreements how to manage the shared resource[XXVI]. This can lead to conflict and entails the projection of soft power abroad, sometimes on another continent. The controversial Blue Nile dam in Ethiopia has changed the power dynamic not only between Ethiopia, Egypt and Sudan[XXVII], but beyond the region, given financing from China.

Ironically, the hard-right mantras of isolationism and climate denial clash with the eagerness of nationalist parties to accept overtures from authoritarian regimes with strings attached – for example, Hungary's coziness with China[XXVIII]. China apparently recognizes the importance of infrastructure abroad as a means of building soft power. Democratic countries have begun to build alliances of their own, for example with climate finance and 'friend-shoring' of production and resources.

Figure 13 :

Climate finance for developing countries [XXIX]
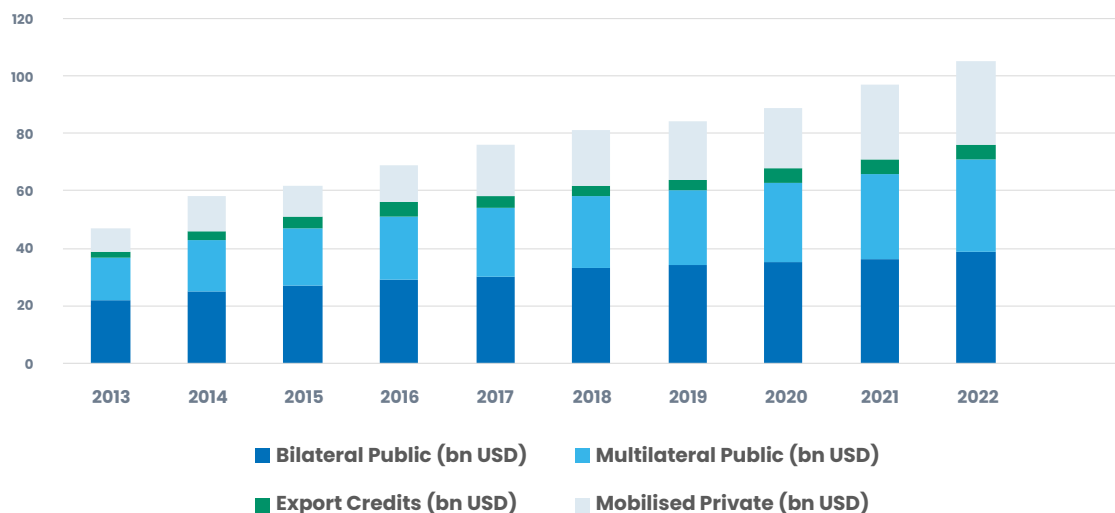
Source: OECD (2024) Climate Finance Provided and Mobilised by Developed Countries in 2013-2022.

Isolationist solutions contribute to the problem. Investing in water infrastructure to alleviate pressures on livelihoods in water-stressed countries can keep populations nourished and offer development at home. Might it be that water and energy, especially from renewable sources, will make the nations increasingly connected, just as coal trading was the start of today's European Union?

Leaders
and laggards

Luxembourg leads the Social Capital scores, followed closely by Denmark and Switzerland, with. New Zealand and Norway also performing well. These countries demonstrate strong scores for corruption, democratic governance, and security. Significant declines were noted for Belarus, Ukraine, Russia, and Iran, primarily due to deteriorating security conditions.

Freedom House, the NGO, reported another year of declining scores for democratic accountability. The most significant declines were registered for Belarus, Nicaragua, Sudan, Tajikistan and Russia. There are some positive trends, such as Thailand, whose status rose from 'Not Free' to 'Partly Free' following competitive parliamentary elections and the formation of a new governing coalition[xxx].

Economic Capital: Renewable Energy.

Latin America as a region is significantly ahead of Asia in the energy transition. Why? Because while few rivers in South America are navigable, they offer abundant opportunities for hydropower. Asian economies have an outsize reliance on coal, while LatAm countries look to their water. Hydropower, too, faces water risks.

We know that climate change is increasing the incidence of climactic phenomena. While aggregate figures for LatAm do not cause concern, components of our model can identify the vulnerable areas. Some parts of a country or region can experience droughts while others are flooding. a pattern which can be pronounced for large countries, and certainly across a continent.

Chile's 14-year megadrought was the worst in a *thousand years*[XXXI], ending only with the 2023–2024 El Niño. The National Oceanic and Atmospheric Administration (NOAA) now estimates an 85% chance of the return to the opposite, or La Niña conditions[XXXII]. Both can affect weather globally.

Figure 14 shows water vulnerability scores versus the relative contribution of hydropower. Within Latin America, the dispersion from average is significant. Peru, Colombia, Bolivia, El Salvador, and Guatemala rely heavily on hydropower, and yet the face the risk of declining water resources over time. Looking at only the recent data shows an improvement, but with La Niña likely to return, some of these gains are likely to be reversed.

Figure 14 :

Hydropower vs water vulnerability:
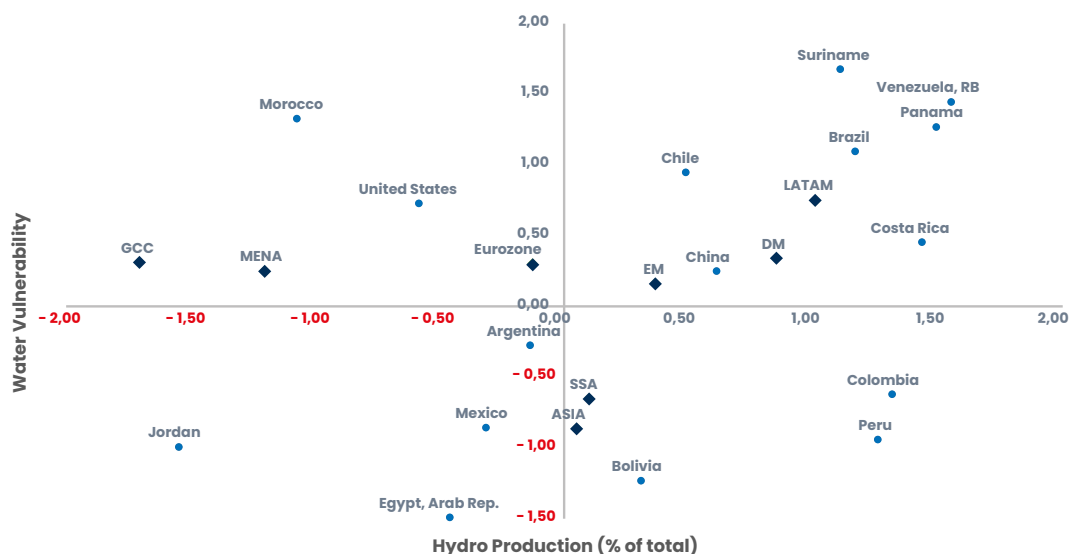
Hydro production and Water Vulnerability are shown as Z scores of our scaled Sovereign Sustainability model results. Higher scores are better.

Source: University of Notre Dame, IEA, Candriam

The pickup El Niño produced in LatAm and selected other vulnerable countries is evident in Figure 15. Argentina, Jamaica, and especially Chile show no benefit because their long-term water deterioration could not be relieved even by El Niño.

El Niño water stress relief, showing the percentage difference between El Niño and La Niña years for LatAm countries:
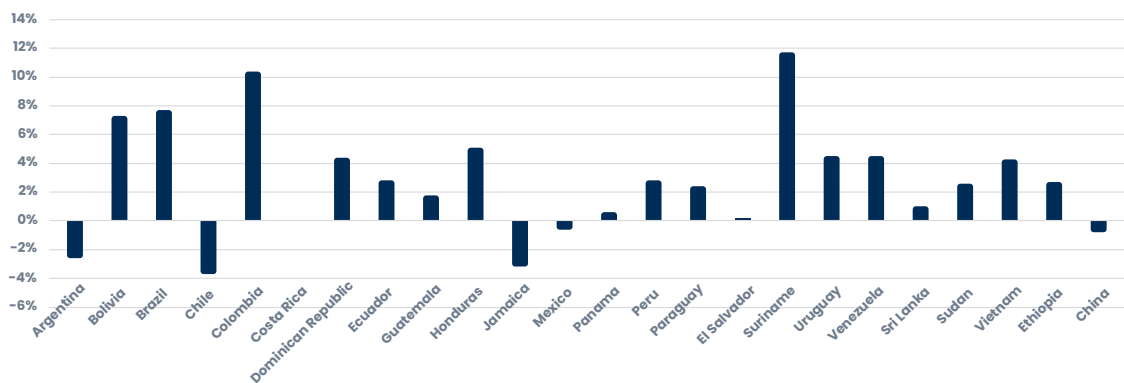
Source: Candriam

And all
the rest.

We don't wish to leave you with the thought that hydropower is the most important water issue within the Economic Capital pillar. Water runs throughout Economic Capital. As the World Bank puts it, "Economic growth is a 'thirsty business'"[XXXIII].

Not only is agriculture the largest use of water, its proportion of water demand has risen over the last century, even as the world has industrialised. Sovereign investors who consider sustainability may benefit from considering the interaction of the economics of water with the Human and Social Capitals.

Leaders
and laggards

The GCC countries, particularly Saudi Arabia, Bahrain, Oman, and Qatar, are increasing their renewable energy capacity and making substantial investments, albeit from a very low base compared to global peers. Within their Economic Capital scores, the gradual improvement of the renewables standings of these countries is a development to monitor.

Beyond the shimmering water of hydropower, our model shows Latin American countries are experiencing the most negative trends in renewables, primarily because of a struggling business environment and increasing tail risks, especially natural hazards. Unprecedented climatic events in recent years, linked to rising global temperatures, have significantly impacted the economic stability and business viability in Latin America and the Caribbean, underscoring the urgent need for enhanced climate resilience and adaptation strategies.

Most of the leading countries in terms of overall Economic Capital are consistently European, along with Canada and New Zealand. These countries lead due to their robust renewable energy policies, significant investments in sustainable energy, and strong economic capacities that support ongoing growth and innovation in the energy sector. The United States falls outside the top ten, despite its technological advancements and resources. China ranks significantly lower, reflecting ongoing challenges in balancing rapid industrial growth with sustainable practices.

Conclusion:
Currents of Change.

We have taken water for granted for too long. It is an economic crisis waiting to happen. Pollution, the increasing unpredictability of rainfall, the magnifications of extremes –– from devastating floods to prolonged droughts – are on a collision course with society. We are depleting the capacity of our ecosystems to recover.

Our Sovereign Sustainability model is designed to help us determine not only whether a nation is sustainable, but where it is headed on that journey. One of the great values of our model to our analysts and portfolio managers is our ability to isolate a topic or group of topics -- across time, across nations, or how that topic is influencing a particular country's sustainability and economic performance.

Aging infrastructure is exacerbating the water problem. Distribution capacity is insufficient for even our current needs, let alone for our future. By continuously applying patchwork solutions, the magnitude of investment needed is now daunting. Debt levels in developed countries increased dramatically following the Covid-19 pandemic yet the focus of governments and electorates still seems to be very short-term.

"

It becomes evident that sustainable solutions are not just environmental imperatives but are crucial for maintaining global stability and security.

As sustainable investors, we need to understand both the short-term and the long-term risks and opportunities. In a comprehensive sustainability framework it is natural for the main pressures on the global system to be visible across all capital pillars. It is also natural that for every pressure there are thousands of opportunities for governments, populations, companies, as well as for investors.

In our series of Sovereign Sustainability Reports we have covered a number of pressing issues in Natural Capital – rule of law and elections, accelerating climate change, deforestation, and now water stress. These reverberate through the capital pillars of our framework as they do in the economy, in our political systems, and in our everyday lives through inflation, rise of extremist parties and their often unsustainable policies, and increasingly through unbearable living conditions for many.

Economies and trade can link or de-link, but Natural Capital is a common resource which cannot be walled off. Solutions require more cooperation, more interconnectedness, more dialogue and more compromise, and more speed. We believe our model helps investors both identify the risks and rewards of their sovereign investments, as well as understanding broader issues.

Appendix.

Score and Ranking
changes.
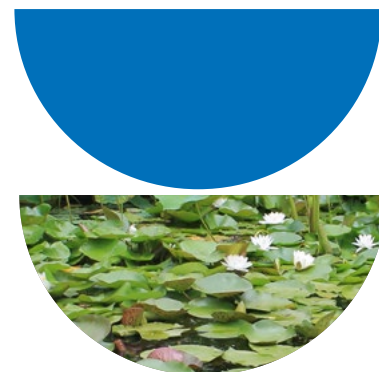
Ranking and score changes since our last published rankings in November 2022 should not be viewed in absolute terms. our model is dynamic, adding data types as they become more relevant. Therefore, the most relevant way to consider changes is by changes in ranking rather than score.

We would draw the most attention to the *declines* in rankings for

- **France** (from 7th place to 12th place)
- **Saudi Arabia** (from 56th place to 74th place)
- **Vietnam** (from 66th place to 91st place)

We would highlight the increase in ranking for

- **India** (from 88th place to 79th place)

We highlight these particular changes because the countries are also of investment relevance. (The ranking of the Cote d'Ivoire, for example, fell by 18 places, the same drop as Saudi Arabia).

This year, we find the nations with major improvements in rankings, for example Georgia and Albania, to be of less potential investment interest. In both cases, the most important, but not only, factor behind the rise was Economic Capital.

France lost ground year-on-year in every component of Social Capital, particularly in government stability and political risk. Components of the security scores have deteriorated. Terrorism scores have deteriorated, with the terrorism threat sub-score now ranking at the bottom of the global universe.

Saudi Arabia slipped broadly, across Natural, Human and Social Capitals.

Vietnam is suffering from a deterioration in Social Capital figures. Scores continued to slide in rule of law, corruption, and civil and political unrest.

India's score improved due to a higher score in Economic Capital. This consists of modest increases in most inputs across this Capital, notably in private consumption and consumption potential.

Country Rankings

N= Natural Capital, H= Human Capital, S= Social Capital, X= Economic Capital

Score – reflects the overall sustainability score of a country

N, H, S, X - Capital scores are shown in percentiles, indicating what percentage of the overall universe a country outperforms in the respective capital

Rank	Score	Country	IN/OUT	2023 IN/OUT	Percentiles			
					N	H	S	X
1	100,00	Denmark	IN	IN	99%	99%	98%	99%
2	86,39	Switzerland	IN	IN	98%	94%	98%	97%
3	83,64	Luxembourg	IN	IN	97%	88%	99%	83%
4	80,98	Finland	IN	IN	96%	90%	91%	88%
5	80,18	Austria	IN	IN	95%	92%	90%	86%
6	79,48	United Kingdom	IN	IN	94%	97%	85%	98%
7	78,72	Sweden	IN	IN	98%	93%	94%	96%
8	77,88	Norway	IN	IN	89%	98%	96%	98%
9	77,37	Germany	IN	IN	91%	96%	89%	93%
10	77,12	Ireland	IN	IN	94%	82%	95%	90%
11	75,74	Netherlands	IN	IN	90%	95%	93%	86%
12	74,86	France	IN	IN	93%	87%	82%	94%
13	74,46	Czech Republic	IN	IN	86%	79%	81%	85%
14	74,06	Belgium	IN	IN	88%	86%	87%	87%
15	73,28	Estonia	IN	IN	79%	78%	88%	69%
16	72,57	New Zealand	IN	IN	83%	86%	97%	94%
17	72,19	Portugal	IN	IN	87%	82%	86%	82%
18	70,39	Spain	IN	IN	90%	76%	80%	90%
19	69,99	Canada	IN	IN	78%	90%	90%	95%
20	68,54	Slovenia	IN	IN	82%	80%	86%	65%
21	67,87	Australia	IN	IN	68%	91%	92%	91%
22	66,97	Lithuania	IN	IN	84%	75%	77%	75%
23	66,84	Japan	IN	IN	80%	81%	84%	92%
24	63,41	Slovak Republic	IN	IN	86%	71%	71%	64%
25	62,94	Korea, Rep.	IN	IN	72%	84%	70%	89%

26	62,59	Malta	IN	IN	85%	78%	82%	76%
27	61,26	Latvia	IN	IN	78%	72%	75%	78%
28	59,78	Iceland	IN	IN	82%	98%	94%	71%
29	59,57	Uruguay	IN	IN	76%	61%	83%	82%
30	59,41	Bermuda	IN	IN	92%	59%	78%	9%
31	58,56	Poland	IN	IN	74%	67%	66%	72%
32	58,39	Italy	IN	IN	77%	77%	74%	78%
33	57,29	Cyprus	IN	IN	75%	74%	73%	66%
34	54,65	Costa Rica	IN	IN	73%	62%	78%	62%
35	54,48	Greece	IN	IN	67%	63%	68%	70%
36	54,31	Croatia	IN	IN	70%	66%	69%	80%
37	53,78	Singapore	IN	IN	66%	89%	79%	81%
38	53,05	Hungary	IN	IN	81%	64%	60%	60%
39	51,67	Chile	IN	IN	66%	69%	72%	79%
40	51,30	Israel	OUT	OUT	74%	85%	57%	73%
41	49,37	Albania	IN	IN	65%	41%	58%	67%
42	49,31	United States	IN	IN	70%	83%	70%	84%
43	47,02	Hong Kong SAR, China	IN	IN	71%	94%	76%	77%
44	46,81	Bulgaria	IN	IN	62%	58%	62%	58%
45	46,67	Romania	IN	IN	69%	53%	65%	49%
46	39,17	Rwanda	OUT	OUT	64%	15%	26%	74%
47	38,78	Jamaica	IN	IN	46%	36%	66%	38%
48	38,16	Mexico	IN	IN	60%	50%	43%	55%
49	37,66	Brazil	IN	IN	59%	47%	54%	74%
50	37,25	Jordan	OUT	OUT	61%	22%	25%	61%
51	36,13	Tunisia	IN	IN	57%	39%	38%	51%
52	35,67	Morocco	IN	IN	58%	25%	23%	66%
53	35,57	Malaysia	IN	IN	34%	52%	56%	58%
54	35,29	Moldova	IN	IN	44%	51%	44%	29%
55	34,82	Kenya	IN	IN	62%	16%	24%	70%
56	34,74	China	OUT	OUT	39%	74%	19%	50%
57	32,88	Montenegro	IN	IN	31%	66%	50%	59%
58	32,80	Egypt, Arab Rep.	OUT	OUT	42%	29%	15%	33%
59	32,52	United Arab Emirates	OUT	OUT	33%	70%	55%	37%
60	32,28	Serbia	IN	IN	30%	60%	49%	18%
61	32,21	Senegal	IN	IN	56%	13%	46%	41%
62	32,05	Panama	IN	IN	63%	44%	58%	34%

63	31,90	Georgia	IN	IN	46%	42%	48%	68%
64	31,36	Argentina	IN	IN	53%	55%	62%	27%
65	31,21	North Macedonia	IN	IN	38%	46%	50%	53%
66	31,17	Armenia	IN	IN	55%	46%	30%	32%
67	31,07	Ecuador	IN	IN	42%	30%	46%	50%
68	30,72	Qatar	OUT	OUT	16%	73%	54%	26%
69	30,18	Namibia	IN	IN	47%	14%	67%	28%
70	28,93	Peru	IN	IN	49%	34%	42%	52%
71	28,37	El Salvador	IN	IN	54%	38%	47%	46%
72	28,01	Cote d'Ivoire	IN	IN	48%	6%	28%	62%
73	27,85	Colombia	IN	IN	45%	40%	39%	48%
74	27,37	Saudi Arabia	OUT	OUT	15%	56%	16%	56%
75	27,07	Bahamas, The	IN	IN	43%	54%	74%	8%
76	27,06	Turkey	OUT	OUT	52%	54%	14%	42%
77	26,75	Dominican Republic	IN	IN	51%	31%	51%	20%
78	26,15	Belize	IN	IN	41%	42%	52%	31%
79	26,03	India	IN	IN	26%	7%	30%	63%
80	25,60	Honduras	IN	IN	50%	22%	22%	39%
81	25,53	Thailand	IN	OUT	26%	50%	34%	54%
82	25,49	Guatemala	IN	IN	58%	28%	27%	22%
83	25,44	Indonesia	IN	IN	25%	18%	45%	45%
84	25,39	Tanzania	IN	IN	38%	14%	33%	42%
85	25,09	Ghana	IN	IN	28%	17%	61%	54%
86	24,96	Oman	OUT	OUT	6%	48%	37%	12%
87	24,78	Kazakhstan	OUT	OUT	11%	65%	32%	10%
88	22,76	Philippines	IN	IN	35%	23%	38%	44%
89	22,52	Gabon	OUT	OUT	50%	6%	20%	21%
90	22,19	Sri Lanka	IN	IN	54%	27%	35%	25%
91	21,89	Vietnam	OUT	OUT	14%	45%	26%	36%
92	20,77	Ethiopia	OUT	OUT	36%	10%	12%	30%
93	20,53	Bolivia	OUT	IN	18%	21%	29%	34%
94	20,42	Benin	OUT	–	27%	4%	36%	23%
95	20,21	South Africa	IN*	IN	17%	19%	59%	22%
96	20,20	Paraguay	OUT	OUT	34%	35%	41%	57%
97	19,85	Cuba	OUT	OUT	37%	57%	22%	7%
98	19,32	Belarus	OUT	OUT	40%	70%	4%	6%
99	18,99	Azerbaijan	OUT	OUT	20%	32%	9%	26%

100	18,22	Ukraine	OUT	OUT	29%	43%	11%	15%
101	17,91	Trinidad and Tobago	OUT	OUT	14%	49%	64%	2%
102	17,18	Tajikistan	OUT	OUT	21%	26%	6%	38%
103	17,08	Uzbekistan	OUT	OUT	6%	38%	10%	17%
104	16,96	Mozambique	OUT	OUT	10%	5%	18%	24%
105	16,32	Nigeria	OUT	OUT	32%	2%	13%	30%
106	16,21	Algeria	OUT	OUT	8%	30%	18%	19%
107	15,98	Cameroon	OUT	OUT	22%	11%	6%	46%
108	15,92	Angola	OUT	OUT	23%	1%	21%	43%
109	15,67	Bahrain	OUT	OUT	3%	58%	31%	14%
110	14,67	Russian Federation	OUT	OUT	19%	68%	7%	6%
111	14,30	Zambia	OUT	OUT	18%	10%	42%	40%
112	14,15	Mongolia	OUT	OUT	5%	37%	63%	5%
113	13,50	Nicaragua	OUT	OUT	30%	26%	14%	35%
114	12,29	Zimbabwe	OUT	OUT	22%	12%	10%	18%
115	11,72	Kuwait	OUT	OUT	2%	62%	40%	10%
116	11,47	Papua New Guinea	OUT	OUT	10%	3%	34%	47%
117	10,17	Pakistan	OUT	OUT	24%	9%	2%	16%
118	9,51	Suriname	OUT	OUT	7%	34%	53%	11%
119	9,00	Congo, Rep.	OUT	OUT	4%	2%	17%	13%
120	8,22	Venezuela, RB	OUT	OUT	9%	20%	2%	1%
121	7,34	Iran, Islamic Rep.	OUT	OUT	2%	33%	3%	3%
122	4,32	Iraq	OUT	OUT	1%	18%	8%	2%
123	3,84	Sudan	OUT	OUT	13%	8%	1%	14%
124	0,00	Lebanon	OUT	OUT	12%	24%	5%	4%

*Gathering further information through engagement.
Source: Candriam

**SOVEREIGN SUSTAINABILITY:
RISING WATER PRESSURE**

Alphabetical Rankings

The overall sustainability is shown in percentiles, indicating the percentage of the overall universe the country outperforms. The weighting is Natural Capital times (the average of Human, Social, and Economic Capitals.

N= Natural Capital, H= Human Capital, S= Social Capital, X= Economic Capital Score

Rank	Score	Country	IN/OUT	2023 IN/OUT	Percentiles			
					N	H	S	X
41	49,37	Albania	IN	IN	65%	41%	58%	67%
106	16,21	Algeria	OUT	OUT	8%	30%	18%	19%
108	15,92	Angola	OUT	OUT	23%	1%	21%	43%
64	31,36	Argentina	IN	IN	53%	55%	62%	27%
66	31,17	Armenia	IN	IN	55%	46%	30%	32%
21	67,87	Australia	IN	IN	68%	91%	92%	91%
5	80,18	Austria	IN	IN	95%	92%	90%	86%
99	18,99	Azerbaijan	OUT	OUT	20%	32%	9%	26%
75	27,07	Bahamas, The	IN	IN	43%	54%	74%	8%
109	15,67	Bahrain	OUT	OUT	3%	58%	31%	14%
98	19,32	Belarus	OUT	OUT	40%	70%	4%	6%
14	74,06	Belgium	IN	IN	88%	86%	87%	87%
78	26,15	Belize	IN	IN	41%	42%	52%	31%
94	20,42	Benin	OUT	–	27%	4%	36%	23%
30	59,41	Bermuda	IN	IN	92%	59%	78%	9%
93	20,53	Bolivia	OUT	IN	18%	21%	29%	34%
49	37,66	Brazil	IN	IN	59%	47%	54%	74%
44	46,81	Bulgaria	IN	IN	62%	58%	62%	58%
107	15,98	Cameroon	OUT	OUT	22%	11%	6%	46%
19	69,99	Canada	IN	IN	78%	90%	90%	95%
39	51,67	Chile	IN	IN	66%	69%	72%	79%
56	34,74	China	OUT	OUT	39%	74%	19%	50%
73	27,85	Colombia	IN	IN	45%	40%	39%	48%
119	9,00	Congo, Rep.	OUT	OUT	4%	2%	17%	13%
34	54,65	Costa Rica	IN	IN	73%	62%	78%	62%
72	28,01	Cote d'Ivoire	IN	IN	48%	6%	28%	62%
36	54,31	Croatia	IN	IN	70%	66%	69%	80%

97	19,85	Cuba	OUT	OUT	37%	57%	22%	7%
33	57,29	Cyprus	IN	IN	75%	74%	73%	66%
13	74,46	Czech Republic	IN	IN	86%	79%	81%	85%
1	100,00	Denmark	IN	IN	99%	99%	98%	99%
77	26,75	Dominican Republic	IN	IN	51%	31%	51%	20%
67	31,07	Ecuador	IN	IN	42%	30%	46%	50%
58	32,80	Egypt, Arab Rep.	OUT	OUT	42%	29%	15%	33%
71	28,37	El Salvador	IN	IN	54%	38%	47%	46%
15	73,28	Estonia	IN	IN	79%	78%	88%	69%
92	20,77	Ethiopia	OUT	OUT	36%	10%	12%	30%
4	80,98	Finland	IN	IN	96%	90%	91%	88%
12	74,86	France	IN	IN	93%	87%	82%	94%
89	22,52	Gabon	OUT	OUT	50%	6%	20%	21%
63	31,90	Georgia	IN	IN	46%	42%	48%	68%
9	77,37	Germany	IN	IN	91%	96%	89%	93%
85	25,09	Ghana	IN	IN	28%	17%	61%	54%
35	54,48	Greece	IN	IN	67%	63%	68%	70%
82	25,49	Guatemala	IN	IN	58%	28%	27%	22%
80	25,60	Honduras	IN	IN	50%	22%	22%	39%
43	47,02	Hong Kong SAR, China	IN	IN	71%	94%	76%	77%
38	53,05	Hungary	IN	IN	81%	64%	60%	60%
28	59,78	Iceland	IN	IN	82%	98%	94%	71%
79	26,03	India	IN	IN	26%	7%	30%	63%
83	25,44	Indonesia	IN	IN	25%	18%	45%	45%
121	7,34	Iran, Islamic Rep.	OUT	OUT	2%	33%	3%	3%
122	4,32	Iraq	OUT	OUT	1%	18%	8%	2%
10	77,12	Ireland	IN	IN	94%	82%	95%	90%
40	51,30	Israel	OUT	OUT	74%	85%	57%	73%
32	58,39	Italy	IN	IN	77%	77%	74%	78%
47	38,78	Jamaica	IN	IN	46%	36%	66%	38%
23	66,84	Japan	IN	IN	80%	81%	84%	92%
50	37,25	Jordan	OUT	OUT	61%	22%	25%	61%
87	24,78	Kazakhstan	OUT	OUT	11%	65%	32%	10%
55	34,82	Kenya	IN	IN	62%	16%	24%	70%
25	62,94	Korea, Rep.	IN	IN	72%	84%	70%	89%
115	11,72	Kuwait	OUT	OUT	2%	62%	40%	10%

27	61,26	Latvia	IN	IN	78%	72%	75%	78%
124	0,00	Lebanon	OUT	OUT	12%	24%	5%	4%
22	66,97	Lithuania	IN	IN	84%	75%	77%	75%
3	83,64	Luxembourg	IN	IN	97%	88%	99%	83%
53	35,57	Malaysia	IN	IN	34%	52%	56%	58%
26	62,59	Malta	IN	IN	85%	78%	82%	76%
48	38,16	Mexico	IN	IN	60%	50%	43%	55%
54	35,29	Moldova	IN	IN	44%	51%	44%	29%
112	14,15	Mongolia	OUT	OUT	5%	37%	63%	5%
57	32,88	Montenegro	IN	IN	31%	66%	50%	59%
52	35,67	Morocco	IN	IN	58%	25%	23%	66%
104	16,96	Mozambique	OUT	OUT	10%	5%	18%	24%
69	30,18	Namibia	IN	IN	47%	14%	67%	28%
11	75,74	Netherlands	IN	IN	90%	95%	93%	86%
16	72,57	New Zealand	IN	IN	83%	86%	97%	94%
113	13,50	Nicaragua	OUT	OUT	30%	26%	14%	35%
105	16,32	Nigeria	OUT	OUT	32%	2%	13%	30%
65	31,21	North Macedonia	IN	IN	38%	46%	50%	53%
8	77,88	Norway	IN	IN	89%	98%	96%	98%
86	24,96	Oman	OUT	OUT	6%	48%	37%	12%
117	10,17	Pakistan	OUT	OUT	24%	9%	2%	16%
62	32,05	Panama	IN	IN	63%	44%	58%	34%
116	11,47	Papua New Guinea	OUT	OUT	10%	3%	34%	47%
96	20,20	Paraguay	OUT	OUT	34%	35%	41%	57%
70	28,93	Peru	IN	IN	49%	34%	42%	52%
88	22,76	Philippines	IN	IN	35%	23%	38%	44%
31	58,56	Poland	IN	IN	74%	67%	66%	72%
17	72,19	Portugal	IN	IN	87%	82%	86%	82%
68	30,72	Qatar	OUT	OUT	16%	73%	54%	26%
45	46,67	Romania	IN	IN	69%	53%	65%	49%
110	14,67	Russian Federation	OUT	OUT	19%	68%	7%	6%
46	39,17	Rwanda	OUT	OUT	64%	15%	26%	74%
74	27,37	Saudi Arabia	OUT	OUT	15%	56%	16%	56%
61	32,21	Senegal	IN	IN	56%	13%	46%	41%
60	32,28	Serbia	IN	IN	30%	60%	49%	18%
37	53,78	Singapore	IN	IN	66%	89%	79%	81%

24	63,41	Slovak Republic	IN	IN	86%	71%	71%	64%
20	68,54	Slovenia	IN	IN	82%	80%	86%	65%
95	20,21	South Africa	IN*	IN	17%	19%	59%	22%
18	70,39	Spain	IN	IN	90%	76%	80%	90%
90	22,19	Sri Lanka	IN	IN	54%	27%	35%	25%
123	3,84	Sudan	OUT	OUT	13%	8%	1%	14%
118	9,51	Suriname	OUT	OUT	7%	34%	53%	11%
7	78,72	Sweden	IN	IN	98%	93%	94%	96%
2	86,39	Switzerland	IN	IN	98%	94%	98%	97%
102	17,18	Tajikistan	OUT	OUT	21%	26%	6%	38%
84	25,39	Tanzania	IN	IN	38%	14%	33%	42%
81	25,53	Thailand	IN	OUT	26%	50%	34%	54%
101	17,91	Trinidad and Tobago	OUT	OUT	14%	49%	64%	2%
51	36,13	Tunisia	IN	IN	57%	39%	38%	51%
76	27,06	Turkey	OUT	OUT	52%	54%	14%	42%
100	18,22	Ukraine	OUT	OUT	29%	43%	11%	15%
59	32,52	United Arab Emirates	OUT	OUT	33%	70%	55%	37%
6	79,48	United Kingdom	IN	IN	94%	97%	85%	98%
42	49,31	United States	IN	IN	70%	83%	70%	84%
29	59,57	Uruguay	IN	IN	76%	61%	83%	82%
103	17,08	Uzbekistan	OUT	OUT	6%	38%	10%	17%
120	8,22	Venezuela, RB	OUT	OUT	9%	20%	2%	1%
91	21,89	Vietnam	OUT	OUT	14%	45%	26%	36%
111	14,30	Zambia	OUT	OUT	18%	10%	42%	40%
114	12,29	Zimbabwe	OUT	OUT	22%	12%	10%	18%

*Gathering further information through engagement.
Source: Candriam

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*As of 31/12/2022, Candriam changed the Assets Under Management (AUM) calculation methodology, and AUM now includes certain assets, such as non-discretionary AUM, external fund selection, overlay services, including ESG screening services, [advisory consulting] services, white labeling services, and model portfolio delivery services that do not qualify as Regulatory Assets Under Management, as defined in the SEC's Form ADV. AUM is reported in USD. AUM not denominated in USD is converted at the spot rate as of 31/12/2023.

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