

WATER-RELATED RISKS AND CHALLENGES

A QUANTITATIVE RESEARCH PERSPECTIVE

EXECUTIVE SUMMARY

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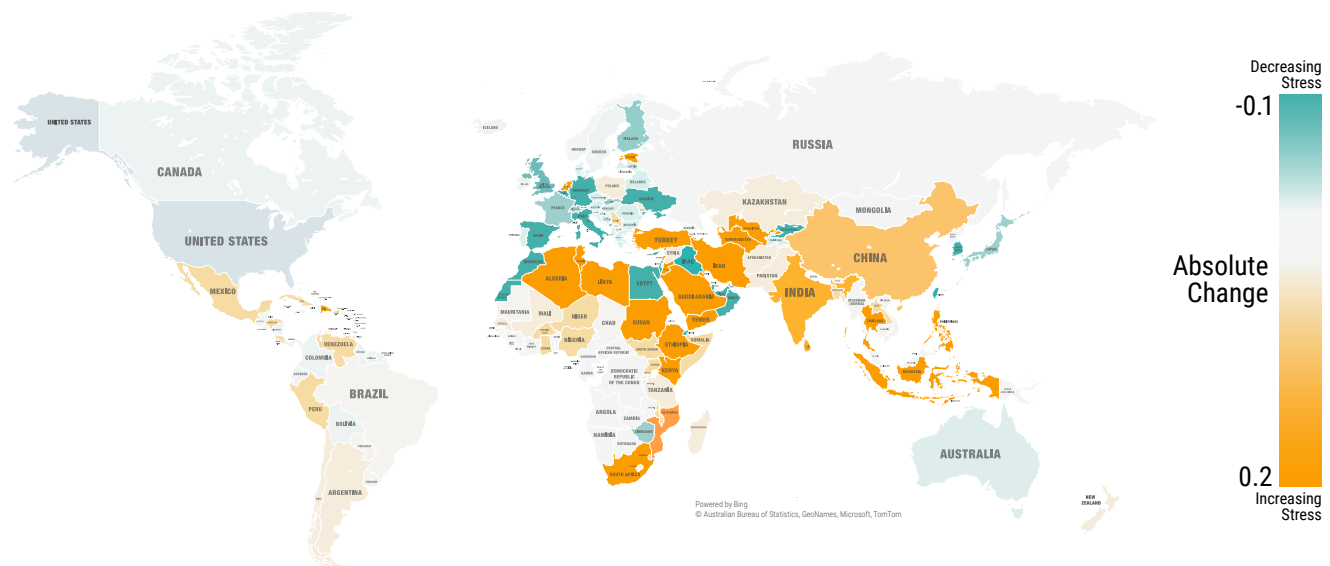
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Building a Case for Water Metric Reporting

- The past two decades have seen a surge in interest in environmental issues, mainly climate change, global warming, and fossil fuels. Yet, another equally important dimension — **water scarcity** — has thus far remained largely unexamined and is not given adequate importance in the economic development agendas of many countries.
- Water scarcity is a prominent concern for billions of people worldwide and has a significant impact at the firm and country levels. Water scarcity is also an important type of physical water risk that portfolio managers and investors should consider when building investment strategies.
- To address this gap, Sustainalytics suggests reviewing water reporting metrics on companies and countries. These metrics offer a useful monitoring tool for firm executives, policymakers, governments, institutional and retail investors.

Water – An Increasing Operational Risk

Exhibit 1: Forecasted Absolute Change in Water Stress – 2002 to 2030



*2002 to 2017 and water withdrawals based on Aquastat data, with forward demand forecasts based on IFPRI Agriculture growth, IMF country GDP forecasts, ourworldindata.org Population Growth.¹
Source: Aquastat, IFPRI, IMF, ourworldindata.org

- Along with flooding and water quality, water scarcity is one of the main water-related challenges of the 21st century. For most of the world's population, Water Stress has risen considerably over the period 2002-2017 and is projected to continue to rise.
- Worldwide, from 2002 to 2017, **water stress increased by 13%**. Over the same period, **Water Withdrawals increased by 4.9%**, with the agricultural and municipal sectors increasing, respectively, by 15% and 13%. This surge in demand further aggravates the uncertainty of water availability. By 2030, about 16 countries are expected to be withdrawing unsustainably from non-replenishable aquifers and surface-level water sources at a national level.
- Exhibit 1 depicts forecasts by country of the change in water stress, showing that water stress has continued to worsen worldwide, especially in developing countries. However, these forecasts may understate the future levels of water stress as they do not consider the additional effects of climate change on renewable water supply.

Sustainalytics Water Metrics

- Water metrics are a valuable tool for managers and policymakers to monitor the water-related risks that companies and industries face. **Sustainalytics' water metrics, i.e., Water Withdrawal, Water Consumption, and Water Intensity**, are tools to gauge the risks related to companies' water use. Within the ESG Risk Rating product, management indicators including **Water Risk Management, Water Management Programmes, Water Intensity, Water Intensity Trend, and Fresh Water Intensity** for Generators, directly assess companies' management and preparedness in handling water-related risks.
- We expect the number of reporting companies to grow in the future due to increased awareness and the adoption of ESG reporting frameworks. By reporting on water metrics, companies demonstrate more transparent practices in their water management and reduce information asymmetry.

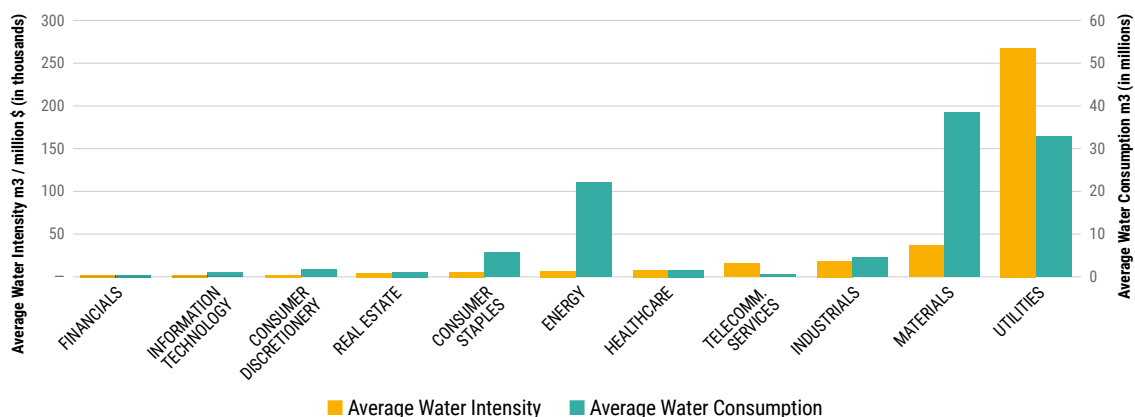
Water Metrics, Material ESG Issues (MEIs), and ESG Risk Rating

- For each company, only a set of issues that are deemed Material ESG Issues (MEIs) are included in the computation. These issues have the potential to cause a significant impact on the company. Each of these MEIs is itself made of a set of indicators and metrics that captures various dimensions. For example, the MEI "Resources" comprises the following indicators and metrics: Water Intensity, Water Risk Management, Water Intensity Trend, etc. This set of indicators and metrics is also specific to each company and subindustry.
- Naturally, all these metrics and indicators directly contribute to their respective MEI and ultimately to the ESG Risk Score. This latter contribution depends on the relative importance of the indicator and MEI for the company or subindustry.
- Empirically, we computed the correlation between the Risk Score of the MEI Resource and Water Intensity Weighted Score and found it positive and equal to 27.7%. Next, the correlation between the Risk Score of the MEI Resource and the ESG Risk Score is also strong and positive, 36.4%. Hence, **the water-related metrics are an important determinant of the MEI Resources which itself seems to have both significant direct and indirect impacts on the ESG Risk Score.**

Putting the Metrics into Practice: Water Use by Sector

- Water-related risks have material financial impacts. High water consumption is costly and can cause economic harm to society and environment. Companies with **high water consumption** and **water intensity** have potentially **high exposure to water risk**.

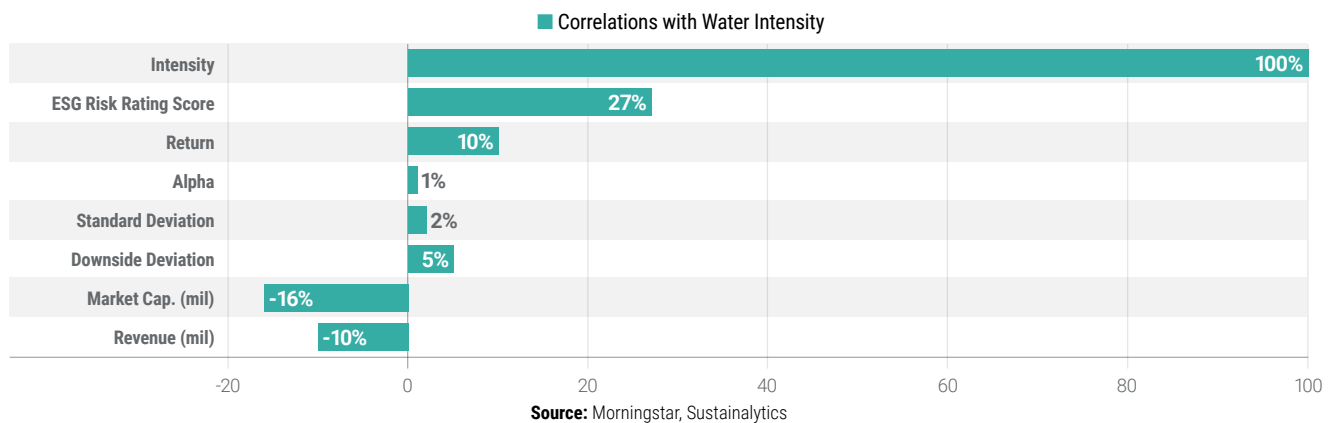
Exhibit 2: Water Use by Sector



- In Exhibit 2 (prior page), water intensity and water consumption (in total cubic meters) of sectors are presented. **Utilities** takes a clear first place for water intensity as water is necessary for many electricity-generating activities, with the **Materials and Industrials** sectors in second and third, respectively. For water consumption, the **Materials** sector is the top consumer, driven by high water demanding steel producers and mining companies, with **Utilities** in second and **Energy** in third, respectively.

Water Intensity and Firm Characteristics

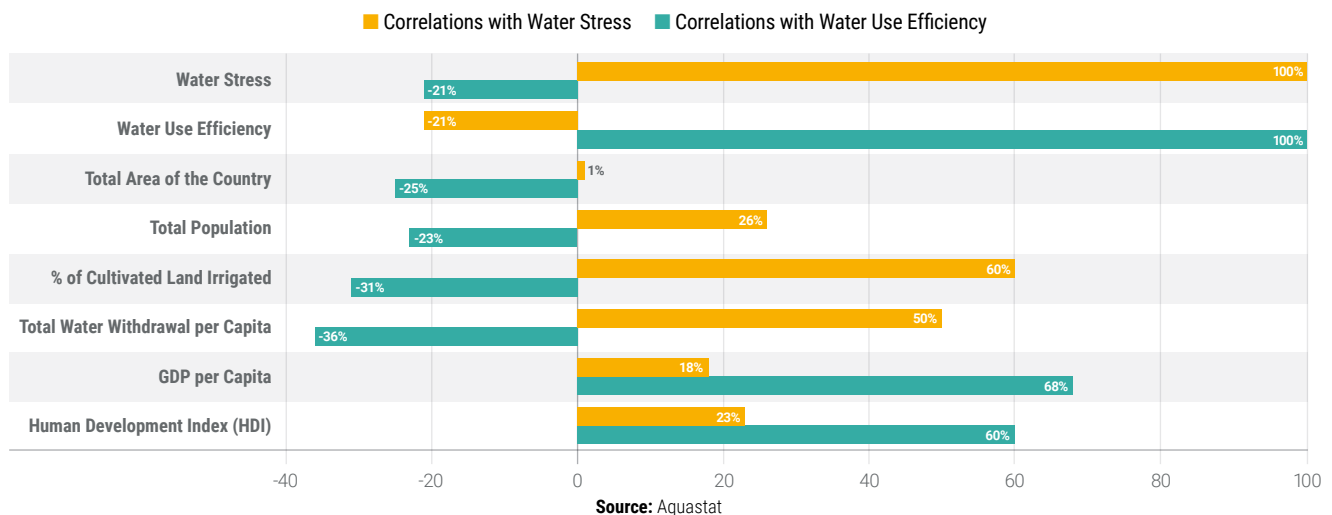
Exhibit 3: Correlations Between Firm Water Intensity and Firm Characteristic



- Using a global sample of 4,914 firms for the year 2020, our analysis shows that firms with **high water intensity** display **high ESG risk, high return, high standard deviation** of returns, and **high downside deviation** of returns (see Exhibit 3). Water intensity, however, weakly relates to risk-adjusted return.

Water Stress, Water Use Efficiency, and Country Characteristics

Exhibit 4 Correlations Between Water Metrics and Country Characteristics



- Our country-level analysis reveals that water stress is inversely related to water use efficiency and is higher in countries with large populations, a high percentage of irrigated cultivated land, high water withdrawal per capita, and high development indicators (see Exhibit 4). Water efficiency is high in countries with small populations, a low Percentage of Cultivated Land Irrigated, low Total Water Withdrawal per Capita, and high development indicators.

Top 5 Countries by Water Stress

- Exhibit 5 reports the top 5 countries as sorted on their water stress. Unsurprisingly, all of these countries are located in the arid region of the Middle East. Fortunately, these countries have a high GDP per capita and a high HDI.

Exhibit 5: Top 5 Countries Sorted by Water Stress

	Water Stress (%)	Water Use Efficiency (US\$/m3)	Total Area (1000 ha)	Total Population (000's)	% of Cultivated Land Irrigated	Total Water Withdrawal per Capita (m3/year)	GDP per Capita (US\$/inhab)	Human Development Index (HDI)
Kuwait	3,851%	102.4	1,780	4,056	100%	308	28,897	0.8
United Arab Emirates	1,708%	92.8	7,102	9,487	67%	421	40,180	0.9
Saudi Arabia	833%	28.3	214,969	33,101	26%	705	20,905	0.9
Libya	817%	3.8	175,954	6,581	20%	886	3,941	0.7
Qatar	432%	191.6	1,149	2,725	66%	335	63,249	0.8

Source: Aquastat

Top 5 Countries by Water Use Efficiency

- Exhibit 6 reports the top 5 countries as sorted on their water use efficiency. All of these countries are located in Europe, and all have a high GDP per capita.

Exhibit 6: Top 5 Countries Sorted by Water Use Efficiency

	Water Stress (%)	Water Use Efficiency (US\$/m3)	Total Area (1000 ha)	Total Population (000's)	% of Cultivated Land Irrigated	Total Water Withdrawal per Capita (m3/year)	GDP per Capita (US\$/inhab)	Human Development Index (HDI)
Luxembourg	4%	1,221	259	592	0%	77	110,003	0.9
Switzerland	7%	391	4,129	8,456	9%	205	80,221	0.9
Denmark	20%	369	4,093	5,732	10%	129	57,454	0.9
Ireland	4%	350	7,028	4,753	0%	181	70,493	0.9
United Kingdom	14%	320	24,361	66,727	2%	126	40,287	0.9

Source: Aquastat

Conclusions The Emergence of Water Risk: from Marginal to Systemic

- Our study sheds light on the importance of water scarcity for firms and countries. It also shows that water stress is on the rise in many regions of the world and is expected to become a critical issue. To address these challenges and better monitor water-related risks, Sustainalytics has introduced several water metrics.
- We further found that water intensity is related to several firm characteristics and is positively related to ESG risk rating. There is also high heterogeneity in water use across sectors. At the country level, we find that water stress and water use efficiency are related to several country characteristics. In sum, we show that water stress has implications beyond the immediate use of water as water stress affects all the aspects of the economy and well-being of society.

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¹ 2030 Water Resources Group (2009); "Charting Our Water Future"; 2030 Water Resources Group ; accessed (04.05.2021) at: https://www.2030wrg.org/wp-content/uploads/2012/06/Charting_Our_Water_Future_Final.pdf

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