

CLEANING UP THEIR ACT

Are companies responding to the risks and opportunities posed by water pollution?

Written on behalf of 525 investors with US\$96 trillion in assets

Lead Sponsor:

 **NORGES BANK**
INVESTMENT MANAGEMENT

CEO FOREWORD

PAUL SIMPSON, CEO, CDP



This year needs to herald the start of a super decade of environmental and climate action. Limiting warming to 1.5°C means radically reducing industrial water demands and impacts.

2019 was the year the world woke up to the environmental crisis. The raging Australian bushfires and continued droughts were a wake-up call that climate change is no longer a distant potential threat; around the world millions of citizens filled the streets to demand urgent action from their leaders to tackle the crisis.

Water is at the front line of the environmental crisis and has been for more than a decade, driven by increasing demand, worsening pollution, and poor governance of water from both public and private sectors. Climate change is shifting rainfall patterns and hydrological cycles, exacerbating the already perilous situation.

Places and profits felt the brunt of the water crisis in 2019. In Caracas, Chennai and Harare millions of people's taps ran dry and disease outbreaks often followed. In October, Anglo American, one of the world's largest miners, saw a 28% drop in copper production amid the worst drought to hit Chile in sixty years¹. Meanwhile, in Chennai, one of the fastest growing economies in the world, large companies had to pay 30% more for water to be trucked to their offices and factories².

Warnings conveying the urgency of the crisis are coming from all angles: the World Resources Institute has revised its predictions of the water supply-demand deficit to 56% by 2030³; Moody's rang the alarm over the economic threat that drought and water stress poses to New South Wales, Australia⁴, and the World Bank has called attention to the economic, health and environmental damage caused by contaminated water⁵.

Companies in the food, textile, energy, industrial, chemicals, pharmaceuticals and mining sectors wield enormous influence over freshwater use and pollution globally. How these companies choose to grow will have a significant impact on freshwater resources. Their activities will make or break our ability to deliver a water-secure, zero-carbon future.

2020 is a critical year. Five years on from the launch of the UN SDGs and the Paris Agreement, the time has come for companies to take deeper, faster and more ambitious action in response to the global water crisis and unleash the transformation needed before 2030. This year needs to herald the start of a super decade of environmental and climate action. Limiting warming to 1.5°C means radically reducing industrial water demands and impacts.

We are already seeing great examples of water leadership. The number of the world's biggest

companies to have reached CDP's Water A List has doubled in the past year. It's also encouraging to see a majority of responding companies now setting corporate level goals or targets.

Yet, action is missing on vital issues. Businesses are failing to make the transition required to address the unfolding crisis. Globally, it is estimated that around 80% of wastewater is released back into the environment untreated⁶. And our analysis indicates that less than half of respondents regularly meter and monitor the quality of their discharges, while just 12% have set a water pollution reduction goal or target. This is a missed opportunity, not only for managing regulatory, litigation and reputational risks linked to poor management of dirty water, but also because wastewater is a valuable resource, largely untapped.

Transparency is the foundation for meaningful water action and business credibility. In 2019, companies representing a quarter of global market capitalization disclosed water security information through CDP. Disclosure of quality data leads to smarter decisions and informs investors, companies and governments of the actions they need to take. Our data will be key to providing insight into how improvements in corporate governance mechanisms translate into action and impact.

But, growing corporate action alone is not enough. Governments must urgently step up their ambition to give businesses the clarity and confidence they need to invest in a water-secure future. Those who act first on water will seize the benefits of the transition. CDP will continue to play its part by setting the standard and providing the tools to help us make the transition together. 2020 must be the year we all step in, without delay, and ramp up global ambition on water security.

Paul Simpson
CEO, CDP

1. <https://www.reuters.com/article/us-anglo-american-results/anglo-american-output-held-back-by-chile-drought-diamond-weakness-idUSKBN1ZM0WN>

2. <https://www.cnbc.com/2019/08/06/rapid-growth-of-indias-chennai-threatened-by-water-shortages.html>

3. Strong, C., Kuzma, S., Vionnet, S., and Reig., P. 2020. *Achieving Abundance: Understanding the Cost of a Sustainable Water Future*. Working Paper, Washington, DC: World Resources Institute. <https://wriorg.s3.amazonaws.com/s3fs-public/achieving-abundance.pdf>

4. https://www.moody.com/research/Moodys-Climate-related-risks-pose-long-term-credit-challenge-for-PBC_1211485

5. Damania, R., Desbureaux, S., Rodella, A., Russ, J., Zaveri, E. 2019. *Quality Unknown: The Invisible Water Crisis*. Washington, DC: World Bank. <https://openknowledge.worldbank.org/handle/10986/32245>

6. WWAP (United Nations World Water Assessment Programme). 2017. *The United Nations World Water Development Report 2017. Wastewater: The Untapped Resource*. Paris, UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000247153_eng

NORGES BANK INVESTMENT MANAGEMENT COMMENTARY



Water scarcity and pollution may pose business risks to companies. How these are managed may drive long-term returns for the fund as a shareholder.

Norges Bank Investment Management manages the assets of the Norwegian Government Pension Fund Global, currently amounting to more than US\$1 trillion. We work to safeguard and build financial wealth for future generations. Our objective is to secure the highest possible return with moderate risk.

Responsible investment is a key priority for the fund as it supports the long-term economic performance of our investments, and reduces financial risks associated with the environmental and social practices of companies in our portfolio. Water scarcity and pollution may pose business risks to companies. How these are managed may drive long-term returns for the fund as a shareholder. Externalities from unsustainable water use may also affect other companies and the fund's long-term value.

Every year we assess companies' water management efforts across indicators of governance, strategy, risk management, and disclosure of metrics and targets. We base these assessments on public disclosures, in many cases directly on responses to CDP's water security questionnaire. We rely on high quality corporate disclosures to inform our risk management, company engagements, voting and investment decisions. We recognize the important role CDP plays in ensuring consistency, comparability and a common repository of water data.

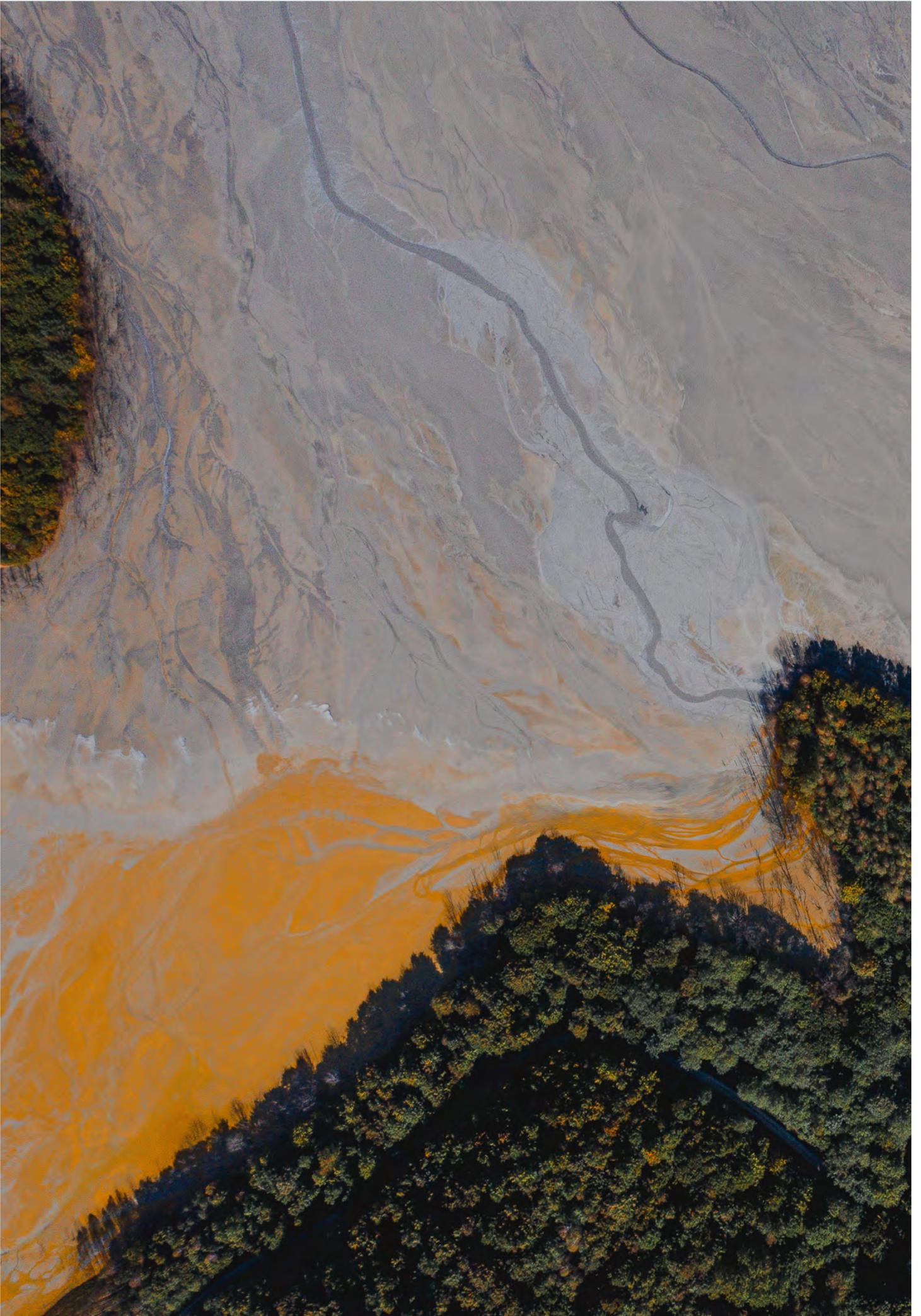
In 2019, our assessments covered 493 companies in the basic materials, chemicals, food and beverage, retail, pharmaceutical, industrial goods and services, oil and gas, and utilities industries. We saw a continued improvement in both the quantity and quality of companies' reporting on water management. More than 70 percent of the companies reported that the board was involved in water management and published policy documents on the topic. Almost as many reported on the actions they had taken to reduce water-related risks in their operations.

While companies are increasing their reporting on water withdrawals and consumption, our assessments show that only around one fourth of relevant companies report their water discharges per facility or water basin. Reporting on water quality and pollution is even more limited, partially due to a lack of consensus on which measurements to use. We were therefore excited to host a workshop in 2019 with CDP to discuss which information companies can disclose to demonstrate a comprehensive management of water quality issues in global agricultural supply chains. This is a challenging but important topic, and we look forward to seeing standards and practices evolve.

In 2019 CDP's water security program celebrated its ten-year anniversary, and we are proud to have been the lead sponsor since its inception. In a large part due to CDP's efforts, water reporting has come a long way since 2009. It is encouraging to see that the number of companies responding to the investor request has continued to increase to 875 this year, but more work is required to increase the relevance, quantity and quality of disclosures.

We would like to congratulate CDP on the release of the 2019 Global Water Report, and wish them the best of luck with their ambitious strategy for the next ten years.

Carine Smith Ihenacho
Chief Corporate Governance Officer
Norges Bank Investment Management



CONTENTS

6	About this report	30	Disclosure insights
7	Key findings	32	Water risk insights
8	Spotlight on pollution	34	Accelerating business action
10	Examples of pollutants of concern for human and ecosystem health	36	CDP's water scores 2019
12	Changing attitudes and regulations	37	CDP's water security A List 2019
14	Ramifications for business and investors alike	40	Appendix I Report methodology
20	Are companies taking action?	44	Appendix II Key indicators by sector
23	Opportunities - tapping the potential		
27	Insights on disclosure, risk and action		
28	CDP's water security program 2019 - 10 years on		



To read 2019 company responses in full, please go to <https://www.cdp.net/en/responses>

Important Notice

The contents of this report may be used by anyone providing acknowledgment is given to CDP Worldwide (CDP). This does not represent a license to repackaging or resell any of the data reported to CDP or the contributing authors and presented in this report. If you intend to repackaging or resell any of the contents of this report, you need to obtain express permission from CDP before doing so.

CDP has prepared the data and analysis in this report based on responses to the CDP 2019 information request. No representation or warranty (express or implied) is given by CDP as to the accuracy or completeness of the information and opinions contained in this report. You should not act upon the information contained in this publication without obtaining specific professional advice. To the extent permitted by law, CDP does not accept or assume any liability, responsibility or duty of care for any consequences of you or anyone else acting, or refraining to act, in reliance on the information contained in this report or for any decision based on it. All information and views expressed herein by CDP is based on their judgment at the time of this report and are subject to change without notice due to economic, political, industry and firm-specific factors. Guest commentaries where included in this report reflect the views of their respective authors; their inclusion is not an endorsement of them.

CDP, their affiliated member firms or companies, or their respective shareholders, members, partners, principals, directors, officers and/or employees, may have a position in the securities of the companies discussed herein. The securities of the companies mentioned in this document may not be eligible for sale in some states or countries, nor suitable for all types of investors; their value and the income they produce may fluctuate and/or be adversely affected by exchange rates.

'CDP Worldwide' and 'CDP' refer to CDP Worldwide, a registered charity number 1122330 and a company limited by guarantee, registered in England number 05013650.

© 2020 CDP Worldwide. All rights reserved.

ABOUT THIS REPORT

This report is aimed at companies and investors seeking to understand how they can better manage the business risks and opportunities associated with water security, with a particular focus on water pollution. It presents analyses from companies that were asked to provide data about their efforts to manage freshwater risks and impacts through CDP's water security questionnaire. CDP's water security program, now in its 10th year, supports companies to respond to stakeholder requests for increased transparency of water-related issues and incentivizes them to play their part in achieving water security for all.

This report presents an analysis of all companies that completed CDP's water security questionnaire in 2019 – the 2,433 companies that responded to a request through CDP from either their investors or their business customers. This is the first year that our global water report brings together these two datasets in order to provide a more holistic, market-based view that helps identify key trends at an industry and geographic level. Companies that voluntarily responded to the water security questionnaire are also included. The data set includes well known global companies such as Microsoft Corporation, Johnson & Johnson and Nestlé worth hundreds of billions of dollars, as well as smaller supply chain companies in manufacturing and materials sectors worth less than US\$500 million.

Whilst the number of disclosing companies increased again this year (2,433 up from 2,144 in 2018) more than 2,500 companies failed to meet investor or customer requests for data. These companies are missing opportunities to strengthen shareholder and customer confidence as well as opportunities to seize economic benefits in the forms of lower costs of capital.

In this report we shine a light on water pollution, an issue that has been grossly underestimated yet can severely affect business performance, as well as have widespread economic, human health and ecological implications. The report investigates the extent to which companies are taking action on pollution, and explores the opportunities this issue presents.



KEY FINDINGS

KEY FINDINGS

More companies than ever are disclosing on water issues and seeing the benefits of their disclosure:

- ▶ CDP's disclosure process enables companies to engage with the issues, benchmark their progress, and gives investors and customers the confidence that their interests are well managed. Companies that disclose through CDP have been found by recent research to have a greater ability to access capital than the average business⁷.

Double the number of companies are showing leadership on water issues; yet these companies are just the tip of the iceberg

- ▶ Many companies seem to be unaware of their exposure to water risks and are failing to take basic steps such as monitoring and setting targets. Progress exists with some management indicators, but this is yet to turn into reduced impacts on the ground.

The economic imperative to turn the world's water crisis around is stronger than ever

- ▶ The combined business value at risk reported in 2019 topped out at US\$425 billion. Our analysis suggests that this figure may be an underestimate, however, as respondents failed to provide financial values for half of the risks they face.

Companies may be blind to the risks and opportunities posed by water pollution

- ▶ The World Bank warns of an "invisible" crisis of water quality profoundly affecting societies and economies. In response, governments globally are moving to ban toxic chemicals, from plastics to PFAS. However, just 10% of respondents recognize water pollution as a top risk and most, in turn, may be missing opportunities to manage and gain related competitive advantages.

BACK TO BASICS

This report highlights the need for companies to double down on achieving absolute impact reduction, cutting through some of the complexity that has surrounded water stewardship in recent years. Science tells us that there is not enough clean freshwater to meet all needs in an increasing number of locations and to an increasing extent. As governments move to ensure the needs of their citizens and natural environments are met, business is having to learn to do more with less. Those that are learning to grow differently and with resilience are those:

- ▶ Reducing overall water withdrawals and consumption in their direct operations and throughout their value chains, with particular attention to water stressed areas and products with high water demands.
- ▶ Eliminating pollution incidents, treating water discharged to the environment, incentivizing suppliers to do the same and designing out pollution from products and services.
- ▶ Setting and making progress against targets for water consumption, withdrawals and pollution that help decouple growth from a dependence on water.

The business transformation required to execute these actions should not be underestimated, especially within a context of shifting regulation and public attitudes, particularly around pollution. The race to deliver a water secure future has begun.

7. Craig, M., Coulombe, E., Nostrat, A. 2019. *The Role of CDP Disclosure to Improve Access to Capital*. Research Note: Millani. https://f01c8ee6-cac3-40ff-a0e4-8bfb54f2b88b.filesusr.com/ugd/66e92b_30b06fd11b9c43d88428f768676e9a8b.pdf

SPOTLIGHT ON POLLUTION

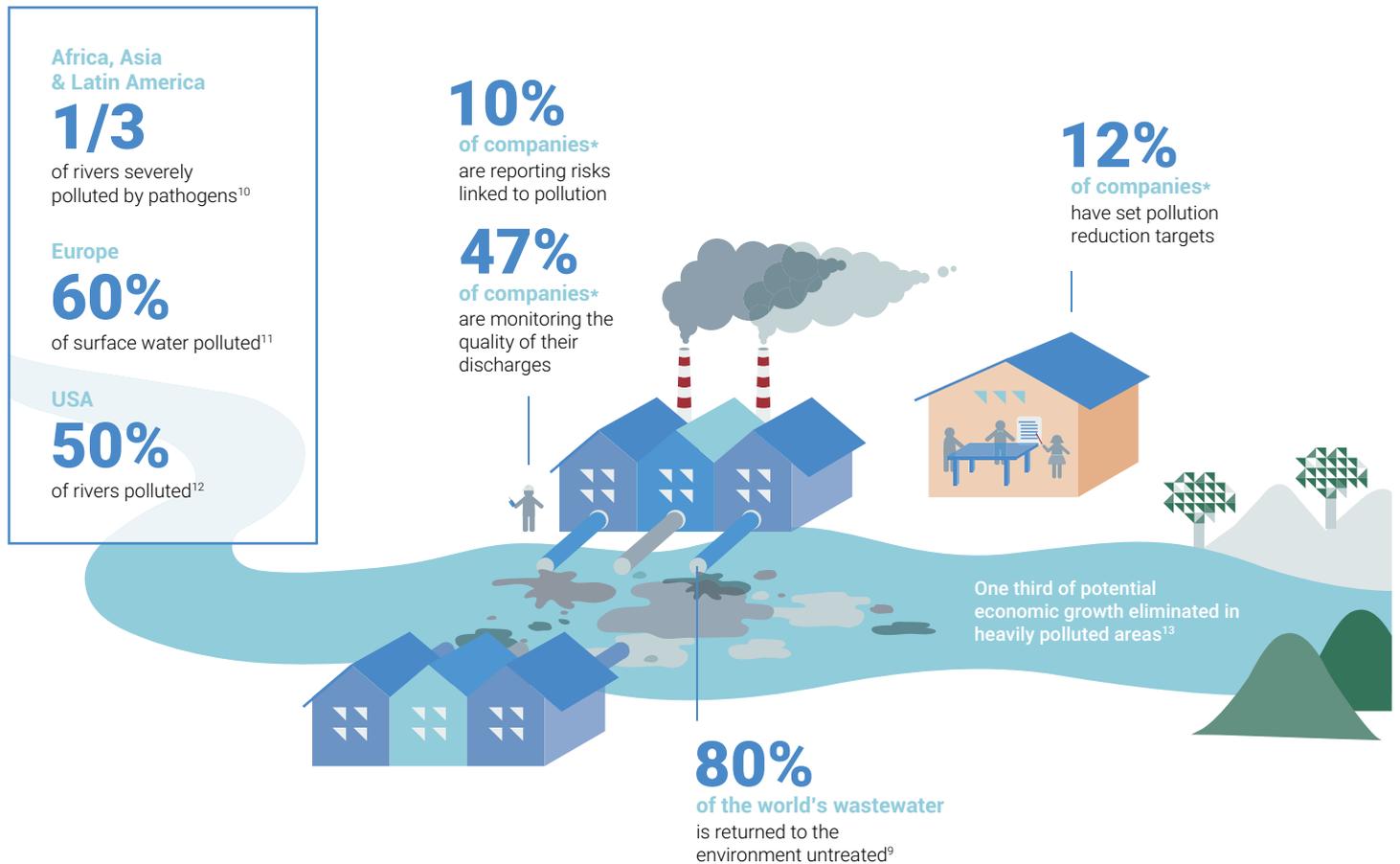


SPOTLIGHT ON POLLUTION

The challenges of water quantity - namely droughts and floods - frequently hit the headlines, leaving the issues of worsening water quality underappreciated and underestimated. However, analysis of the largest water quality global database by the World Bank warns of an “invisible crisis” that is threatening human and environmental well-being, whilst slashing the economic potential of heavily polluted areas⁸.

Large industrial companies find themselves on the front line of this crisis and are key to addressing it. The choices they make have the potential to either deliver business resilience, commercial opportunities and better environmental and public health outcomes, or erode business value and undermine shareholder confidence.

On one hand, they are significant contributors to the problem. Those putting pollutants, from plastics to pesticides, pharmaceuticals to PFAS (more commonly known as “forever chemicals”), into the environment and into the market, have ethical, financial and legal obligations to reduce or even eliminate pollution. On the other hand, companies can realise competitive advantage in managing their pollution potential. Wastewater, for example, represents a vast untapped resource of heat, power and high-value products. In addition, the growth in consumer demand for products that have lower pollution potential is a bright spot on the horizon that companies can ill afford to miss.



*Percentage of companies responding to CDP's 2019 water security questionnaire

8. Damania, R., Desbureaux, S., Rodella, A., Russ, J., Zaveri, E. 2019. *Quality Unknown: The Invisible Water Crisis*. Washington, DC: World Bank. <https://openknowledge.worldbank.org/handle/10986/32245>

9. UNEP. 2016. *A Snapshot of the World's Water Quality: Towards a global assessment*. United Nations Environment Programme, Nairobi, Kenya. https://uneplive.unep.org/media/docs/assessments/unep_wwqa_report_web.pdf

10. UNEP. 2016. *A Snapshot of the World's Water Quality: Towards a global assessment*. United Nations Environment Programme, Nairobi, Kenya. https://uneplive.unep.org/media/docs/assessments/unep_wwqa_report_web.pdf

11. 60% of surface waters in the EU have not achieved good ecological status. <https://www.eea.europa.eu/publications/state-of-water/>

12. <https://www.nrdc.org/stories/water-pollution-everything-you-need-know>

13. Damania, R., Desbureaux, S., Rodella, A., Russ, J., Zaveri, E. 2019. *Quality Unknown: The Invisible Water Crisis*. Washington, DC: World Bank. <https://openknowledge.worldbank.org/handle/10986/32245>

EXAMPLES OF POLLUTANTS OF CONCERN FOR HUMAN AND ECOSYSTEM HEALTH

	Impacts
 <p>Plastics</p>	<p>Plastic pollution is associated with many sectors: from the Apparel sector's production and use of synthetic fibres to the heavy use of plastic packaging by Food & Beverage and Pharmaceuticals sectors. Washing clothes releases half a million tonnes of microfibrils into the ocean every year¹⁴. Although the ecological impacts of plastics have been widely reported, the long-term effects of microplastic ingestion on the human body are not yet known¹⁵. These sectors are facing increasing reputational and regulatory risks associated with plastics, so too are companies in the petrochemical sector, the source of plastic production.</p>
 <p>PFAS</p>	<p>Poly and perfluoroalkyl substances (PFAS), a class of more than 4,000 chemicals, are ubiquitous and found in cleaning products, non-stick cookware, waterproof coats, stain resistant carpet, food packaging and even tap water. In 2016, research found that at least six million Americans were drinking PFAS-contaminated drinking water that exceeded US Environmental Protection Agency (EPA) recommendations¹⁶. They are a cause for concern because they do not break down in the environment and research suggests they pose a variety of human health risks including cancer, birth defects, thyroid disease and liver damage¹⁷.</p>
 <p>Pharmaceuticals</p>	<p>Even low concentrations of active pharmaceutical ingredients in water and soil can cause harm to the environment¹⁸. For example:</p> <ul style="list-style-type: none"> ▶ Antimicrobial drugs – spread the antibiotic resistance of bacteria and fungi¹⁹, causing the drugs to become ineffective in humans. ▶ Hormone preparations and oral contraceptives – contain synthetic estrogen which can affect the capacity of aquatic species to reproduce²⁰.
 <p>Mining waste</p>	<p>Contamination of surface and groundwater occurs from mine tailings and scrape rocks. Pollutants of concern include:</p> <ul style="list-style-type: none"> ▶ Metals - cadmium, chromium, copper, cobalt, lead, manganese, mercury, silver, thallium, zinc ▶ Metalloids – antimony and arsenic ▶ Asbestos <p>These can have long term and harmful effects on biodiversity as well as public health. For example cadmium, nickel and chromium are carcinogenic; manganese and mercury can lead to mental disorders²¹; and asbestos, recently found in beauty products, can cause lung cancer²².</p>

14. <https://www.unenvironment.org/news-and-stories/story/putting-brakes-fast-fashion>

15. <https://www.who.int/news-room/detail/22-08-2019-who-calls-for-more-research-into-microplastics-and-a-crackdown-on-plastic-pollution>

16. Xindi H. et al. 2016. Detection of Poly- and Perfluoroalkyl Substances (PFASs) in U.S. Drinking Water Linked to Industrial Sites, Military Fire Training Areas, and Wastewater Treatment Plants. *Environmental Science & Technology Letters*. 2016, 3, 10, 344-350. <https://pubs.acs.org/doi/10.1021/acs.estlett.6b00260>

17. <https://www.nationalgeographic.com/science/2020/01/pfas-contamination-safe-drinking-water-study/>

18. Weiss, F.T., Leuzinger, M., Zurbrugg C., Eggen, R.I.L. 2016. *Chemical Pollution in Low- and Middle-Income Countries*. Eawag: Swiss Federal Institute of Aquatic Science and Technology.

19. European Commission. 2019. Communication from the Commission to the European Parliament, the Council and the European Economic and Social Committee. European Union Strategic Approach to Pharmaceuticals in the Environment. COM/2019/128 final. <https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:52019DC0128>

20. Kidd, A., Blanchfield, P.J., Mills, K.H., Palace, V.P. Evans, R.E. Lazorchak, J. M., Flick R.W. 2007. Collapse of a Fish Population after Exposure to a Synthetic Estrogen. *Proceedings of the National Academy of Sciences*. 104(21):8897-901. https://www.researchgate.net/publication/6314305_Collapse_of_a_Fish_Population_After_Exposure_to_a_Synthetic_Estrogen

21. Ugya, A.Y., Ajibade, F.O. and Ajibade, T.F. 2018. *Water Pollution Resulting From Mining Activity: An Overview*. The Federal University of Technology, Akure, Nigeria. https://www.researchgate.net/publication/326925600_Water_Pollution_Resulting_From_Mining_Activity_An_Overview

22. <https://www.cbsnews.com/news/asbestos-in-makeup-claires-beauty-plus-global-fda/>

EXAMPLES OF POLLUTANTS OF CONCERN FOR HUMAN AND ECOSYSTEM HEALTH

	Impacts
 <p>Textile chemicals</p>	<p>Textile mills generate one-fifth of the world's industrial water pollution and use 20,000 chemicals²³. Textile dyeing is the second largest polluter of water globally²⁴. Each stage of textile processing has the potential to release pollutants into the freshwater environment, for example²⁵:</p> <ul style="list-style-type: none"> Washing and sourcing operations: non-biodegradable surfactants (alkyl phenol ethoxylates or APEs); organic solvents (phenols). Dyeing operations: benzidine-based azo dyes; sulfur dyes; dyes and dyeing carriers containing heavy metals or chlorines. Bleaching operations: sulfur and chlorine-based bleaching agents; caustic soda, acids and surfactants. Cloth protection: hazardous pesticides for natural fabrics; plasticizers and flame retardants for synthetic fabrics. <p>As well as harming the environment, these chemicals can be dangerous to human health. For instance, benzidine-based chemicals used for dyeing are classified as carcinogenic by the US EPA²⁶.</p>
 <p>Agricultural pollutants</p>	<p>Fertilizers and other agricultural chemicals reach surface and groundwater through soil erosion and leaching, causing major environmental threats and public health concerns²⁷.</p> <ul style="list-style-type: none"> Fertilizers – nutrients such as nitrogen and phosphorus can become contaminants when they reach surface and groundwater, causing excessive eutrophication and oxygen depletion²⁸. Pesticides – including organochlorine insecticides, organophosphates, carbamates, triazines, bipyridylium herbicides, pyrethroids. Several, especially the organochlorines, have a high toxic and bioaccumulation potential; their effects on environmental and human health are often unknown or unclear²⁹. Livestock manure – contains considerable quantities of nutrients, oxygen depleting substances and pathogens and, in intensive systems, also heavy metals, drug residues, hormones and antibiotics. These can reach water via leaching and runoff from livestock farms as well as through the application of manure to agricultural land as organic fertilizer³⁰.
 <p>Oil & Gas pollutants</p>	<p>Petroleum Hydrocarbons (PHCs) are the constituent parts of oil products such as gasoline and diesel. Their release into the aquatic environment can occur at several stages within the Oil & Gas sector - from extraction through to combustion - with oil spills being the most notable. Petroleum hydrocarbons include:</p> <ul style="list-style-type: none"> Polycyclic aromatic hydrocarbons (PAHs) - persistent in the environment and bioaccumulate in aquatic organisms. For humans, long term exposure to PAHs, through drinking water or fish consumption, can result in cataracts and kidney and liver damage³¹. Monoaromatics such as Benzene – these are less persistent but can be toxic. Benzene, for example, is known to be carcinogenic³². <p>There are also non-hydrocarbon pollutants associated with the Oil & Gas sector that can detrimentally impact biodiversity and human health. Produced water, a by-product of crude oil production, can contain high concentrations of salts, organic and inorganic chemicals, and naturally occurring radioactive material (NORM)³³.</p>

23. <https://www.nrdc.org/issues/encourage-textile-manufacturers-reduce-pollution>

24. UNEP. 2018. *Putting the brakes on fast fashion*. United Nations Environment Programme, Nairobi, Kenya. <https://www.unenvironment.org/news-and-stories/story/putting-brakes-fast-fashion>

25. Weiss, F.T., Leuzinger, M., Zurbrugg C., Eggen, R.I.L. 2016. *Chemical Pollution in Low- and Middle-Income Countries*. Eawag: Swiss Federal Institute of Aquatic Science and Technology. https://www.eawag.ch/fileadmin/Domain1/Abteilungen/sandec/publikationen/Chemical_Pollution/Lamics-WEB.pdf

26. EPA. 2016. Fact Sheet: *Benzidine-Based Chemical Substances*. United States Environmental Protection Agency, Washington D.C., USA.

27. Divya, J., and Belagali, S.L. 2012. *Impact of chemical fertilizers on water quality in selected agricultural areas of Mysore district, Karnataka, India*. <https://pdfs.semanticscholar.org/2db9/4493a5530ea66dd4758c8056b4631b7de101.pdf>

28. <https://www.wri.org/our-work/project/eutrophication-and-hypoxia/sources-eutrophication>

29. Weiss, F.T., Leuzinger, M., Zurbrugg C., Eggen, R.I.L. 2016. *Chemical Pollution in Low- and Middle-Income Countries*. Eawag: Swiss Federal Institute of Aquatic Science and Technology. https://www.eawag.ch/fileadmin/Domain1/Abteilungen/sandec/publikationen/Chemical_Pollution/Lamics-WEB.pdf

30. <http://www.fao.org/3/a-i7754e.pdf>

31. <http://www.idph.state.il.us/cancer/factsheets/polycyclicaromatichydrocarbons.htm>

32. Shores, A. and Laituri, M. 2018. The state of produced water generation and risk for groundwater contamination in Weld County, Colorado. *Environmental Science and Pollution Research*, 25(30), <https://link.springer.com/article/10.1007%2F11356-018-2810-8>

33. Huff, J. 2007. Benzene-induced Cancers: Abridged History and Occupational Health Impact. *International Journal of Occupational and Environmental Health*, 13(2), <https://www.tandfonline.com/doi/abs/10.1179/oeh.2007.13.2.213>

CHANGING ATTITUDES AND REGULATIONS

In the pursuit of a water secure, zero carbon future, regulators worldwide are taking action to drive a transition away from polluting behaviours and products.

For example:

- ▶ In March 2019, the European Parliament approved a law to ban single-use plastic. The “Single-Use Plastics Directive” – Directive (EU) 2019/904. **Mitsubishi Chemicals Holdings Corporation** anticipates US\$1.4 billion worth of disruption to its sales and value chain if similar regulations are introduced worldwide.
- ▶ In March 2019, the State of New Jersey directed chemical manufacturers to pay millions of dollars to clean-up PFAS³⁴. The directive was issued under New Jersey’s Spill Compensation and Control Act, under the Water Pollution Control Act and Air Pollution Control Act. The issue has been gaining traction amongst national policy makers. In January 2020, the US House of Representatives passed a resolution to require the Administrator of the Environmental Protection Agency to designate PFAS as hazardous substances under the Comprehensive Environmental Response; this will be voted on in the Senate in late 2020^{35,36}.
- ▶ In 2018, Chinese regulators undertook the largest nationwide plant inspection in history, and closed tens of thousands of supplier companies for water pollution breaches against a range of regulatory standards^{37,38}. A number of companies recorded risks in 2019 associated with tightening of Chinese regulations, including **DIC Corporation, Wus, PVH Corp and Ford Motor company**.
- ▶ The European Water Framework Directive (2000/60/EC) aims to achieve good ecological status in water bodies of member states. This has driven tighter corporate regulatory approaches in a number of states. For example, in 2019, **K + S AG** reported risk of refusal or revocation of permits for the disposal of saline residues from its Potash and Magnesium Products business unit. Meanwhile **ENAGAS**, a Spanish oil and gas storage and transportation company, reported risks of fines, penalties, and enforcement orders for discharge permits issued by River Basin Authorities.

This regulatory shift may, in part, be driven by a citizen awakening that is taking place. A late 2018 survey of 7,000 consumers across seven European markets, garnering their views on plastic packaging, packaging recyclability and related green policies, found that 52% of consumers are boycotting brands over sustainability concerns with packaging³⁹. Consumer attitudes are fueled by the campaigns of civil society such as Greenpeace’s Detox and Dirty Laundry campaigns⁴⁰ (aimed at the Apparel sector), and the Break Free from Plastic campaign⁴¹.

Such shifts in attitudes and regulation will challenge the fundamental nature of some industries. The fight against plastic pollution is a case in point. From having little impact on the climate just 20 years ago, the production and disposal of plastic now uses nearly 14% of all the world’s oil and gas⁴². Changing regulations and attitudes mean that those industries manufacturing plastics and using plastics in their products will need to undergo business transformation if they wish to thrive. For example, Schrodgers estimated that due to new laws and taxes, beverage companies that fail to reduce reliance on virgin plastics could see annual profits drop by 5% over the next decade⁴³. Meanwhile, consulting firm Accenture estimated that petrochemical demand growth could drop by one third, to about 1.5% a year, if recycling is dramatically improved and laws reduce the amount of plastic allowed for single-use applications⁴⁴.

34. State of New Jersey, Department for Environmental Protection. 2019. *DEP directs five chemical companies to fund removal of extensive PFAS contamination throughout State*. https://www.nj.gov/dep/newsrel/2019/19_0018.htm

35. H.R. 535 – 116th Congress: PFAS Action Act of 2019. <https://www.govtrack.us/congress/bills/116/hr535/text>

36. This is happening in the context of the Trump administration allowing companies to pollute without penalty during the coronavirus pandemic. <https://www.theguardian.com/environment/2020/mar/27/trump-pollution-laws-epa-allows-companies-pollute-without-penalty-during-coronavirus>

37. <https://www.forbes.com/sites/trevornace/2017/10/24/china-shuts-down-tens-of-thousands-of-factories-in-widespread-pollution-crackdown/#3dc89f4f4666>

38. <https://cen.acs.org/articles/96/i7/Drug-chemical-makers-brace-China.html>

39. <https://www.procarton.com/wp-content/uploads/2018/10/European-Consumer-Packaging-Perceptions-study-October-2018.pdf>

40. <https://www.greenpeace.org/international/act/detox/>; <https://www.greenpeace.org/international/publication/7168/dirty-laundry/>

41. <https://www.breakfreefromplastic.org/>

42. IEA. 2018. *The Future of Petrochemicals: Towards more sustainable plastics and fertilisers*. International Energy Agency, Paris, France. <https://webstore.iea.org/download/summary/2310?fileName=English-Future-Petrochemicals-ES.pdf>

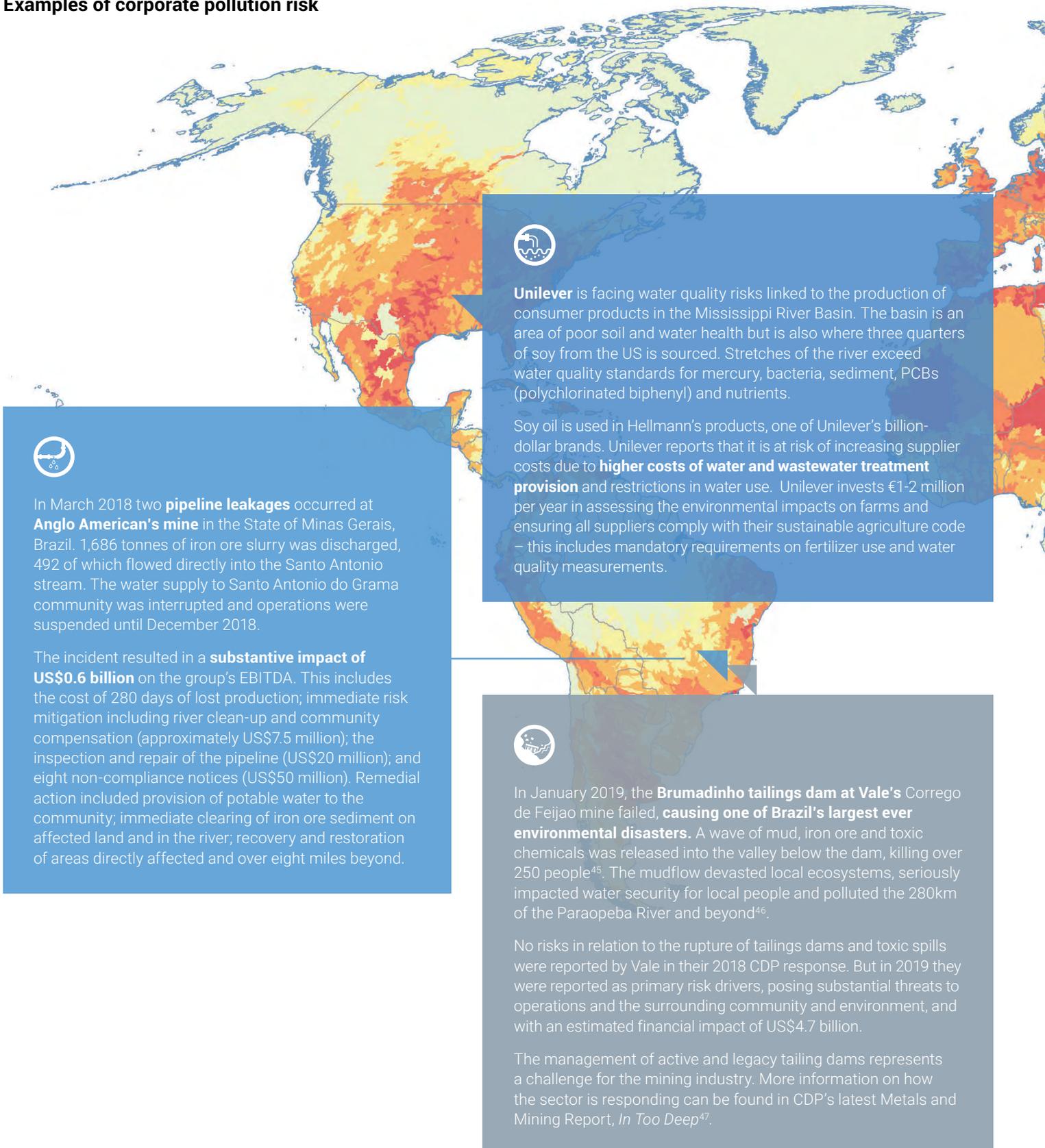
43. Suchak, S., Irving, E. 2018. *Plastics phase-out: Exposure through the value chain*. Schrodgers. <https://www.schrodgers.com/en/insights/economics/plastics-phase-out-exposure-through-the-value-chain/>

44. <https://www.euractiv.com/section/energy/news/how-europes-war-on-plastics-is-affecting-petrochemicals/>



RAMIFICATIONS FOR BUSINESS AND INVESTORS ALIKE

Examples of corporate pollution risk



In March 2018 two **pipeline leakages** occurred at **Anglo American's mine** in the State of Minas Gerais, Brazil. 1,686 tonnes of iron ore slurry was discharged, 492 of which flowed directly into the Santo Antonio stream. The water supply to Santo Antonio do Gramma community was interrupted and operations were suspended until December 2018.

The incident resulted in a **substantive impact of US\$0.6 billion** on the group's EBITDA. This includes the cost of 280 days of lost production; immediate risk mitigation including river clean-up and community compensation (approximately US\$7.5 million); the inspection and repair of the pipeline (US\$20 million); and eight non-compliance notices (US\$50 million). Remedial action included provision of potable water to the community; immediate clearing of iron ore sediment on affected land and in the river; recovery and restoration of areas directly affected and over eight miles beyond.



Unilever is facing water quality risks linked to the production of consumer products in the Mississippi River Basin. The basin is an area of poor soil and water health but is also where three quarters of soy from the US is sourced. Stretches of the river exceed water quality standards for mercury, bacteria, sediment, PCBs (polychlorinated biphenyl) and nutrients.

Soy oil is used in Hellmann's products, one of Unilever's billion-dollar brands. Unilever reports that it is at risk of increasing supplier costs due to **higher costs of water and wastewater treatment provision** and restrictions in water use. Unilever invests €1-2 million per year in assessing the environmental impacts on farms and ensuring all suppliers comply with their sustainable agriculture code – this includes mandatory requirements on fertilizer use and water quality measurements.



In January 2019, the **Brumadinho tailings dam at Vale's** Corrego de Feijao mine failed, **causing one of Brazil's largest ever environmental disasters**. A wave of mud, iron ore and toxic chemicals was released into the valley below the dam, killing over 250 people⁴⁵. The mudflow devastated local ecosystems, seriously impacted water security for local people and polluted the 280km of the Paraopeba River and beyond⁴⁶.

No risks in relation to the rupture of tailings dams and toxic spills were reported by Vale in their 2018 CDP response. But in 2019 they were reported as primary risk drivers, posing substantial threats to operations and the surrounding community and environment, and with an estimated financial impact of US\$4.7 billion.

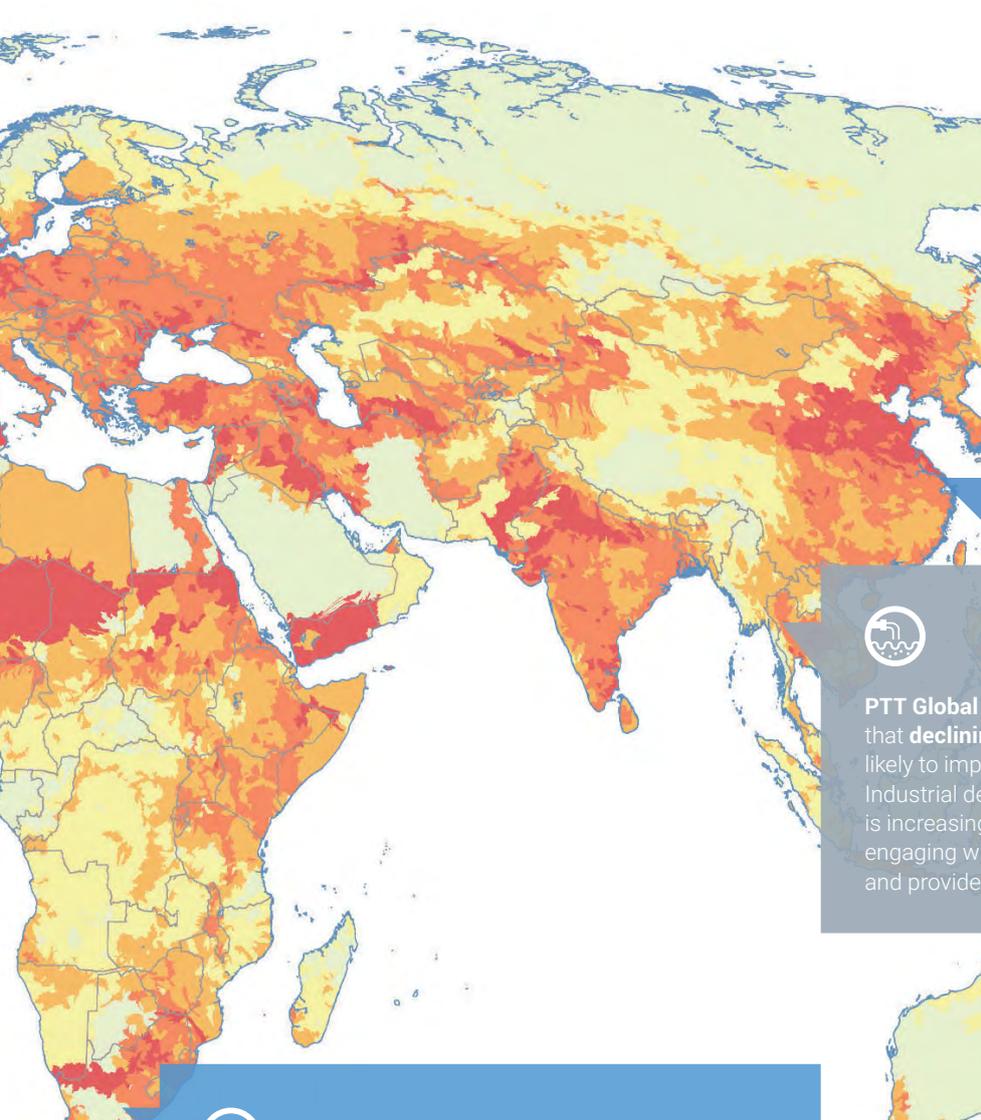
The management of active and legacy tailing dams represents a challenge for the mining industry. More information on how the sector is responding can be found in CDP's latest Metals and Mining Report, *In Too Deep*⁴⁷.

45. <https://www.reuters.com/article/us-vale-sa-disaster-exclusive/exclusive-brazil-prosecutor-aims-to-charge-vale-within-days-over-mining-waste-dam-disaster-idUSKBN1Z72GS>

46. <https://www.theguardian.com/world/2019/jan/29/the-river-is-dying-the-vast-ecological-cost-of-brazils-mining-disasters>

47. https://6fefcbb86e61af1b2fc4-c70d8ead6ced550b4d987d7c03fcd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/004/613/original/CDP_Metals_and_mining_report_2019.pdf?1561049112

RAMIFICATIONS FOR BUSINESS AND INVESTORS ALIKE



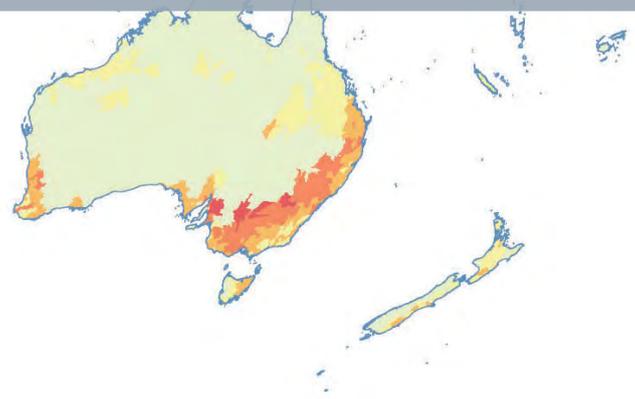
Wus, a Chinese electrical component manufacturer, is expecting a drastic reduction in its production capacity as a result of **increased state control over the discharge of pollutants** in the Yangtze river basin. Government departments are tightening emissions targets for pollutants and restricting wastewater discharges. The company is investing in improving its wastewater treatment and recycling to reach the required standards; it is also engaging positively with the regulatory authorities.



PTT Global Chemical, a Thai fossil fuel company, reports that **declining water quality of upstream reservoirs** is very likely to impact on their operating costs within the year. Industrial development and community expansion upstream is increasing the turbidity and conductivity of water. PTT is engaging with water suppliers who monitor the water quality and provide warnings.



Barloworld Limited is an industrial brand management company based in South Africa. The company reports that its **share price and ability to attract and retain key talent and capital could be affected by reputational issues**. For example, companies within the group may discharge pollutants to a local water body or become involved in conflicts over water claims, negatively impacting that company's reputation in a local community, with the general public and/or regulators. This could translate into reduced demand for Barloworld's products and services and an increase in mitigation costs.



Water Quality Risk scale



Very low risk (0-1)

Very high risk (4-5)

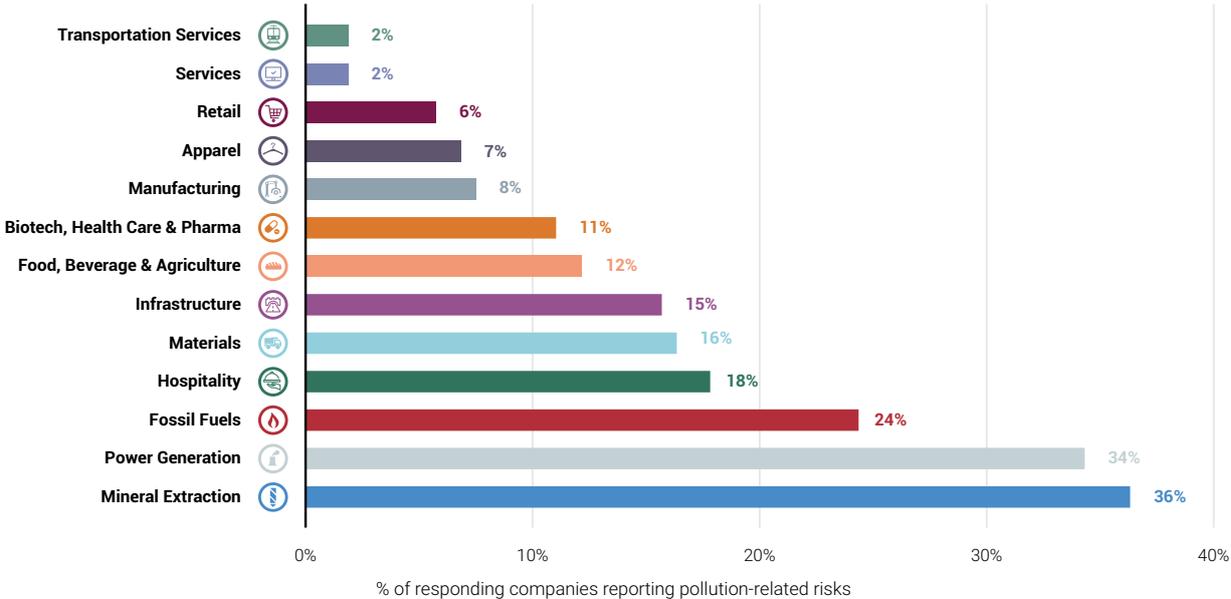
Water Quality Risk Layer © 2020 WWF Water Risk Filter. The WWF Water Risk Filter's Water Quality Risk Layer is based on the study of Vörösmarty et al. (2010)⁴⁸, which compiled a broad suite of pollutants with well documented direct or indirect negative effects on water security for both humans and freshwater, namely, nitrogen, phosphorus, pesticide, sediment, and organic loading (BOD) as well as soil salinization, mercury deposition, potential acidification, and thermal alteration. For more information please refer to the Water Risk Filter Methodology at <https://waterriskfilter.panda.org/en/Explore/DataAndMethod>

48. Vörösmarty, C. J., McIntyre, P. B., Gessner, M. O., Dudgeon, D., Prusevich, A., Green, P., ... & Davies, P. M. 2010. Global threats to human water security and river biodiversity. *Nature*, 467(7315), 555. <https://www.nature.com/articles/nature09440>

RAMIFICATIONS FOR BUSINESS AND INVESTORS ALIKE

Here, data on pollution are presented from responses to CDP's 2019 water security questionnaire. The methodology for the analysis is presented in Appendix II.

Pollution risk exposure by sector

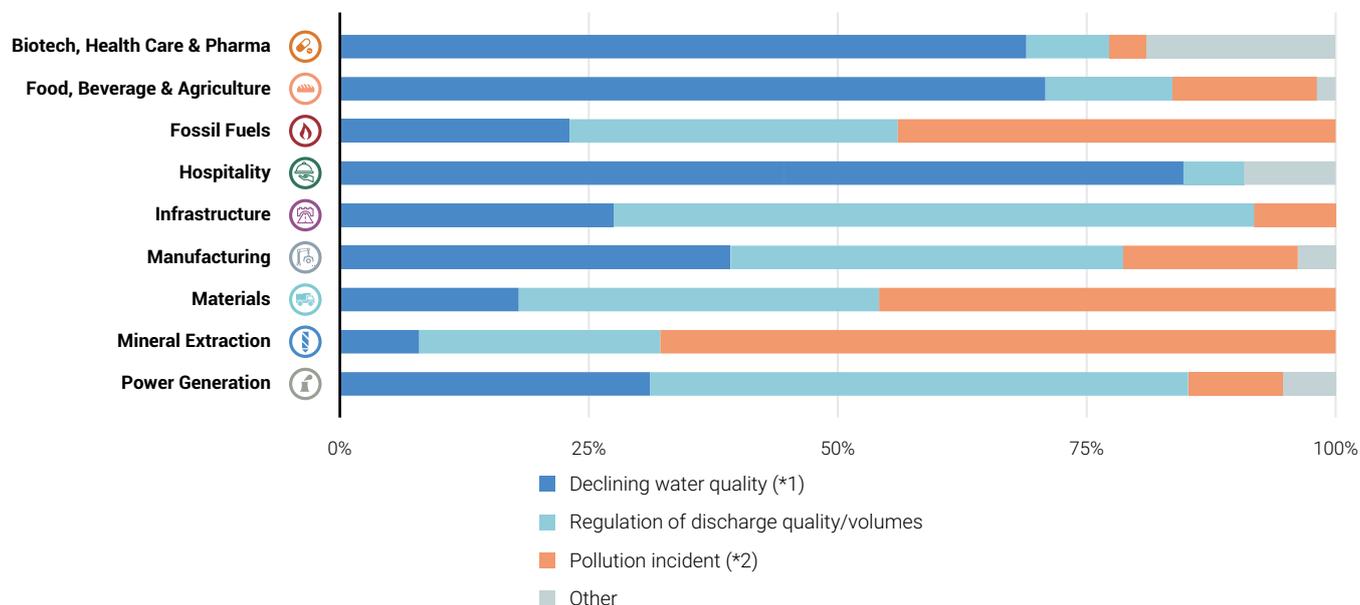


There may be more pollution-related risks than those analyzed here due to differences in approach to reporting risks amongst companies. Our methodology for analyzing risks is explained in Appendix I.



RAMIFICATIONS FOR BUSINESS AND INVESTORS ALIKE

Major risk drivers related to pollution - by sector



This graph excludes Apparel, Retail, Services and Transportation Services sectors as these sectors reported less than 4 pollution-related risks in total.

*1: "Declining water quality" includes risks reported as 'Other, please specify' that were related to declining ambient water quality.

*2: "Pollution incidents" includes risks reported as the leaching of pollutants to groundwater bodies, the pollution of water bodies due to fertilizers (and other chemical use or animal use), rupture of tailings dams and toxic spills, etc.

The root causes of pollution-related risks for companies and their investors are:

- ▼ The potential for a company to release pollutants into freshwater, leading to fines or penalties as well as brand damage and loss of social license to operate due to community opposition.
- ▼ A heavy dependence on polluting properties in the goods and services sold by companies, leading to hits on profitability due to product bans or reduced customer demands.
- ▼ A decline in the quality of water necessary for core business processes, leading to disruptions in production and increased costs.

RAMIFICATIONS FOR BUSINESS AND INVESTORS ALIKE

Sector	Example company, region	Risk	Impact	Likelihood; timeframe	Potential financial impact
Mineral Extraction	Kumba Iron Ore, South Africa	Regulation of discharges: developing regulatory environment in South Africa. Draft regulations associated with lining of pollution control infrastructure and mine residue dumps; water liability in closure costs; and requirements to internalize costs associated with waste/pollution.	Medium to high impact. Cost increases.	Very likely; 1-3 years	US\$7.7 million
Power Generation	EDF, France	Regulation of discharges: compliance with river water temperature limits, particularly during heat waves.	Medium to high impact. Reduction or disruption in production capacity – shutdown or decrease in capacity, mainly of nuclear fleet.	More likely than not; 4-6 years	US\$33-330 million
Fossil Fuels	PTT Global Chemical, Thailand	Declining water quality: more frequent reports of increased turbidity in upstream reservoirs due to industrial development and community expansion.	High impact. Increased operating costs.	Very likely; current	Approx 0.1% of EBITDA
Hospitality	Caesars Entertainment, Mississippi, USA	Declining water quality: the upstream land of the Mississippi River basin is poorly protected, leading to poor water quality.	Medium to high impact. Increased operating costs. Quality and lifetime of water-using equipment will degrade under poor water quality leading to increased maintenance costs.	Likely; more than 6 years	US\$0.8-1.2 million
Materials	Mitsubishi Materials Corporation	Pollution incidents including leaching of pollutants to groundwater.	High impact. Regulatory and reputational risks associated with discharges of its wastewater from copper production.	Likely	No data provided
Infrastructure	Zhejiang Narada power source co., Ltd, China	Pollution incidents: excessive emissions or environmental accidents by suppliers of heavy metals.	Medium to high impact. Penalties or suspension of production.	Likely	No data provided
Food, Beverage & Agriculture	Nestlé, Switzerland	Declining water quality: pollution of Henniez springs by farming practices posing a risk to quality of product.	High impact. Constraint to growth.	Very likely; 1-3 years	US\$6 million
Biotech, Health Care & Pharma	Netcare Ltd, South Africa	Declining water quality of municipal wastewater.	High impact.	Very likely; 1-3 years	US\$4.8 million
Manufacturing	Syngenta	Pollution incidents in supply chain and due to improper use of products.	Medium-high impact. Loss of license to operate; reduced revenues from lower sales/output.	About as likely as not; 1-3 years	No data provided
Apparel	Kering, China	Regulatory and brand damage risk: increasing scrutiny of the textile industry since Greenpeace's Detox campaign ⁴⁹ .	Medium-high impact.	Likely; current	No data provided
Retail	Associated British Foods, Mozambique	Declining water quality: increased salinity of river water, posing a risk to sugar cane quality.	High impact. Reduction or disruption in production capacity.	Very likely; 1-3 years	No data provided
Services	Redefine Properties Ltd, South Africa	Declining municipal water quality causing inability to supply potable water and potential damage to infrastructure and equipment.	Medium impact. Impact on company assets.	More likely than not, 4-6 years	No data provided

49. <https://www.greenpeace.org/international/act/detox/>

RAMIFICATIONS FOR BUSINESS AND INVESTORS ALIKE

A small group of respondents are beginning to understand the implications of water pollution, particularly those in the Mineral Extraction, Power Generation, Fossil Fuels and Hospitality sectors. However, our analysis suggests that most respondents may be blind to the risks they face, with 90% of all respondents reporting no pollution-related risk.

This low level of reporting may reflect traditionally low financial impacts of regulatory fines and penalties, which often appear merely as noise on a profit and loss sheet and lead to a false impression of immateriality. However, companies that get ahead of the trend for tighter environmental protection and mounting consumer concern will be those that reap the rewards.

These findings corroborate with analysis of Food and Beverage companies shared during an NBIM roundtable session co-hosted with CDP to explore pollution management in agricultural supply chains. Out of 598 companies analyzed, few report on water quality issues, focusing instead on water withdrawals and consumption⁵⁰.



**US
\$20.8
billion**

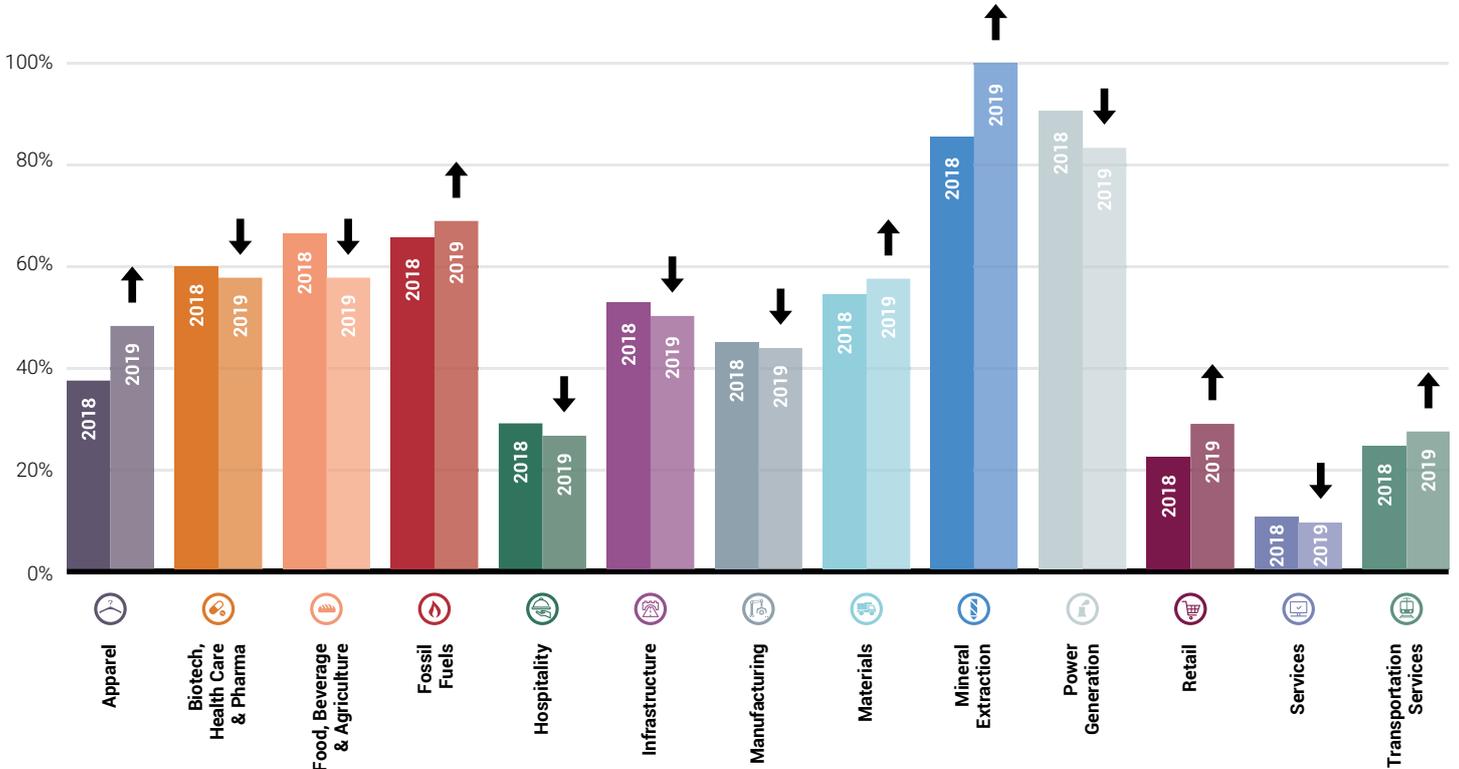
largest environmental damage settlement in United States history resulting from the Deepwater Horizon explosion which took place a decade ago⁵¹

50. Finding presented at a roundtable on water quality in the Food & Beverage sector, co-hosted by NBIM and CDP, 2019.

51. <https://www.justice.gov/enrd/file/834511/download>

ARE COMPANIES TAKING ACTION?

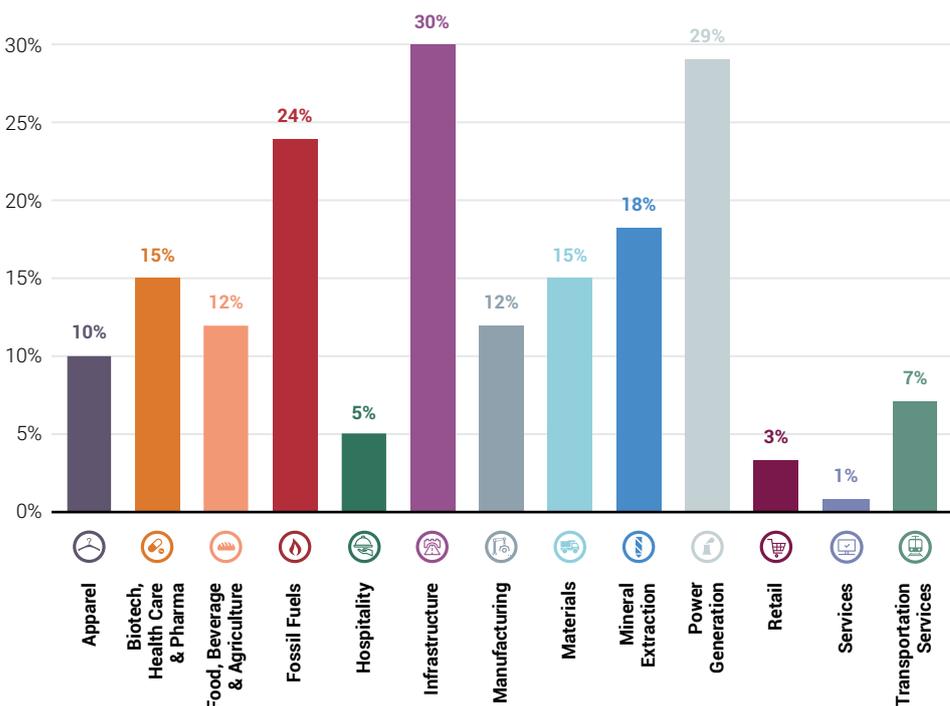
Monitoring discharges by sector



% of responding companies per sector that are monitoring the quality of discharges at 75% of facilities or more

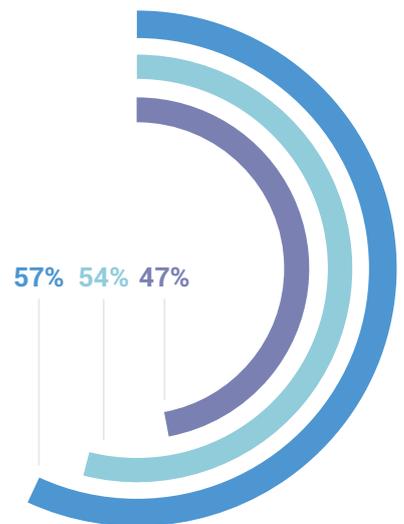
Some companies changed their sector classification between 2018 and 2019. Therefore the differences between 2018 and 2019 can only give an indication of trends.

Pollution goals and targets by sector



% of responding companies per sector setting pollution goals and/or targets

Monitoring wastewater discharges



- % monitoring discharges
- % monitoring volume of discharges
- % monitoring quality of discharges

ARE COMPANIES TAKING ACTION?

Companies report a range of actions related to pollution management, most of which could be categorized as “business as usual”. Important? Absolutely. Transformational? Not yet.

Most respondents are focused on managing the risks and impacts associated with their potential to release pollutants into the freshwater environment. In this case, the adage, ‘you measure what you manage’, holds true and encouragingly, our analysis shows that more than half (57%) of respondents are monitoring the wastewater they discharge in some form across the majority of their facilities. **However, less than half (47%) are monitoring the actual quality of their discharges – either by temperature or effluent parameter.**

Target setting plays another vital role in pollution management. Available evidence shows that targets are important elements in the successful execution of corporate strategies. They can lead to both cost and impact reductions, promote innovation and reduce dependency. Yet, when it comes to target setting to avoid pollution, **just 12% of all respondents have set a pollution reduction goal or target.** In other words, the vast majority of companies in sectors with the greatest potential to pollute have no commitment to address the issue.

There are, however, examples of companies setting water quality targets:

- ▶ **Eli Lilly & Co**, a Biotech and Pharmaceuticals company, set a goal to reduce phosphorus in wastewater by 15% by 2020. At the end of 2018 it had already exceeded this goal and achieved a 34.4% decrease through changes to production and cleaning processes, facilitated through collaboration across the organization.
- ▶ **Asahi Group Holdings and Suntory**, two Japanese Food & Beverage companies, have set facility-level targets to reduce the polluting potential of their wastewater and have tied these targets to C-suite incentives. Suntory also asks their raw material suppliers to report on withdrawals, discharges and the management of water resources; this is a prerequisite for supplying Suntory.
- ▶ **Toray Industries Inc.** is a manufacturing company producing chemicals, plastics, health care supplies and electronic components. Monetary incentives are provided to the CEO and a representative member of the board for the achievement of quantitative targets, one of which is to deliver a threefold increase in the amount of water treated by membrane treatment by 2030, compared with 2013.
- ▶ **Kering**, a luxury apparel company, is aiming to have 100% implementation of its sustainability standards by its suppliers by 2025. The standards include guidelines on water management for raw material production and manufacturing processes. Leather is one of the most environmentally intensive raw materials used by Kering; the standards promote chrome-free and metal-free tanning which are being taken up by many of its brands including Gucci and Bottega Veneta.
- ▶ **Campbell's Soup** has a goal to reduce nitrogen applied per ton of tomatoes by 10% by the end of 2020, as compared to 2012⁵².

Companies' targets on pollution are often driven by corporate policy to comply with local regulations. However, given the significant variation in water quality regulation globally, companies should be implementing internal company standards on water quality and going above what is required by local regulation⁵².



We need robust water quality information in order to monitor trends and see how things are moving. It makes the markets better informed and leads to better decisions.

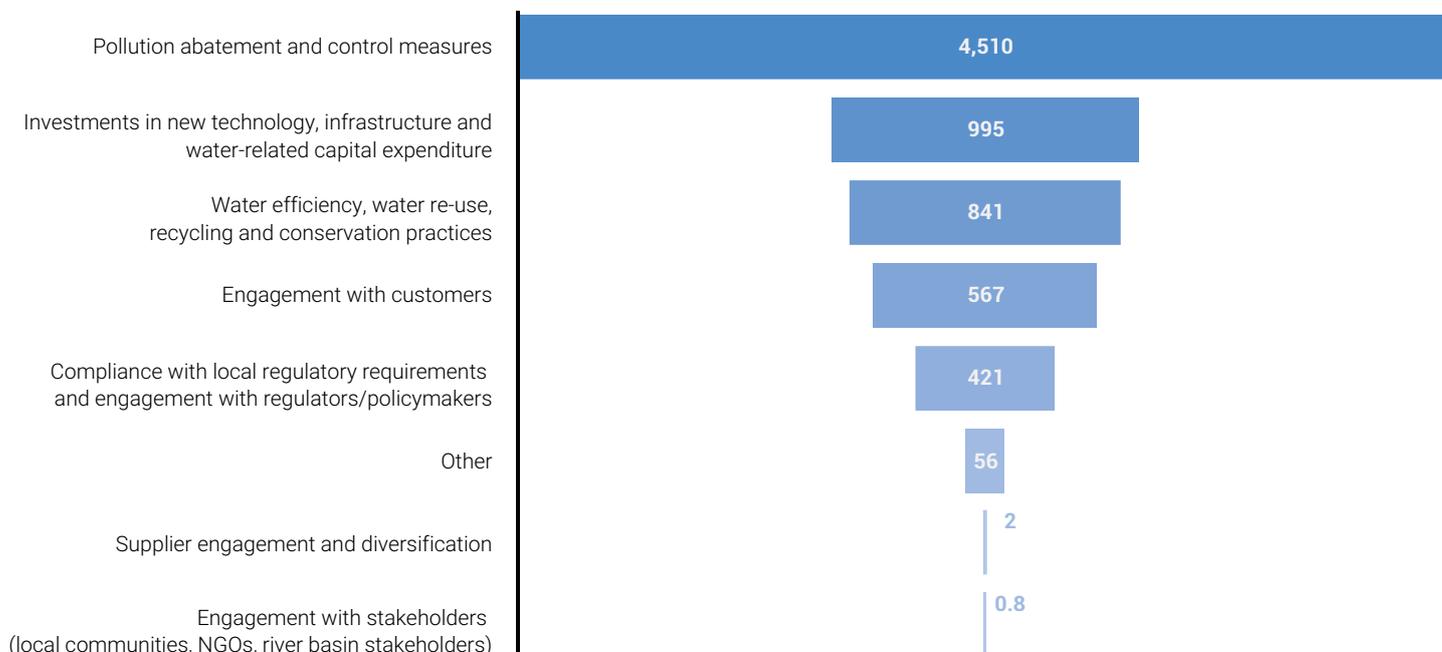
– Wilhelm Mohn, Head of Sustainability, NBIM.



ARE COMPANIES TAKING ACTION?

Capital investments

Cost of response to pollution risk - in US\$ million



When it comes to investment in pollution management activities, in 2019, respondents anticipated spending over US\$7 billion on measures to mitigate pollution risks, mainly on pollution control in response to regulatory pressure. Over half of this figure (US\$4.4 billion) is made up of estimates by one company, US energy giant **Duke Energy Corporation**, of the closure costs for impacted ash impoundments in response to US federal and state regulations. The company reports that some cost recovery may be possible through the federal and state utility commissions.

Teck Resources Ltd, a Canadian coal extraction and processing company, are planning to spend US\$450-700 million on mitigating impacts and stabilizing selenium concentrations downstream of its operations in the Elk Valley. This includes investments focused on treatment facilities, diversions, research and development, monitoring, and stakeholder engagement.

EDF, a French energy company, is investing US\$440 million to mitigate the risk of shutting down its nuclear power plants during heatwaves to comply with thermal pollution regulations. This includes programmed shutdown of riverside power plants during heatwaves for maintenance; thermal and biological monitoring at specific power plants; improved performance of air cooling towers; an R&D program into thermal impact on aquatic biodiversity; and changes to equipment specification during heatwaves.

Husky Energy Inc are investing an estimated US\$53 million in upgrading wastewater treatment and disposal facilities at its Lima oil refinery, Peru. This is in response to more stringent discharge regulations for selenium and phosphorus.

OPPORTUNITIES - TAPPING THE POTENTIAL

The transition to a water-secure, zero carbon future is a source of opportunity for innovation, market differentiation and brand value when it comes to pollution. To succeed, companies will need to look beyond the “business-as-usual” responses to pollution management and pursue plans to grow differently.

Rethinking waste

The traditional, linear approach of abstracting freshwater, treating it, using it and disposing of it is no longer sustainable. Future development requires approaches that minimize resource consumption and focus on resource recovery under circular economy principles:

Design out waste and pollution

Keep products and materials in use

Regenerate natural systems⁵³

Wastewater is a vast, untapped resource. It is a potential source of heat, power, process water and high-value materials. There has never been a better time to tap into this resource - technologies are more sophisticated, the regulatory climate is favourable, and the business case is clear. The market for smart water management alone is estimated to grow from US\$8.46 billion in 2016 to US\$20.10 billion in 2021⁵⁴ - a promising prospect.

Our analysis suggests that a small number of leading companies are already gaining competitive advantage by harnessing this highly valuable resource.



53. Rodriguez, D. J., Serrano H.A., Delgado, A., Nolasco, D., Saltiel, G. 2020. *From Waste to Resource: Shifting paradigms for smarter wastewater interventions in Latin America and the Caribbean*. World Bank, Washington, DC. The World Bank, 2020. <https://www.worldbank.org/en/topic/water/publication/wastewater-initiative#casestudies>

54. <https://www.marketsandmarkets.com/Market-Reports/smart-water-management-market-1265.html>

OPPORTUNITIES - TAPPING THE POTENTIAL

Wastewater as a resource



Water

Industrial wastewater has for a long time been reused for agricultural production, power stations, steel works, oil refineries, textile manufacturing and paper production.

Advancing technology has increased opportunities for wastewater reuse and enabled companies to reduce their overall water withdrawal and consumption – strengthening their resilience and reducing impacts.

Alumina

a bauxite mining and alumina refining company, are using an innovative technology to filter bauxite residue and squeeze out water which is then reused in the refining process. The technology could be sold to other alumina producers, offering a new revenue stream.

Lonmin Plc

a mineral resources group, set a target to reduce third party water withdrawals by 10% by 2022 from a 2017 baseline. These targets initiated the investment in a reverse osmosis plant at its precious metals refinery to treat stormwater and return it for operations, as well as water efficiency initiatives.

Tata Chemicals

has improved recycling and water management and within a year reduced its use of groundwater by 99.4%.



Energy

Wastewater is a source of chemical and thermal energy. Chemical energy can be harnessed through the anaerobic digestion of organic substances (biosolids) in wastewater to produce biogas – mostly methane – that is then burned to make heat and electricity.

It can be used for on-site energy needs or processed further and used in place of natural gas. The remaining nutrient-rich biosolids can be used as fertilizer in agriculture. Other applications being explored include using biosolids as building material and fuel⁵⁵.

The approach harnesses methane for energy instead of letting it escape into the atmosphere. Although the methane releases carbon dioxide when burned, the net emissions are negligible if methane-rich biogas is being used in place of fossil fuels. In 2016 WRI estimated that by 2020, waste-to-energy systems in China will have reduced emissions by 20 million tons of CO₂ - an amount equivalent to the annual emissions of 4 million cars⁵⁶.

Using sewage waste as a source of chemical energy is becoming more prevalent. Opportunities exist for other organic wastes, such as restaurant, food processing and animal waste, to be used. **Carbery Milk Products**, for example, is creating ethanol from their wastewater and selling it as biofuel⁵⁷.

Thermal energy contained in wastewater can also be extracted for heating and cooling industrial plants, data centers, and public and residential buildings. **POSCO** is collecting and treating wastewater and using it as industrial cooling water at its factories. **Suez** has developed a wastewater heat exchange solution that cuts greenhouse gas emissions by 50% to 70% compared with traditional thermal solutions.

There are opportunities for integrated approaches between sectors and utilities. For example, a recent report from the World Bank highlights a thermal power plant in San Luis Potosi, Mexico, which uses treated effluent from the nearby wastewater treatment plant in its cooling towers. This wastewater is 33% cheaper for the power plant than groundwater and has resulted in savings of US\$18 million⁵⁸.

55. Rodriguez, D. J., Serrano H.A., Delgado, A., Nolasco, D., Saltiel, G. 2020. *From Waste to Resource: Shifting paradigms for smarter wastewater interventions in Latin America and the Caribbean*. World Bank, Washington, DC. The World Bank, 2020. Resource. <https://www.worldbank.org/en/topic/water/publication/wastewater-initiative#casestudies>

56. <https://www.wri.org/blog/2017/03/insider-rethinking-wastewater-can-help-achieve-both-climate-and-development-goals>

57. <https://www.bluetechresearch.com/latest-news/news/turning-whey-from-dairy-wastewater-into-alcohol-and-revenue/>

58. Rodriguez, D. J., Serrano H.A., Delgado, A., Nolasco, D., Saltiel, G. 2020. *From Waste to Resource: Shifting paradigms for smarter wastewater interventions in Latin America and the Caribbean*. World Bank, Washington, DC. The World Bank, 2020. <https://www.worldbank.org/en/topic/water/publication/wastewater-initiative#casestudies>

OPPORTUNITIES - TAPPING THE POTENTIAL



Metals and chemicals

Recovery of high value products such as metals and other inorganic compounds – mainly from industrial wastewater – presents opportunities for resource recovery and high value products.

Effluents from mining and electrical industries can contain traces of heavy metals which can be recovered through electrochemical extraction processes. These are often energy and chemically intensive and so application is limited to specific large-scale industries. However, there is potential for enhancing these processes through new bio-electrochemical technology.



Revenue streams

Some businesses are creating new revenue streams from their wastewater.

For example, the ethanol being produced from **Carbery Milk Products** wastewater is being used to create beer⁶⁰. Microalgae is also being explored as a means to produce high value products from resources dissolved in wastewater – for example biofuels, bioplastics, nutrition supplements and cosmetics⁶¹.



Nutrients

The majority of wastewater reuse occurs for agricultural irrigation, with wastewater providing a valuable source of nitrogen and phosphorus.

Untreated or diluted wastewater has been used for irrigation and aquaculture for centuries, but technology has developed to enable nutrients such as phosphorus to be recovered directly from municipal wastewater sludge and sold. This will be an increasingly important resource for companies with a dependence on agricultural commodities to consider, given extractable mineral phosphorus is predicted to become scarce in the next 50-100 years. However, the approach must be planned, managed and implemented properly as it can be associated with environmental, public health and agronomic risks⁵⁹.



Environmental benefits

Wastewater, if of suitable quality, can be used for groundwater recharge, river and wetland augmentation, and restoration of biodiversity.

However, this must be properly planned and monitored, because the discharge of insufficiently treated wastewater can lead to major human and environmental risks.

Taylor Wimpey Plc, a UK construction company, is using Sustainable Urban Drainage Systems (SUDS) on its residential and amenity developments. SUDS are engineered vegetated areas that store and filter stormwater run-off, reducing downstream flooding and pollution as well as restoring biodiversity.

59. Rodriguez, D. J., Serrano H.A., Delgado, A., Nolasco, D., Saltiel, G. 2020. *From Waste to Resource: Shifting paradigms for smarter wastewater interventions in Latin America and the Caribbean*. World Bank, Washington, DC. The World Bank, 2020. <https://www.worldbank.org/en/topic/water/publication/wastewater-initiative#casestudies>

60. <https://www.bluetechresearch.com/latest-news/news/turning-whey-from-dairy-wastewater-into-alcohol-and-revenue/>

61. WWAP (United Nations World Water Assessment Programme). 2017. *The United Nations World Water Development Report 2017. Wastewater: The Untapped Resource*. Paris, UNESCO. <http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/wwdr/2017-wastewater-the-untapped-resource/>

OPPORTUNITIES - TAPPING THE POTENTIAL

Product innovation

For companies to thrive in a water-secure future, many of the products they provide will need to be aligned with this future, i.e. a future in which the polluting potential of their products has, at best, been designed out completely, or at least, been drastically minimized.

One example of a company designing out its pollution potential is **Mitsubishi Chemical Holdings Corporation**, a Japanese chemical manufacturer. In response to potential regulation of the use of plastics worldwide, it is increasing its investment in the research and development of new non-plastic or biodegradable plastic products, as well as treatment and recycling technologies. It anticipates investment in technological development, plant construction and marketing to be about 10% of the total annual capital and R&D expenditure over the next 5 years.

Unfortunately, there is very little evidence of this kind of ambition in the disclosures made by companies in 2019:

- ▶ only about 1% of companies identify opportunities related to designing out pollution from their products;
- ▶ investment in product-related R&D does not feature as a dominant response to pollution-related risks; and
- ▶ there are very few, if any, targets associated with reducing the pollution potential of products.

The signals of change coming from governments and consumers are strong and growing. Companies in all sectors have a legal, ethical and financial obligation to act. While there are seeds of best practice, we have a long way to go before the effective elimination and management of corporate water pollution moves to the mainstream. Too many responders appear blind to the business risks and opportunities posed by water pollution. Investors and customers have an important role to play in raising this as an issue of concern in shareholder resolutions, supplier contracts, earnings calls and one-to-one engagements. CDP will continue to gather data to support these efforts whilst tracking the progress companies are making.



INSIGHTS ON DISCLOSURE RISK AND ACTION 2019

CDP'S WATER SECURITY PROGRAM 2019 – 10 YEARS ON

2,433
companies

representing a quarter of global market capitalization, disclose water security risks, impacts and actions through CDP. This represents a fourteen-fold increase on the 175 companies that disclosed in 2010.

525
investors

with US\$96 trillion in assets request large companies to both disclose their impacts on water security through CDP and take action to reduce them. This is up from 151 investors in 2010.

861
cities

disclose water data through CDP, with 105 cities making the cities A list. These A list cities are spread across six continents, in 31 countries, representing a population of 170 million people.

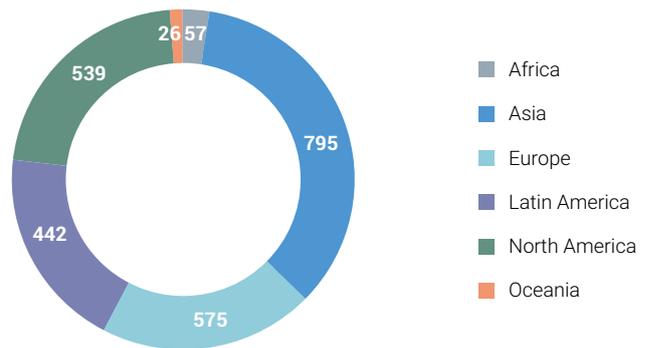
108
countries

CDP motivates companies to take ambitious action on water security in 108 countries, from Afghanistan to Zimbabwe and from Argentina to Zambia - up from 25 countries 10 years ago.

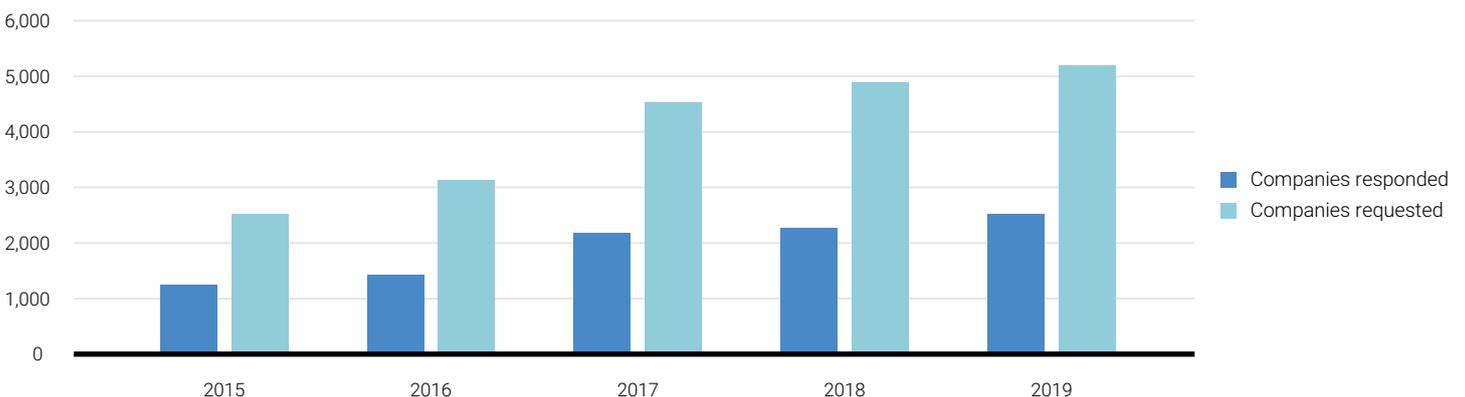
44
purchasing organizations

motivate their suppliers to disclose and act on water impacts through CDP.

Disclosing companies per region



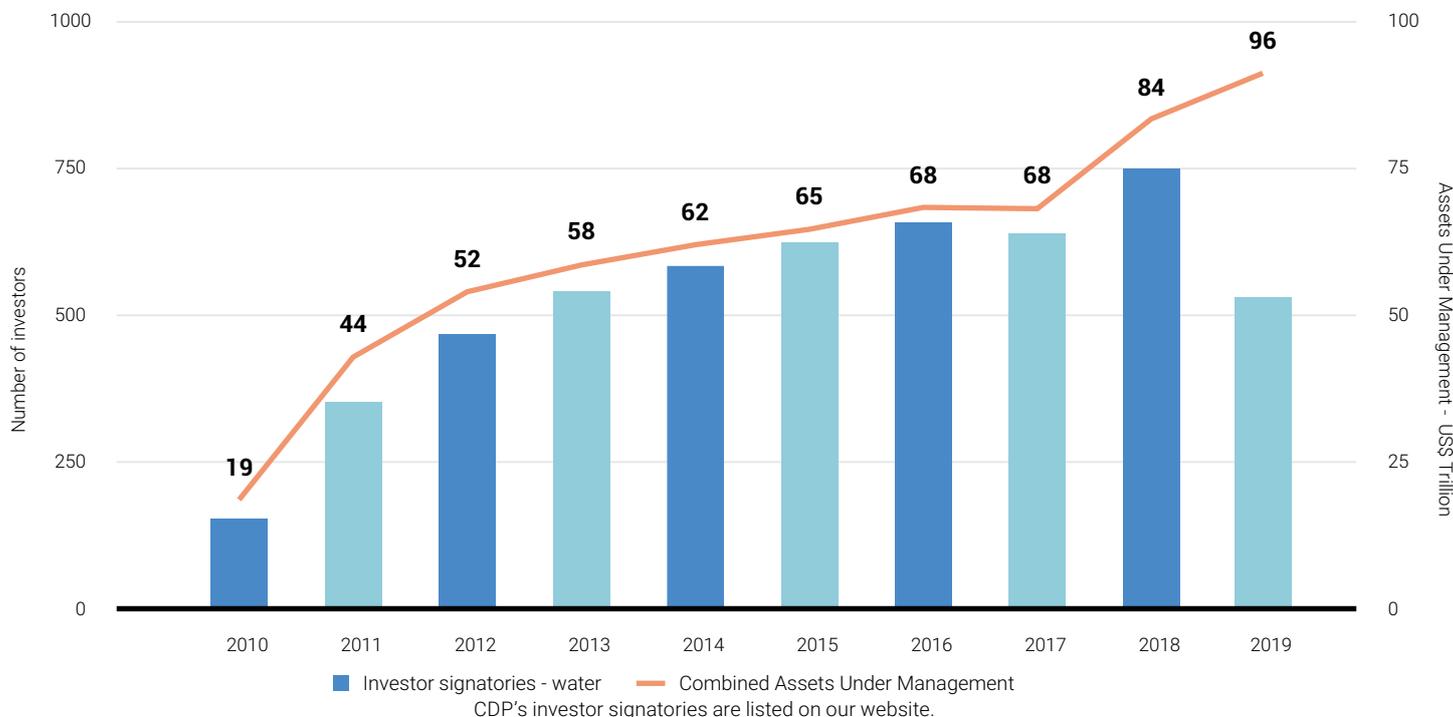
Response rate 2015-2019



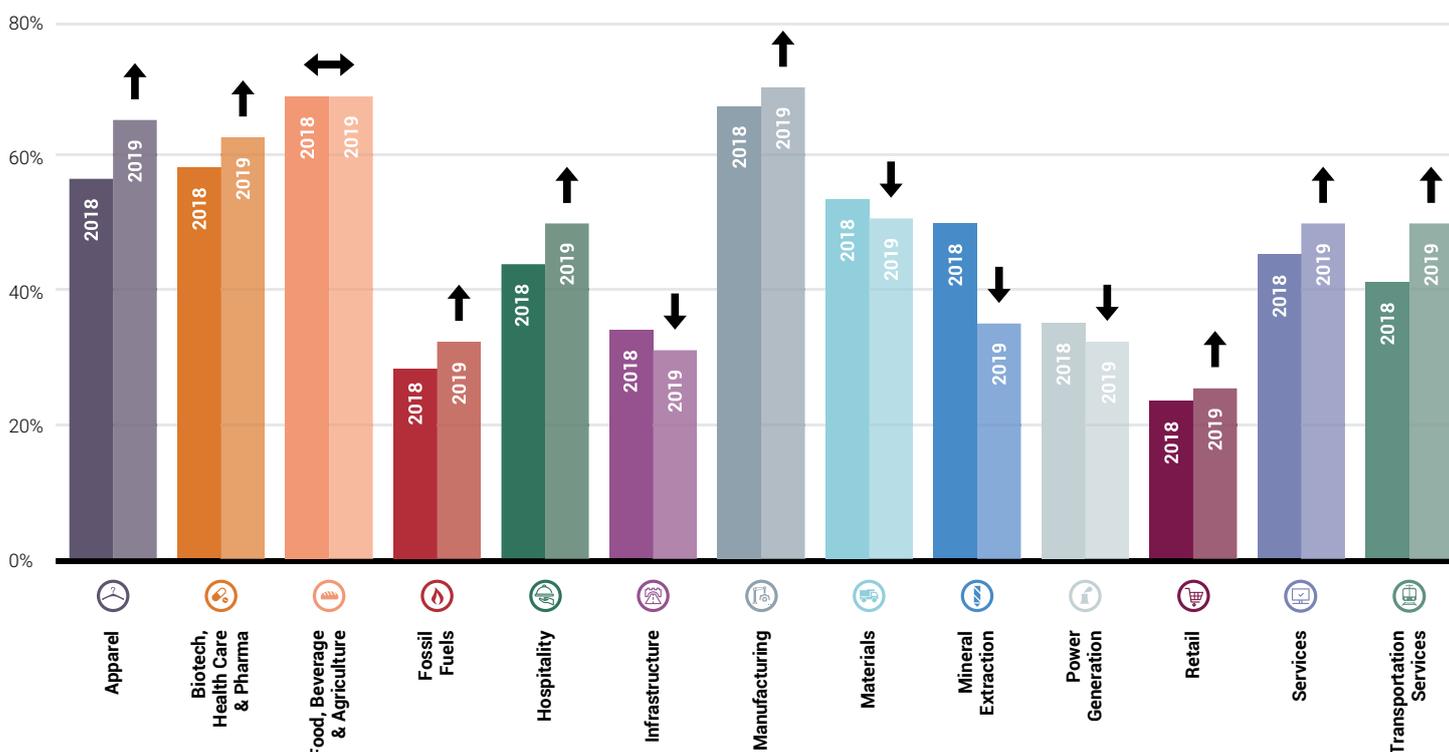
Some companies are requested to respond by both their investors and one or more customer(s). To avoid duplication, we only count them once here.

CDP'S WATER SECURITY PROGRAM 2019 – 10 YEARS ON

CDP Investor signatories and assets



Response rate by sector - 2018 and 2019



Some companies changed their sector classification between 2018 and 2019. Therefore the differences in response rate between 2018 and 2019 can only give an indication of trends.

DISCLOSURE INSIGHTS

Transparency on water management issues is emerging as a fundamental activity for businesses. Disclosure through CDP's annual water questionnaire produces a standardized, comparable dataset in one place and brings with it many business benefits.

Companies that disclose through CDP ranked 19 percentiles better than the average business in their ability to access capital – according to research by McGill University and consultancy firm Millani

The questions asked, and the process of disclosing, helps businesses engage with the issues and informs their strategy. CDP uses the resulting detailed data to score companies against how they are managing water issues, providing a powerful, standardized benchmark to the market. The data is also used by investors, customers, policy makers, academics and civil society to inform their decisions and strategies.

In 2019, more companies than ever (2,433) reported on water management, prompted by increasing pressure from investors and customers, as well as the rise in regulatory requirements to disclose material risks in mainstream reports across many jurisdictions.

Disappointingly, there has been a decrease in disclosure from the Mineral Extraction sector, with 7 out of the 37 disclosing in 2018 dropping out in 2019. This decrease comes despite investors showing significant interest in CDP's mining data. Our *In Too Deep* mining report⁶² released in May 2019 had over one thousand downloads, and 45 major investment houses have accessed our unique dataset on tailings dams management, available on CDP's investor portal. Meanwhile, the Responsible Mining Foundation has called on the sector to shift to more open and accessible data formats⁶³.

These companies may be missing some real strategic benefits. In 2019, McGill University and consultancy firm Millani found that companies that disclosed through CDP ranked 19 percentiles better than the average business in their ability to access capital⁶⁴. The research concluded that comprehensive voluntary disclosure signals high quality management teams with enhanced awareness of threats and opportunities linked to climate and environmental change.

Water is critically important for many companies and activities, but we believe the scarcity of corporate reporting of relevant water data remains a challenge for investors. Where available, companies' disclosures of water data and related management activities feed directly into our fundamental analysis and contribute to our investment decisions. We see CDP as a unique platform and aggregator of data that is investment relevant. We believe the CDP Water questionnaire addresses the full spectrum of the water value chain from source to use to water management, in a local context and in a consistent way. We encourage companies to increase their focus on water data reporting and to use CDP as a platform for disclosure. **Flora Gaber, project manager, sustainable investments, AP7**
Miriam Benarey, Sustainability Research & ESG, Impax Asset Management

The Environment Agency Pension Fund wants companies we invest in to manage their water risk. CDP's water questionnaire provides comparable, high quality information on water security which our fund managers can use to assess the level of financial risk in our portfolio of companies and take appropriate action. We want more companies to disclose. Market-wide disclosure is vital to asset owners and their asset managers in helping to invest responsibly and bring about positive change. **Craig Martin, Chief Pensions Officer, Environment Agency Pension Fund**

Water is a defining issue and a material risk for many sectors, which is being further exacerbated by a changing climate. It is particularly acute for the food industry, with agriculture accounting for the vast majority of global freshwater consumption. At LGIM we engage, amongst others, with packaged food manufacturers as to how they manage their current and future risks as well as their strategy for alternative and less-water intensive products. For this, CDP's water disclosure is a crucial information source to make appropriate investment decisions. **Meryam Omi, Head of Sustainability and Responsible Investment Strategy, LGIM**

62. https://6fefcbb86e61af1b2fc4-c70d8ead6ced550b4d987d7c03fcd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/004/613/original/CDP_Metals_and_mining_report_2019.pdf?1561049112

63. <https://www.edie.net/news/7/World-s-largest-mining-firms--selectively-reporting--on-positive-sustainability-progress--report-warns/>

64. Craig, M., Coulombe, E., Nostrat, A. 2019. *The Role of CDP Disclosure to Improve Access to Capital*. Research Note: Millani. https://f01c8ee6-cac3-40ff-a0e4-8bfb54f2b88b.filesusr.com/ugd/66e92b_30b06fd11b9c43d88428f768676e9a8b.pdf

DISCLOSURE INSIGHTS

Mineral Extraction companies who disclosed to the water security questionnaire in 2018 but did not do so in 2019

- ▼ African Rainbow Minerals
- ▼ Goldcorp Inc*
- ▼ IAMGOLD Corporation
- ▼ Ivanhoe Mines
- ▼ PanAust
- ▼ Sandfire Resources NL
- ▼ Saracen Mineral Holdings

Goldcorp Inc merged with Newmont last year. For 2020, the request for Goldcorp Inc's water security data will be incorporated within the request for Newmont's water security disclosure, who has disclosed to CDP since 2010.

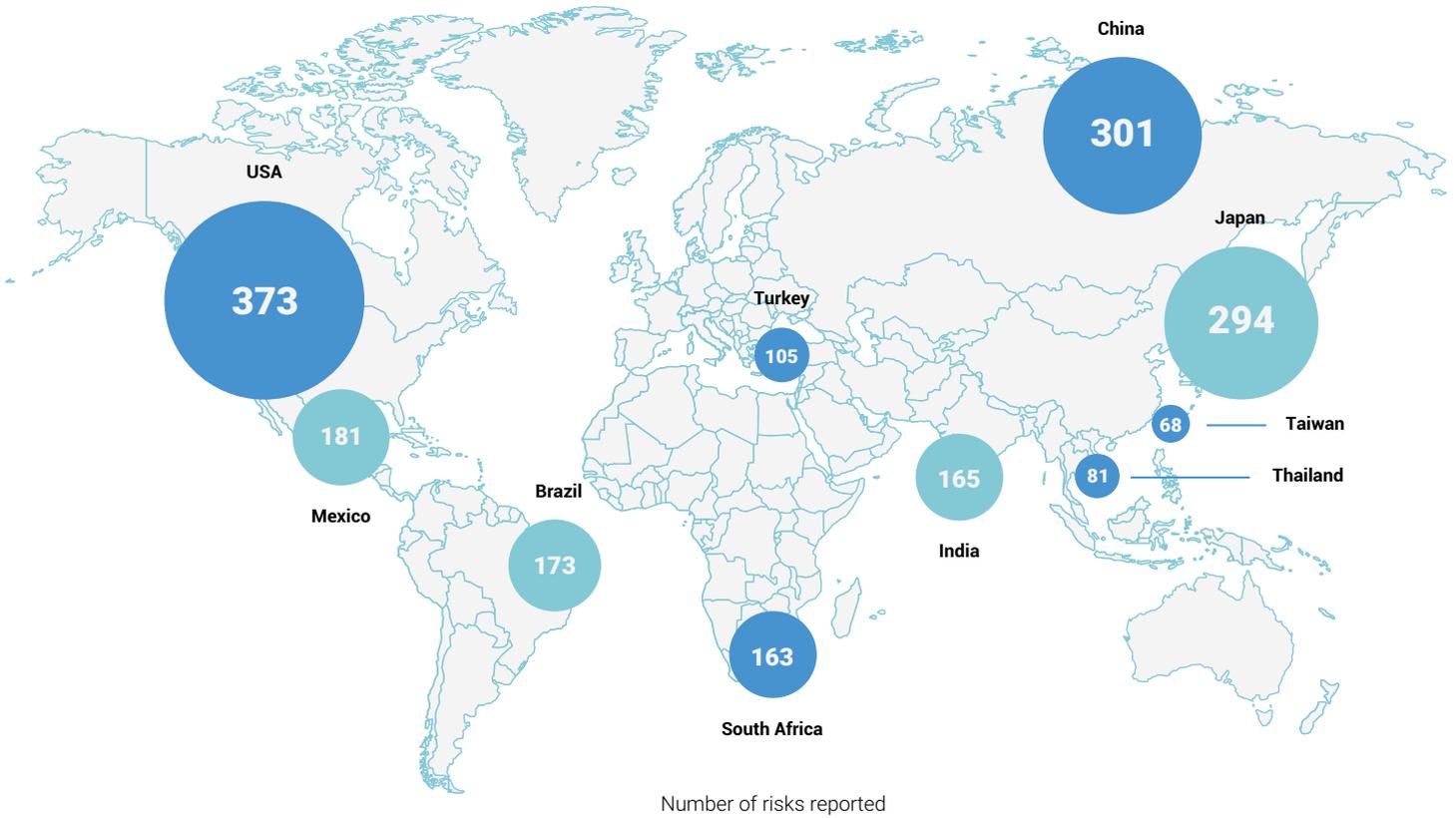
Largest companies which have failed to respond to investor requests for water data via CDP for a decade

- ▼ Apple Inc.
- ▼ BAE Systems
- ▼ CEZ
- ▼ Chesapeake Energy Corporation
- ▼ Chevron Corporation
- ▼ Costco Wholesale Corporation
- ▼ Ericsson
- ▼ Exxon Mobil Corporation
- ▼ General Dynamics Corporation
- ▼ Honeywell International Inc.
- ▼ Imperial Oil
- ▼ Jardine Matheson
- ▼ Jardine Strategic
- ▼ Korea Electric Power Corporation
- ▼ Lukoil
- ▼ National Oilwell Varco, Inc.
- ▼ Public Service Enterprise Group Inc.
- ▼ Reliance Industries
- ▼ Repsol
- ▼ Royal Dutch Shell
- ▼ Schlumberger Limited
- ▼ Southern Copper Corporation
- ▼ Southwestern Energy
- ▼ Surgutneftegas
- ▼ Tenaris S.A.
- ▼ Tesco
- ▼ The Kansai Electric Power Co., Inc.
- ▼ TJX Companies, Inc.
- ▼ TransCanada Corporation
- ▼ Transocean Ltd

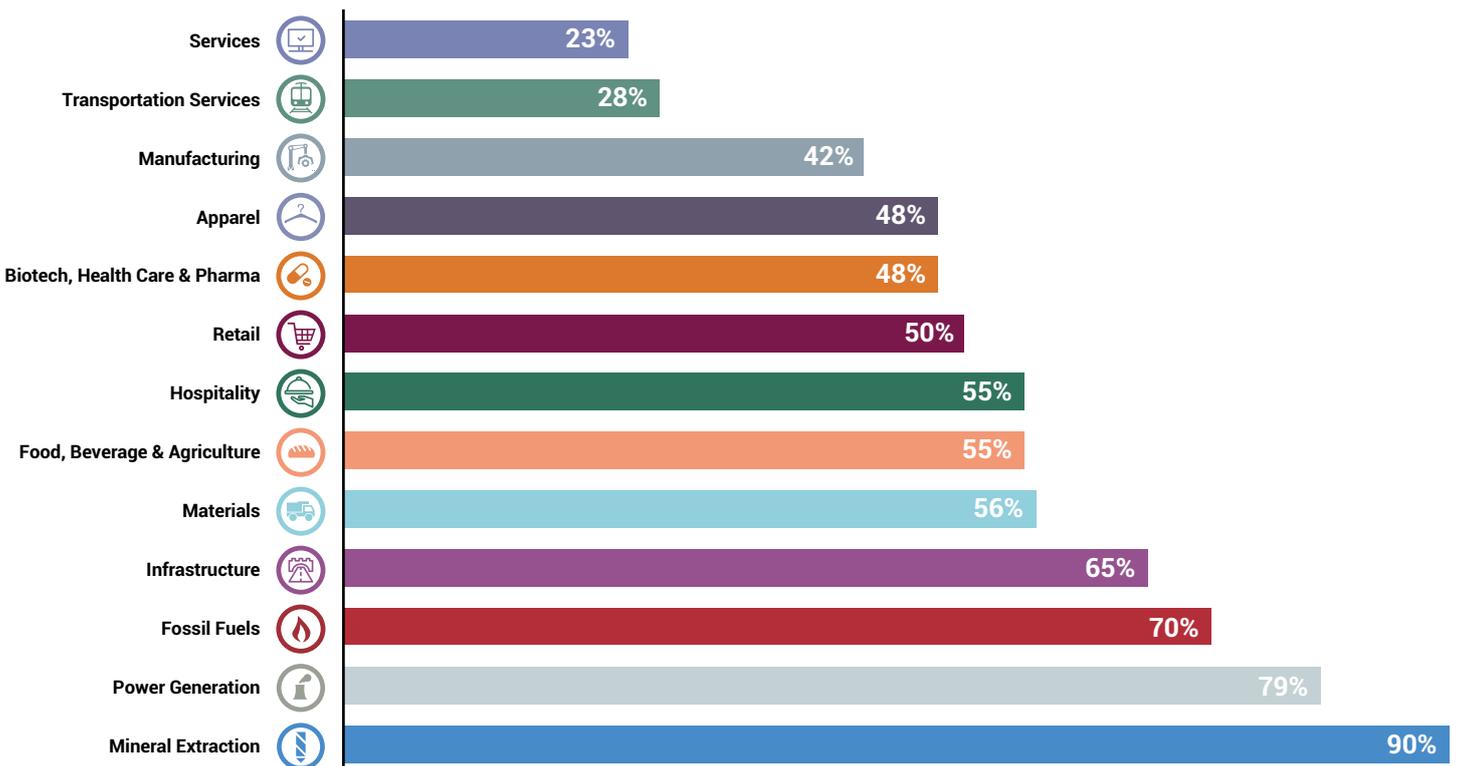
The response status of all companies requested to respond to their investors, including other companies who have not responded to the request, can be found on the CDP website: <https://www.cdp.net/en/search>

WATER RISK INSIGHTS

Top 10 countries where risks are reported



Exposure to water-related risks by sector



% of companies responding "yes" to the question "Have you identified any inherent water-related risks with the potential to have substantive financial or strategic impact on your business?"

WATER RISK INSIGHTS

**US
\$425
billion**

maximum combined business value at risk

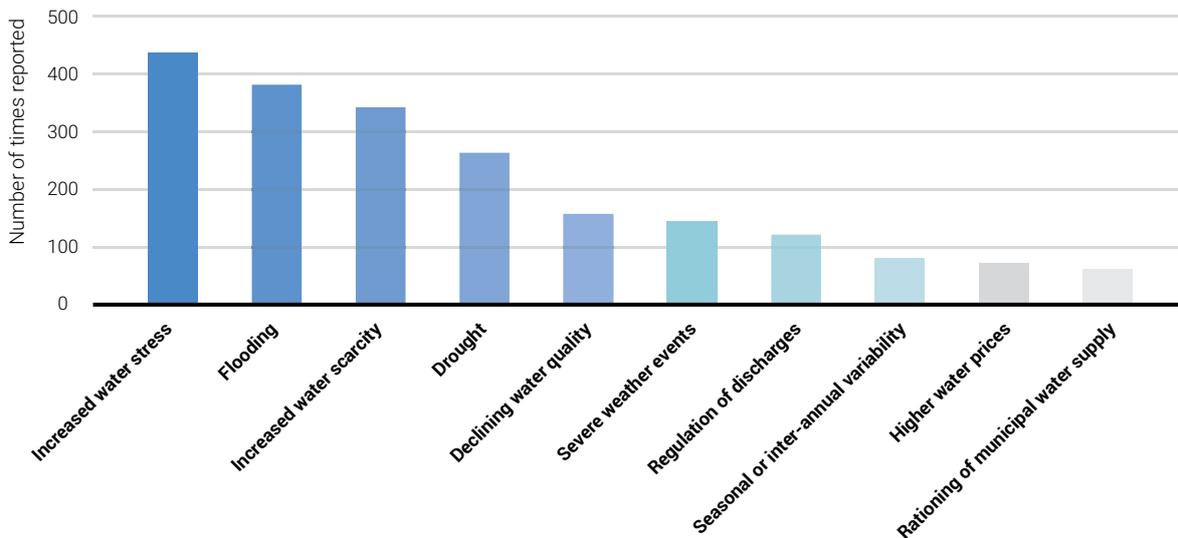
In 2019, 45% of companies reporting to investors or customers report exposure to substantive risks from water insecurity – risks that threaten their reputation and license to operate, the security of their supply chains, financial stability and their ability to grow⁶⁵.

That more than half of respondents report no exposure to substantive water-related risks is surprising given the prevalence and increasing nature of water security issues globally, and the fact that CDP requests data only from companies for which water is a material, or at least highly relevant, issue.

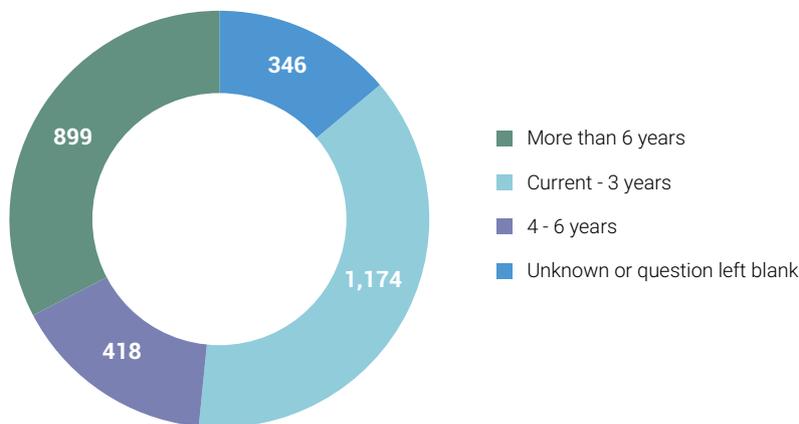
Of those reporting exposure, the combined business value at risk reported in 2019 topped out at US\$425 billion⁶⁶ with about 40% of the risks anticipated to hit within the next 1-3 years.

The Apparel and Manufacturing sectors are amongst those with the lowest proportion of companies reporting water risk exposure. This is surprising given that these sectors tend to be heavy users of both water and chemicals in both direct operations and supply chains, some of which are agricultural.

Top 10 water risk drivers



Timeframe of risks



65. Last year, we reported on a cohort of 277 consistently responding companies. The risk exposure of that group was 75%. This year it is 74%. The 45% figure refers to the much larger dataset of 2,433 companies responding to their investors and customers.

66. The reported business value at risk in 2019 was US\$188-425. Only about half of the risks reported had an estimated reported value.

ACCELERATING BUSINESS ACTION

Since 2015, CDP has scored responses to the water security questionnaire. These scores have been made publicly available since 2016⁶⁷.

Through our public water scoring methodology, CDP drives a race to the top, incentivizing companies to responsibly manage and reduce their impacts on freshwater resources. The scoring methodology rewards companies that, amongst other factors, take action on the following issues. For more information on CDP's approach to scoring corporate water performance, please see our [Scoring Introduction](#) and [Water Scoring Methodology](#).

Percentage of disclosing companies taking action on:

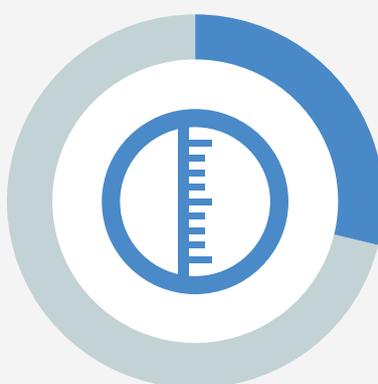
Governance & Strategy



21%

- Have water-related board-level incentives;
- Integrate water into long-term business objectives; and
- Have a publicly available water policy

Measuring & Monitoring



32.5%

- Measure all water aspects (withdrawals, discharges, quality, consumption, and employee access to water, sanitation and hygiene) at 75% of facilities or more

Risk Assessment



32%

- Conduct a regular water risk assessment including key stakeholders

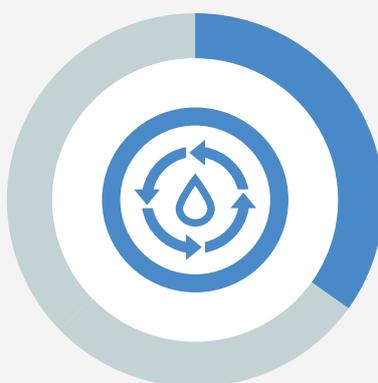
Targets & Goals



58%

- Set targets and/or goals at the corporate level

Value Chain Engagement



30.5%

- Actively engage their value chain (suppliers, customers or other value chain partners) on water-related issues

Water Impact Reduction



43% / 41%

- Reporting lower/about the same water withdrawals compared with previous year: 43%
- Reporting lower/about the same water consumption compared with previous year: 41%

Percentages are based on the total number of companies responding to CDP's water security questionnaire. CDP requests data from companies in sectors which are considered dependent on water. Companies reporting that they are not dependent on water are not able to report their activities for Measuring & Monitoring, Water Impact Reduction, nor Value Chain Engagement.

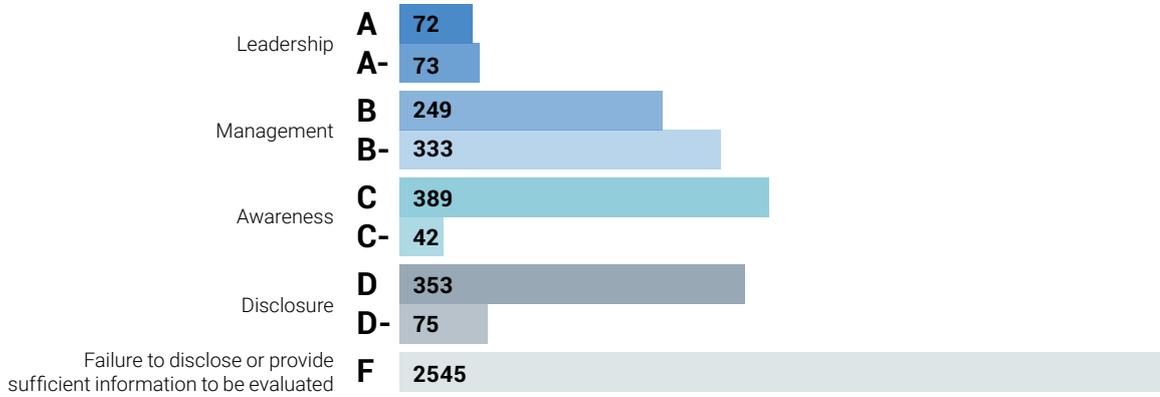
An aerial photograph of a dry, cracked riverbed. The water is a muddy brown color, and the surrounding earth is light brown and heavily eroded, showing deep, parallel tracks from heavy machinery. A blue rectangular text box is overlaid on the left side of the image.

The role of CDP's water scoring methodology, and the publication of our water security A List, is to push companies beyond where they would otherwise be on water issues. It is currently the only corporate water incentive mechanism operating on an industrial scale. And its influence is growing, with CDP scores increasingly being woven into mainstream financial products, CEO incentive structures and supplier contracts.

2019 saw a 100% increase in the number of companies making the water security A List relative to 2018 – up to 72 from 31. However, analysis suggests that these are just the tip of the iceberg.

CDP'S WATER SCORES 2019

Number of companies at each score level

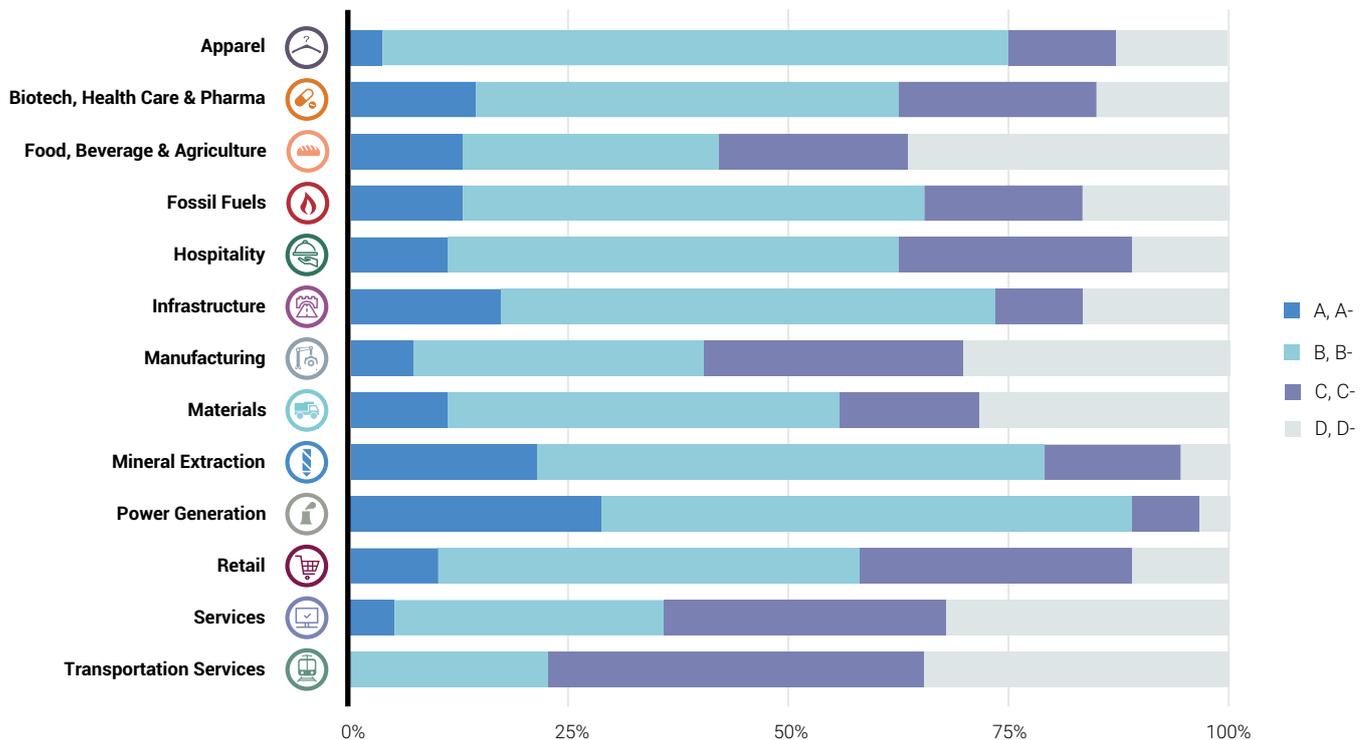


Not all responses are eligible for scoring. For more information please see the [Introduction to Scoring](#).

Geographical distribution of A list companies 2018 and 2019



Scores by sector



CDP'S WATER SECURITY A LIST 2019



Biotech, Health Care & Pharma

- ▼ **AstraZeneca**
United Kingdom
- ▼ **Bayer AG**
Germany
- ▼ **Johnson & Johnson**
United States
- ▼ **Novartis**
Switzerland
- ▼ **Koninklijke Philips NV**
Netherlands
- ▼ **Shionogi & Co., Ltd.**
Japan



Food, Beverage & Agriculture

- ▼ **Altria Group, Inc.**
United States
- ▼ **Asahi Group Holdings, Ltd.**
Japan
- ▼ **Coca-Cola European Partners**
United Kingdom
- ▼ **Danone**
France
- ▼ **Diageo Plc**
United Kingdom
- ▼ **General Mills Inc.**
United States
- ▼ **Japan Tobacco Inc.**
Japan
- ▼ **Kirin Holdings Co Ltd.**
Japan
- ▼ **Kikkoman Corporation**
Japan
- ▼ **Philip Morris International**
United States
- ▼ **Anheuser Busch InBev**
Belgium
- ▼ **Vina Concha y Toro S A**
Chile
- ▼ **Coca-Cola HBC AG**
Switzerland
- ▼ **Suntory Beverage & Food**
Japan



Hospitality

- ▼ **Las Vegas Sands Corporation**
United States



Infrastructure

- ▼ **City Developments Limited.**
Singapore
- ▼ **Tokyo Gas Co., Ltd.**
Japan



Power Generation

- ▼ **Companhia Energetica Minas Gerais - CEMIG**
Brazil
- ▼ **Dominion Energy**
United States
- ▼ **EDP - Energias de Portugal S.A.**
Portugal
- ▼ **Pinnacle West Capital Corporation**
United States



Mineral Extraction

- ▼ **ETİ SODA A.Ş.**
Turkey



Materials

- ▼ **Anglo American Platinum**
South Africa
- ▼ **AGC Inc.**
Japan
- ▼ **Impala Platinum Holdings**
South Africa
- ▼ **LIXIL Group Corporation**
Japan
- ▼ **Lonmin**
South Africa
- ▼ **Owens Corning**
United States
- ▼ **Empresas CMPC**
Chile
- ▼ **UPM-Kymmene Corporation**
Finland

CDP'S WATER SECURITY A LIST 2019



Manufacturing

- ▼ **Air Liquide**
France
- ▼ **BASF SE**
Germany
- ▼ **Braskem S/A**
Brazil
- ▼ **FIRMENICH SA**
Switzerland
- ▼ **Ford Motor Company**
United States
- ▼ **General Motors Company**
United States
- ▼ **Givaudan SA**
Switzerland
- ▼ **Hitachi, Ltd.**
Japan
- ▼ **SK Hynix**
Republic of Korea
- ▼ **Hyundai Motor Co**
Republic of Korea
- ▼ **International Flavors & Fragrances Inc.**
United States
- ▼ **KAO Corporation**
Japan
- ▼ **Klabin S/A**
Brazil
- ▼ **Kubota Corporation**
Japan
- ▼ **L'Oréal**
France
- ▼ **Mitsubishi Electric Corporation**
Japan
- ▼ **Mondi PLC**
United Kingdom
- ▼ **Nissan Chemical Industries, Ltd.**
Japan
- ▼ **Nissan Motor Co., Ltd.**
Japan

- ▼ **Sony Corporation**
Japan
- ▼ **Stanley Black & Decker, Inc.**
United States
- ▼ **Symrise AG**
Germany
- ▼ **Toray Industries, Inc.**
Japan
- ▼ **Toyota Boshoku Corporation**
Japan
- ▼ **Toyota Motor Corporation**
Japan
- ▼ **Unilever plc**
United Kingdom
- ▼ **Volkswagen AG**
Germany
- ▼ **Yokogawa Electric Corporation**
Japan
- ▼ **Brembo SpA**
Italy
- ▼ **CNH Industrial NV**
United Kingdom
- ▼ **HP Inc**
United States



Retail

- ▼ **J Sainsbury Plc**
United Kingdom



Services

- ▼ **Ecolab Inc.**
United States
- ▼ **Fujitsu Limited**
Japan
- ▼ **NEC Corporation**
Japan
- ▼ **Sumitomo Corporation**
Japan

APPENDICES

The background of the page is a solid light blue color. Overlaid on this background is a complex geometric pattern of overlapping squares and triangles. The shapes are rendered in various shades of blue, from a very light, almost white hue to a slightly darker, muted blue. The pattern is composed of several large squares, each divided into four triangles by a diagonal line. These squares and triangles are arranged in a staggered, overlapping fashion, creating a sense of depth and movement. The overall effect is a modern, minimalist aesthetic.

APPENDIX I REPORT METHODOLOGY

In **2019, 4,978** companies were asked to provide data about their efforts to manage and govern freshwater resources through CDP's water security questionnaire. 1,568 of these were asked by their investors, while 3,745 were asked by their purchasing companies as part of CDP's Supply Chain program. Note that some companies are requested by both their investors and their purchasing companies.

In total, **2,433** companies responded to CDP's water security questionnaire in 2019. This includes companies that responded to a request, companies that responded voluntarily, and companies that responded through their parent company.

Responding companies are divided into thirteen sectors, defined by CDP's Activity Classification System, which categorizes companies by the diverse activities from which they derive revenue, and associates these activities with how they impact on water security.

The sections below provide the detailed methodology for deriving each of the data points presented in the report.

POLLUTION ANALYSIS

Pollution risk exposure – percentage of companies reporting pollution-related risks by sector

- ▶ Combined datasets of questions W4.2 and W4.2a to cover risks within both direct operations and the value chain. (W4.2 *Provide details of identified risks in your direct operations with the potential to have a substantive financial or strategic impact on your business, and your response to those risks*; W4.2a *Provide details of risks identified within your value chain (beyond direct operations) with the potential to have a substantive financial or strategic impact on your business, and your response to those risks*.)
- ▶ Of all the "primary risk drivers" reported in W4.2 and W4.2a (column 4), identified those that were pollution-related - e.g. declining water quality, pollution incident.
- ▶ Counted the number of companies reporting any of the identified pollution-related risk drivers for each sector.
- ▶ Calculated the percentage of responding companies reporting pollution-related risks for each sector.

Major pollution risk drivers by sector

- ▶ Used the dataset of pollution-related risks derived from the pollution risk exposure analysis (above).
- ▶ Grouped the pollution-related "primary risk drivers" reported in column 4 into the following categories:
 - Pollution incident
 - Declining water quality
 - Regulation discharges quality/volume
 - Pollution incidences
 - Other

For example, the risk drivers of "Acid rock drainage and metal leaching", "Rupture of tailings dams and toxic spills" and "Leaching pollutants to groundwater bodies" were grouped under the category "Pollution incidences". The "Other" group includes the risk drivers reported under "Other, please specify" that mention pollution or water quality issues.

- ▶ Counted the number of pollution-related primary risk drivers per group in each sector.
- ▶ Calculated percentages per sector using the total number of reported pollution-related risks per sector as the denominator.

Pollution monitoring – percentage of companies monitoring their wastewater discharges by sector

- ▶ Identified "water aspects" relevant to wastewater discharge monitoring under question W1.2 *Across all your operations, what proportion of the following water aspects are regularly measured and monitored?* – e.g. "water discharge quality - temperature", "water discharges – total volumes".
- ▶ Counted the number of organizations per sector selecting these "water aspects" AND monitoring them at 75% or more of their sites/facilities/operations.
- ▶ Calculated the percentages monitoring discharges per sector using the total number of responding companies per sector as the denominator.
- ▶ Performed a similar calculation looking solely at the "water aspects" relevant for monitoring the quality of discharges.

- ▶ Performed a similar calculation looking solely at the “water aspects” relevant for monitoring the volume of discharges.
- ▶ Performed the same analysis for 2018 to provide a comparison with the previous year.

Pollution targets and goals – percentage of companies with targets/goals relevant to pollution by sector

- ▶ Counted organizations that responded to the question W8.1a *Provide details of your targets that are monitored at the corporate level and the progress made* AND provided pollution-related target(s). Pollution-related targets were identified by looking at responses to “category of targets” in column 2.
- ▶ Counted organizations that responded to the question W8.1b *Provide details of your water goal(s) that are monitored at the corporate level and the progress made* AND provided pollution-related goal(s). Pollution-related goals were identified by looking at responses under “goals” in column 1.
- ▶ Counted the total number of organizations that had pollution-related targets and/or goals; then counted the number falling within each sector.
- ▶ Calculated the percentage of responding companies that reported pollution-related targets and/or goals within each sector.

Cost of response to pollution

- ▶ Used the dataset of pollution-related risks derived from the pollution risk exposure analysis (above).
- ▶ Grouped responses under column 15, “primary response to risk”, according to the following categories:
 - Pollution abatement and control measures
 - Water efficiency, water re-use, recycling and conservation practices
 - Investment in new technology, infrastructure and water-related capital expenditure
 - Compliance with local regulatory requirements and engagement with regulators/policymakers
 - Supplier engagement and diversification
 - Engagement with customers
 - Engagement with stakeholders - local communities, NGOs, river basin stakeholders
 - Other
- ▶ Converted all estimates of cost of response in column 17 to US\$.
- ▶ Calculated the total sum of costs of response within each group. The data is presented in US\$ million.

DISCLOSURE ANALYSIS

Disclosure rates 2015-2019

- ▶ Based on CDP’s historic data on disclosure numbers.
- ▶ The total number of companies requested and responding for each year between 2015 and 2019 is presented.

Disclosure rates 2018-2019 by sector

- ▶ Calculated the number of companies submitting a response to the water questionnaire in 2018 and 2019 per sector. Expressed these as percentages of the number of companies requested to disclose for each sector.
- ▶ Calculated the percentage change in numbers disclosing between 2018 and 2019 per sector. Note that some companies changed their sector classification between 2018 and 2019 and so this percentage change is only an indication of trends in disclosure between 2018 and 2019.

Disclosing companies per region

- ▶ Calculated the total number of companies that submitted a response in 2019 in each region based on their response status on the CDP system.

RISK ANALYSIS

Business value at risk

- Combined datasets of W4.2 and W4.2a to cover risks within both direct operations and the value chain. (W4.2 *Provide details of identified risks in your direct operations with the potential to have a substantive financial or strategic impact on your business, and your response to those risks*; W4.2a *Provide details of risks identified within your value chain (beyond direct operations) with the potential to have a substantive financial or strategic impact on your business, and your response to those risks*.)
- Identified responses under columns 11-14 in the data extract, potential financial impact figures. Some companies provide a single estimate, others provide a minimum-maximum range.
- Converted all financial values provided to US\$ in order to allow comparability.
- Calculated the sum of single estimates, the sum of minimum values, and the sum of maximum values. In order to provide a value range at risk, the sum of estimates was added to the sum of minimum values and then to the sum of maximum values.

Risk exposure per sector

- Counted the number of companies answering "yes" to the question W4.1 *Have you identified any inherent water-related risks with the potential to have substantive financial or strategic impact on your business?* - in their direct operations and/or their value chain.
- Calculated the percentage of companies that responded "yes" to W4.1 for each sector, using the number of responding companies per sector as the denominator.

Top 10 risk drivers

- Combined datasets of W4.2 and W4.2a to cover risks within both direct operations and the value chain. (W4.2 *Provide details of identified risks in your direct operations with the potential to have a substantive financial or strategic impact on your business, and your response to those risks*; W4.2a *Provide details of risks identified within your value chain (beyond direct operations) with the potential to have a substantive financial or strategic impact on your business, and your response to those risks*.)
- Calculated the number of times each "primary risk driver", column 4, had been reported. Picked the 10 most frequently reported.

Timeframe of risks

- Combined datasets of W4.2 and W4.2a to cover risks within both direct operations and the value chain. (W4.2 *Provide details of identified risks in your direct operations with the potential to have a substantive financial or strategic impact on your business, and your response to those risks*; W4.2a *Provide details of risks identified within your value chain (beyond direct operations) with the potential to have a substantive financial or strategic impact on your business, and your response to those risks*.)
- Analyzed responses in column 8, "timeframe": counted the number of risks reported within each timeframe: current to 3 years, 4 to 6 years, more than 6 years, and unknown or unanswered.

Geographical distribution of risks

- Combined datasets of W4.2 and W4.2a to cover risks within both direct operations and the value chain. (W4.2 *Provide details of identified risks in your direct operations with the potential to have a substantive financial or strategic impact on your business, and your response to those risks*; W4.2a *Provide details of risks identified within your value chain (beyond direct operations) with the potential to have a substantive financial or strategic impact on your business, and your response to those risks*.)
- Calculated the number of risks reported within each country in column 1. Identified the top 10 countries where risks most frequently reported.

BUSINESS PERFORMANCE METRICS – p34

Governance & Strategy – percentage of companies that integrate water in their governance and strategy

- A company performs on this metric if they have answered "yes" to:
 - W6.2 *Is there board level oversight of water-related issues within your organization?*
 - W7.1 *Are water-related issues integrated into any aspects of your long-term strategic business plan, and if so how?* AND select the following three aspects: water-related issues integrated into financial planning; water-related issues integrated into long-term objectives; and water-related issues integrated into the strategy for achieving long-term objectives.
 - W6.1 *Does your organization have a water policy?* The water policy must be publicly available.
- Counted the total number of organizations that responded positively to all the questions and aspects outlined above. Calculated the percentage of companies performing on this metric by using the total number of responding companies as the denominator.

Measuring & Monitoring – percentage of companies monitoring key water aspects at 75% of their facilities or more

- Companies perform on this metric if they select the following aspects in response to W1.2 *Across all your operations, what proportion of the following water aspects are regularly measured and monitored?:*

- total withdrawal volumes
 - total discharge volumes
 - total consumption volumes
 - quality of water discharges
 - the provision of fully-functioning, safely managed Water, Sanitation and Hygiene (WASH) services to all workers
- Counted the number of organizations selecting the above aspects. Calculated the percentage of responding companies performing on this metric by using the total number of responding companies as the denominator.
- Note that question W1.2 only appears if a company answers “neutral”, “important”, “vital” in response to W1.1 *Rate the importance (current and future) of water quality and water quantity to the success of your business.*

Risk Assessment - percentage of companies conducting a regular risk assessment including river basin management authorities

- Company performs on this metric if they answer “yes” to W3.3 *Does your organization undertake a water-related risk assessment?*
- AND if any of the following are selected in response to W3.3a *Select the options that best describe your procedures for identifying and assessing water-related risks – Frequency of assessment:*
- Six-monthly or more frequently
 - Annually
 - Every two years
- AND selects “river basin management authorities” in response to W3.3c *Which of the following stakeholders are considered in your organization’s water-related risk assessments?*
- Counted the number of organizations answering as above. Calculated the percentage of responding companies performing on this metric by using the total number of responding companies as the denominator.

Targets & Goals – percentage of companies setting targets and/or goals that are monitored at the corporate level

- Companies perform on this metric if they select setting targets and/or goals at the corporate level in response to question W8.1_C2 *Describe your approach to setting and monitoring water-related targets and/or goals.*
- Counted the number of companies selecting the aspect above. Calculated the percentage of responding companies performing on this metric by using the total number of responding companies as the denominator.

Value Chain Engagement – percentage of companies actively engaging with their value chain (suppliers, customers or other value chain partners) on water-related issues

- Company performs on this metric if they select one of the following in response to question W1.4 *Do you engage with your value chain on water-related issues?:*
- Yes, our customers or other value chain partners
 - Yes, our suppliers
- Counted the number of companies selecting the above. Calculated the percentage of responding companies performing on this metric by using the total number of responding companies as the denominator.
- Note that question W1.4 only appears if companies select “neutral”, “important” or “vital” in response to question W1.1 *Rate the importance (current and future) of water quality and water quantity to the success of your business.*

Water Impact Reduction

Water withdrawals - percentage of companies reporting a reduction in water withdrawals

- Counted companies that selected total withdrawals and selected “lower” or “about the same” for the “Comparison with previous reporting year” in response to question W1.2b *What are the total volumes of water withdrawn, discharged, and consumed across all your operations, and how do these volumes compare to the previous reporting year?*
- Calculated the percentage of responding companies that reported lower/about the same water withdrawals compared to the previous year.
- Note that question W1.2b only appears if you select “Neutral” “Important,” or “Vital” as your “Direct use importance rating” in response to W1.1 *Rate the importance (current and future) of water quality and water quantity to the success of your business.*

Water consumption – percentage of companies reporting a reduction in water consumption

- Counted companies that selected total consumption and selected “lower” or “about the same” for the “Comparison with previous reporting year” in response to question W1.2b *What are the total volumes of water withdrawn, discharged, and consumed across all your operations, and how do these volumes compare to the previous reporting year?*
- Calculated the percentage of responding companies that reported lower/about the same water consumption compared to the previous year.

APPENDIX II KEY INDICATORS BY SECTOR

	Apparel	Biotech, Health Care & Pharma	Food, Beverage & Agriculture	Fossil Fuels
Disclosure				
CDP Investor Program				
Total companies responding to investor and supply chain request for water information	29	93	390	50
Total companies requested for water information by investors	42	139	541	141
Response rate (%)	69%	67%	72%	35%
Public responses	13	66	165	34
Private responses	16	27	225	16
CDP Supply Chain Program				
Total companies responding to customer request for water information	15	47	339	15
Water dependence				
Respondents reporting that sufficient amounts of good quality freshwater available for use is 'vital' or 'important' for their direct operations	62%	85%	86%	74%
Respondents reporting that sufficient amounts of good quality freshwater available for use is 'vital' or 'important' for their indirect operations	69%	74%	77%	40%
Water accounting				
Respondents that monitor total water withdrawal volumes at more than 75% of facilities	52%	76%	70%	82%
Respondents that monitor total water consumption volumes at more than 75% of facilities	48%	71%	69%	76%
Respondents that monitor total water discharge volumes at more than 75% of facilities	52%	62%	60%	78%
Respondents that monitor water recycling/reuse at more than 75% of facilities	28%	33%	26%	64%
Respondents reporting withdrawals from water-stressed areas	28%	47%	26%	38%
Value chain engagement				
Respondents engaging their value chain on water-related issues	56%	47%	34%	33%
Business impacts				
Respondents that have experienced detrimental water-related business impacts in the reporting year	10%	6%	12%	20%
Total financial value of impacts	\$1,392,728	\$227,168,664	\$117,457,979	\$888,132,482
Respondents subject to penalties, fines and/or enforcement orders	14%	13%	11%	18%
Total value of reported penalties, fines and/or enforcement orders	\$32,972	\$182,929	\$3,364,294	\$53,955,122
Water risk assessment				
Respondents that undertake a water-related risk assessment	66%	80%	63%	88%
Respondents that undertake a water risk assessment with a specified frequency	66%	76%	56%	72%
Respondents that factor water availability at a basin/catchment level into water risk assessments	48%	70%	35%	82%
Respondents that factor water quality at a basin/catchment level into water risk assessments	45%	61%	31%	72%
Respondents that factor stakeholder conflicts concerning water resources at a basin/catchment level into water risk assessments	41%	51%	27%	76%
Respondents that factor implications of water on key commodities/raw materials into water risk assessments	45%	60%	29%	56%
Respondents that factor water-related regulatory frameworks into water risk assessments	48%	68%	32%	78%
Respondents that factor status of ecosystems and habitats into water risk assessments	38%	51%	26%	78%
Respondents that factor access to fully-functioning, safely managed WASH services for all employees into water risk assessments	45%	63%	28%	64%
Respondents that factor customers into water risk assessments	38%	62%	26%	52%
Respondents that factor employees into water risk assessments	45%	67%	31%	76%
Respondents that factor investors into water risk assessments	45%	58%	24%	78%
Respondents that factor local communities into water risk assessments	48%	62%	30%	80%

	Apparel	Biotech, Health Care & Pharma	Food, Beverage & Agriculture	Fossil Fuels
Respondents that factor NGO's into water risk assessments	38%	49%	22%	62%
Respondents that factor other water users at a basin/catchment level into water risk assessments	48%	49%	24%	70%
Respondents that factor regulators into water risk assessments	45%	66%	32%	82%
Respondents that factor river basin management authorities into water risk assessments	48%	54%	26%	68%
Respondents that factor statutory special interest groups at a local level into water risk assessments	34%	41%	22%	70%
Respondents that factor suppliers into water risk assessments	38%	60%	26%	62%
Respondents that factor water utilities at a local level into water risk assessments	41%	61%	26%	64%
Water risks				
Respondents exposed to substantive water risk both in direct operations and/or along the value chain	48%	48%	55%	70%
Respondents exposed to substantive water risk in direct operations only	24%	19%	27%	46%
Respondents exposed to substantive water risk in the value chain only	10%	1%	3%	2%
Percentage of risks that are physical	76%	100%	98%	168%
Percentage of risks that are regulatory	24%	24%	14%	70%
Percentage of risks that are reputational	7%	10%	7%	18%
Percentage of risks that are technological	0%	2%	0%	2%
Respondents reporting >50% of facilities at risk	14%	14%	26%	34%
Water opportunities				
Respondents that identify and are realizing water-related opportunities	66%	61%	44%	66%
Percentage of water opportunities relating to efficiency	61%	47%	58%	53%
Percentage of water opportunities relating to resilience	18%	22%	14%	13%
Percentage of water opportunities relating to products and services	16%	15%	9%	9%
Percentage of water opportunities relating to markets	5%	11%	11%	17%
Governance & strategy				
Respondents with a documented water policy that is publicly available	52%	52%	32%	58%
Respondents with board-level oversight of water issues	76%	72%	72%	86%
Respondents that integrate water-related issues into long-term business objectives	62%	65%	52%	70%
Respondents that integrate water-related issues into their strategy for achieving long-term objectives	62%	66%	49%	68%
Respondents that integrate water-related issues into financial planning	52%	51%	42%	68%
Respondents whose water-related CAPEX increased in the reporting year	21%	26%	15%	28%
Respondents whose water-related OPEX increased in the reporting year	34%	34%	15%	30%
Respondents using climate-related scenario analysis to inform business strategy	24%	33%	17%	60%
Respondents identifying water-related outcomes from climate scenario analysis	17%	17%	13%	36%
Respondents using an internal price on water	10%	12%	9%	30%
Targets & goals				
Respondents with targets and goals that are monitored at the corporate level	76%	68%	59%	72%
Respondents setting water intensity reduction targets	38%	2%	19%	19%
Respondents setting supplier engagement targets	0%	0%	1%	0%
Respondents setting Water, Sanitation & Hygiene (WASH) targets	0%	0%	1%	0%
Linkages & trade-offs				
Respondents that have identified any linkages or trade-offs between water and other environmental impacts	52%	57%	29%	68%

Global Market Performance Report - Q3 2023									
Regional Performance					Sector Analysis				
North America	Europe	Asia	Latin America	Africa	Energy	Technology	Healthcare	Finance	Consumer Goods
Hospitality	Infrastructure	Manufacturing	Materials	Mineral Extraction	Power Generation	Retail	Services	Transportation Services	Total
59%	65%	28%	37%	86%	87%	44%	19%	17%	30%
45%	58%	31%	40%	82%	84%	47%	16%	20%	32%
68%	80%	44%	59%	91%	97%	50%	24%	22%	44%
45%	65%	35%	47%	77%	82%	35%	16%	15%	35%
27%	60%	26%	37%	82%	82%	29%	13%	20%	28%
68%	68%	33%	42%	41%	76%	53%	19%	17%	34%
68%	60%	39%	42%	82%	89%	47%	20%	20%	38%
Regional Performance Summary - Q3 2023									
55%	65%	42%	56%	86%	79%	50%	23%	28%	45%
14%	25%	22%	34%	55%	45%	12%	12%	7%	23%
9%	5%	2%	1%	0%	0%	15%	2%	4%	2%
345%	150%	78%	119%	232%	263%	115%	39%	13%	89%
9%	43%	18%	37%	50%	113%	15%	9%	15%	21%
0%	13%	4%	6%	23%	16%	26%	4%	11%	6%
0%	0%	1%	0%	0%	0%	0%	2%	0%	1%
9%	15%	14%	21%	55%	26%	18%	7%	13%	16%
Sector Analysis Summary - Q3 2023									
59%	68%	39%	48%	77%	87%	56%	26%	24%	42%
42%	22%	44%	51%	49%	46%	42%	26%	40%	45%
17%	19%	9%	7%	8%	11%	19%	9%	20%	12%
13%	36%	32%	25%	5%	14%	23%	42%	20%	24%
25%	22%	11%	10%	28%	18%	14%	17%	16%	13%
Regional Performance Summary - Q4 2023									
55%	60%	39%	47%	64%	76%	44%	23%	17%	38%
91%	75%	64%	73%	95%	100%	79%	40%	37%	65%
68%	65%	40%	62%	91%	89%	56%	24%	33%	45%
64%	65%	39%	58%	86%	92%	50%	25%	24%	44%
55%	58%	34%	56%	73%	89%	56%	23%	17%	39%
18%	33%	20%	26%	27%	42%	15%	9%	7%	19%
32%	33%	20%	27%	23%	32%	24%	13%	11%	20%
27%	58%	19%	26%	45%	84%	21%	15%	20%	22%
18%	43%	10%	18%	45%	53%	18%	9%	2%	13%
5%	8%	8%	11%	9%	18%	3%	5%	2%	9%
Sector Analysis Summary - Q4 2023									
77%	75%	59%	68%	86%	92%	62%	34%	35%	58%
6%	13%	8%	20%	6%	16%	11%	2%	0%	11%
0%	8%	1%	2%	5%	3%	0%	2%	0%	1%
0%	8%	1%	2%	5%	3%	0%	2%	0%	1%
Regional Performance Summary - Q1 2024									
73%	68%	32%	47%	77%	92%	62%	21%	15%	36%

For more information please contact:

CDP Water Security

Cate Lamb
Director

Catherine Moncrieff
Senior Manager

Laureen Missaire
Senior Project Officer

Fraser O'Halloran
Project Manager

CDP North America

Christina Copeland
Senior Manager

Board of Trustees

Katherine Garrett-Cox (Chair)

Annise Parker

Jane Ambachtsheer

Stephen T. Chow

Jeremy Burke

Justin Johnson

Rachel Kyte

Christine Loh

Ramakrishnan Mukundan

Jeremy Smith

Takejiro Sueyoshi

Martin Wise

David J. Wolfson

Our sincere thanks are extended to:

Individuals

Debra Tan, Eivind Fliflet, Lisa Beauvilain, Wilhelm Mohn

Organizations

AGWA, Alcoa Foundation, Alliance for Water Stewardship, Global Reporting Initiative, Gordon and Betty Moore Foundation, Interfaith Center on Corporate Responsibility, IUCN, OECD, PGGM, Porticus Foundation, National Business Initiative (South Africa), Nordea, Norges Bank Investment Management, Park Foundation, SDC, United Nations Global Compact, United Nations-supported Principles for Responsible Investment, WaterAid, World Resources Institute, WWF

Scoring partners

Adec Innovations, Gestão, KPMG, SGS, TEC



CDP Worldwide

Level 4
60 Great Tower Street
London EC3R 5AD
Tel: +44 (0) 20 3818 3900
water@cdp.net
www.cdp.net

