CANDRIAM
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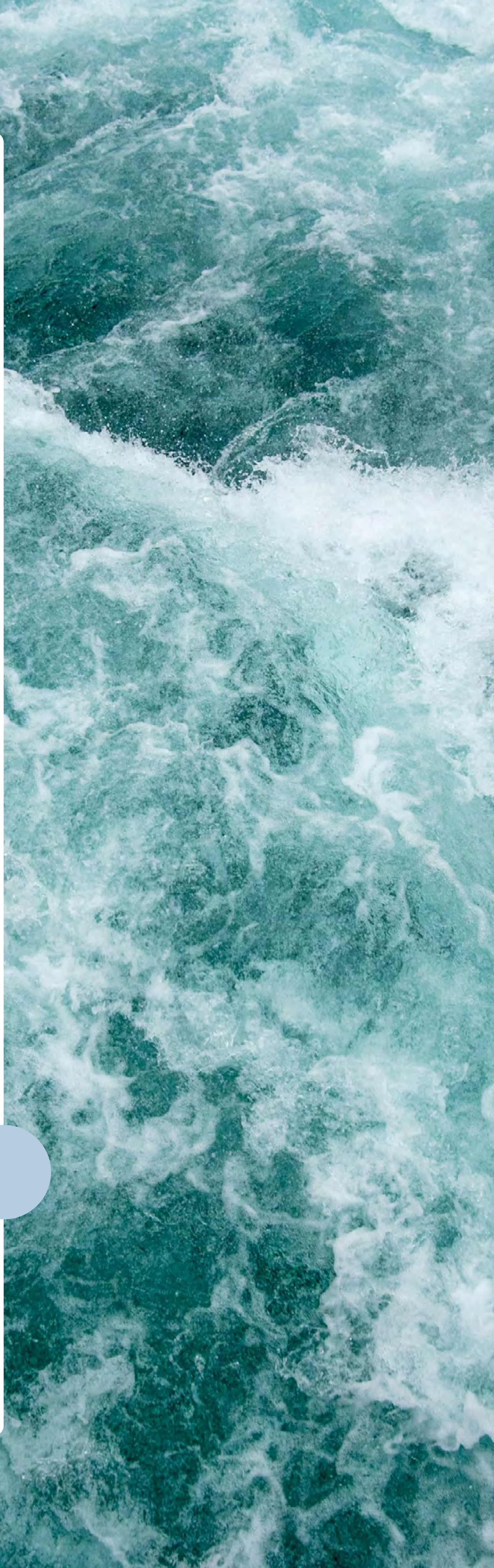
Paint It Blue

How to address the looming global water crisis



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Marketing communication

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Introduction: Let It Flow.

> **"**
>
> ***Water, water everywhere,***
> ***Nor any drop to drink.***
>
> **- Samuel Taylor Coleridge,**
> **The Rime of the Ancient Mariner (1798)**

With five oceans and seven seas, 71% of the earth's surface is covered by water - no wonder we long thought that the "elixir of life" was an infinite resource. And as for many other earth resources, we thought that there was no problem… until there was.

Water sustains not only human existence but the entire ecosystem. As the global population burgeons and climate change intensifies, bringing extreme water incidents from floods to droughts, the fragile balance between water supply and demand is increasingly strained. The equation is as simple as juxtaposing two figures: total water demand is continuously on the rise and is expected to reach 6,800 km^3 in 2050, when annual sustainable water supply is currently 4,000km^3[1] and expected to decrease. We have reached, and are trespassing, our planet's boundaries and on our way to face a water gap of 2,800 km^3.

The United Nations have listed Water among global Sustainable Development Goals, as "sustainable management of water resources and access to safe water and sanitation are essential for unlocking economic growth and productivity, and provide significant leverage for existing investments in health and education"[2].

As an increasing number of individuals are at risk of water stress, and the quality of existing water sources is degrading due to multiple types of pollution, it is our food security and our health that are at threat. According to the UN, over two billion people do not have safe drinking water and 3.5 billion lack access to safely managed sanitation. The global urban population facing water scarcity is projected to potentially double from 933 million in 2016 to between 1.7 and 2.4 billion people, in 2050[3].

In this paper, we aim to explore the many facets of our relationship with, and management of, water, as well as potential solutions to improve their sustainability. In agriculture and industries, which altogether are responsible for 90% of water withdrawals[4], the rise of more water conscious practices is paramount while new technologies offer potential solutions to help bridge the water gap by optimizing water usage. The disturbance of water cycles creates huge risks for our economies but can also generate promising opportunities for investors who are convinced in this secular thematic. Water conscious cropping techniques, smart agriculture, closed-loop industrial processes, improved wastewater treatment and desalination are among the technologies that offer potential solutions, if implemented sustainably.

Water has so far been invisible in our economic models and taken for granted by governments, businesses and individuals. As a global water crisis looms, there is an urgent need to reallocate capital towards water-resilient business models and solutions.

Let’s make our planet blue again.

1. A water gap? Why?

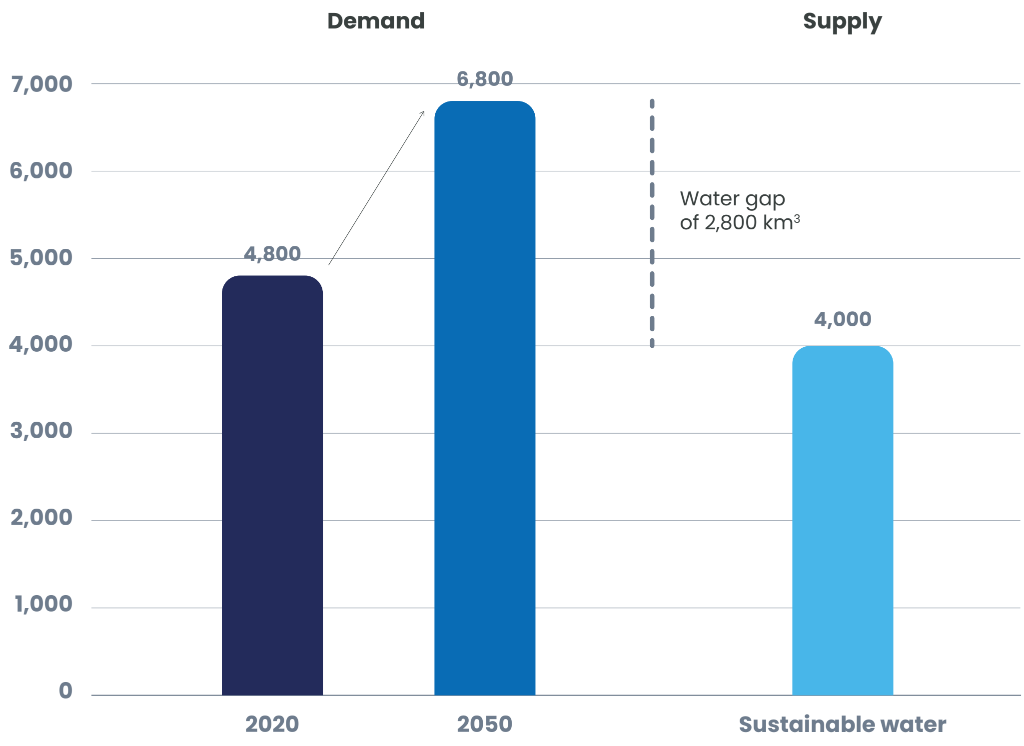
1.1. What is a water gap ?

We call the Earth the Blue Planet. We tend to see water as a given, an infinite resource. For those of us who do not lack it, it had not been an issue, until there suddenly was too much water at a time, in floods destroying buildings and killing people, or too little, in droughts, leading to economic and social disasters such as famine, forced migration and conflict over remaining resources. Both extremes, floods and droughts, have long-term effects on vegetation, animals and people.

How did we reach that point?

Globally, total water demand has risen from under 4,000 km^3 in 1990 to 4,800 km^3 in 2020, and it is expected to reach a staggering 6,800 km^3 by 2050. Meanwhile, the sustainable water supply is estimated around 4,000km^3 currently – and should decrease by 2050. **This difference between demand and supply is called the Water Gap.**

Figure 1:
Without immediate action, the world is facing a water shortage of 40% by 2050
Water demand and supply (in km³ per year)



Sources: World Resources Institute, Aqueduct Database (2020)

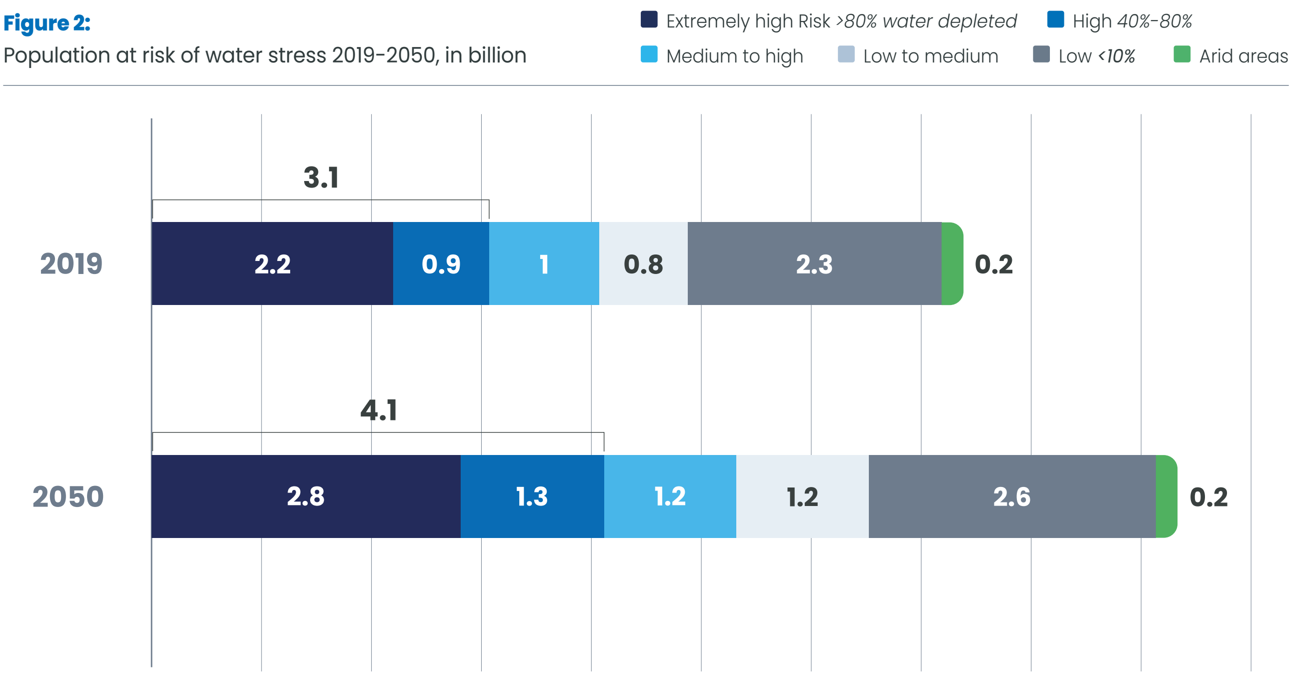
Global population growth (48% increase between 1990 and 2020[5]) is only one the drivers behind this imbalance. The change in our production and consumption habits with more global and industrialized economies has been the other main driver of this increasing gap.

This surge in demand is juxtaposed with the fact that global freshwater available *per capita* has shrunk from 13,800m³ in 1960 to a mere 5,500m³ in 2020[6], mostly due to overconsumption, climate change and pollution, highlighting the urgency of our situation.

1.2. Is it bad, Doc ?

Water stress has risen significantly over the past decade and is accelerating. It is estimated that in 2019, 3.1 billion people were living in areas with "high" or "extremely high" risk of water stress, and in 2050 this number could reach 4.1 billion.

Figure 2:
Population at risk of water stress 2019-2050, in billion



Source: World Resources Institute (2023)

With this, 40% of all irrigated agriculture is expected to face extremely high water stress by 2040[7], placing **food security at the center stage of the debate.**

The quantity of water is one thing. But for most of our usages, **its quality also matters.** Out of 75,000 water bodies surveyed in 89 countries in 2021, **40% were found severely polluted[8].** The World Health organization reports that an estimated 27% of the global population (2.2 billion people) lack "safely managed drinking water" – water at home, available, and safe – and that 43% of the global population (3.5 billion people) lack "safely managed sanitation" – access to a toilet or latrine[9]. Unsafe drinking water, sanitation and hygiene services pose important risk to health: Waterborne diseases affect 20% of the global population, resulting in 3.5 million deaths per year[10].

Sources of contamination may be organic (herbicides, pesticides, oil compounds, dye...), pathogen (bacteria, viruses...) or an increase in salinity (by the dissolution of salts) due to overexploitation of soils and natural resources in general, and to sea-level rise. As for pollution coming from industrial activities, culprits are mainly found in Construction & Mining (metals), Agriculture (nitrates salts) and Fashion (micro plastics).

1.3. Old habits die hard

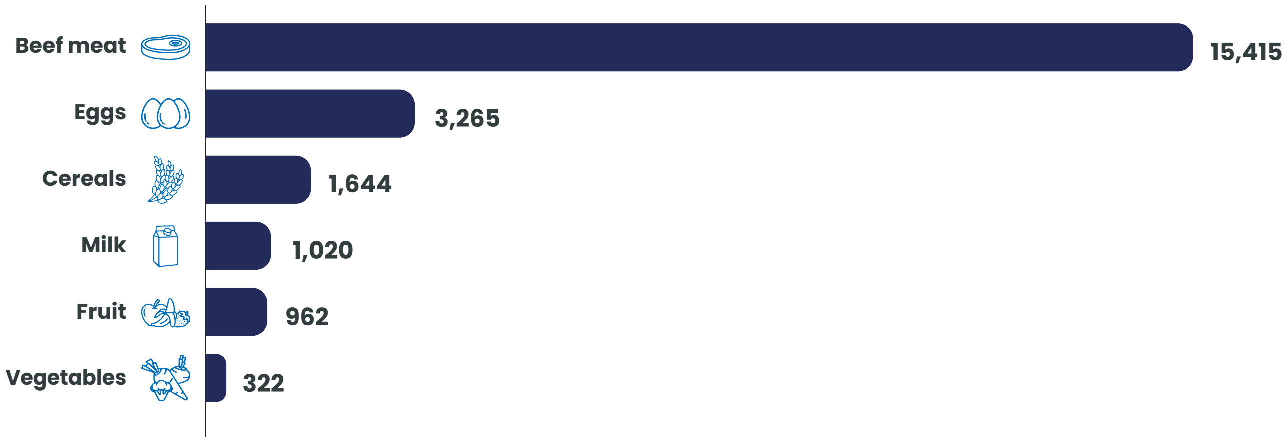
Several reasons may explain the water gap: agriculture and our diets, industries, as well as daily usage by populations.

Agriculture and diets

Agriculture accounts for approximately 72% of the freshwater withdrawn globally[11], making it by far the most water intensive sector. This figure can rise to more than 90% in some regions.

In order to address the exacerbating water crisis, we need to transition to more sustainable agricultural systems. Solutions exist, both systemic and technological, including adapting crops to changing climate and water availability patterns, adopting water conservation oriented practices and developing water optimization solutions. But reducing water consumption in agriculture will also depend on our ability to shift to more water-conscious diets.

Figure 3:
Food Water Footprints, water (in L) needed to produce 1 kg (global average)



Sources: WFN (2020), Vanhamet al. (2018), Mekonnen and Hoekstra (2012)

While it is now well-known that meat production is carbon-intensive, it is less known that it is water-intensive as well. According to the Water Footprint Network, producing one kilogram of beef requires approximately 15,400 liters of water, in comparison with 3,300 liters for eggs and 1,600 liters for cereals. Shifting dietary preferences can play a role in water conservation.

The agriculture sector faces a dual challenge. On one hand, there's an expected 35% increase in demand by 2050 compared to 2020 levels[12], mostly driven by population and economic growth. On the other, unsustainable farming practices - inefficient water management - and climate change risks to irrigation compound these challenges.

Industries

Industry and energy together use approximately 19% of the world's freshwater withdrawals[13]. A regional distribution indicates that industrial water withdrawal averages 17% of total water use in high-income countries but only 2% in low-income countries. Studies suggest a strong increase in demand by 2050, from 24% to 55% according to sources[14].

Industries are a major stakeholder to address in a plan to improve water management. A 10% reduction in water use across all industries could save 150 billion cubic meters annually by 2030[15], which is roughly three times the volume of Lake di Garda in Italy.

Demand is concentrated in a handful of water-thirsty industries.

The majority of industrial water uses and wastewater generation comes from the energy sector, responsible for 10% of global water withdrawal[16]. The energy production industry uses water for fuel extraction, processing, transport, cooling and gas purification in power plants.

Other sectors such as food, textile, industry, chemicals, pharmaceuticals and mining also greatly affect global freshwater use and pollution – producing a pair of jeans requires a staggering quantity of 8,000 liters of water.

It is estimated that **70% of industrial wastewater is not treated, or inadequately treated, before it is dumped into the environment[17],** creating widespread pollution issues. This creates significant opportunities for the deployment of more efficient water treatment and circularity solutions.

Diving into the realities of **industrial water consumption**

10%

of global water withdrawals are used for energy production and electricity generation[18]

27%

of the water used by manufacturing industries is attributed to microchips and semiconductors industry[19]

Amount of liters needed for production (industry average)[20] :

52,000–83,000 L

for a car

12,760 L

for a mobile

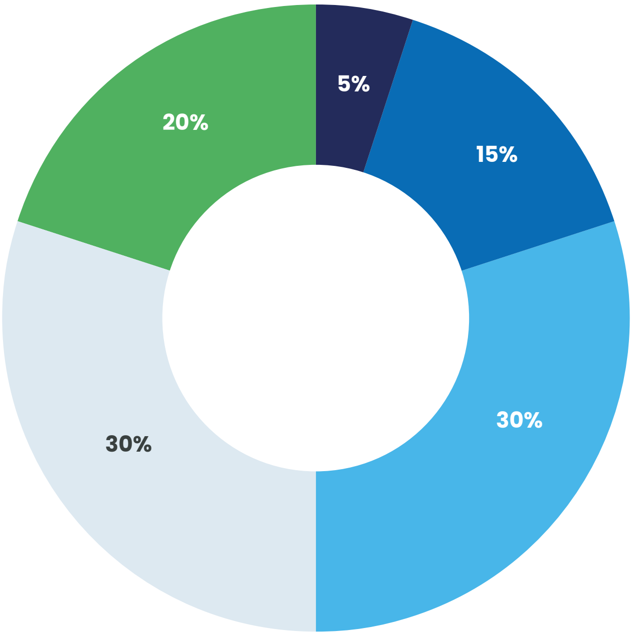
8,000 L

for jeans

Individual usage

On top of addressing agriculture and industry water withdrawals, we, as individuals, need to understand that we can play a pivotal role in mitigating the water crisis. On average, **a person in Europe uses about 144 liters of water per day**, according to EEA[21] – while in many parts of the world, access to clean water is limited to just a few liters per day. Toilet flushing alone makes up 30% of overall household water use[22], with five daily flushes of an old toilet using 70 liters of water.

Figure 4:
Household water use



Drinking and Cooking	5%
Laundry	15%
Toilet flushing	30%
Body Care	30%
Cleaning and Gardening	20%

Sources: Water Footprint Network (2022), EEA (2022), EPA (2021)

Freshwater withdrawals for domestic use have increased by 600% since the 60s[23]. While this increase is legitimately explained by demographics and economic growth (more people exiting poverty and having access to basic sanitation), we cannot deny the fact that attempting to solve the water equation has to include **improving our water consumption patterns**. For example, policy restrictions on water usage have already been implemented under extreme situations – such as droughts - and this could become more frequent if the past trends prevail or accelerate.

Reducing individual usage also involves **improving the condition of municipal water networks**, a factor often overlooked or unknown. The age of these water infrastructures differs regionally. According to industry statistics, in the Western world, where systems are sometimes over 50 years old, water loss can reach 20 to 30%[24] due to aging urban distribution networks.


Society has paid a mere fraction of the true cost of water.

2. Solving the water gap by *using less*.

Water demand patterns can be changed through a profound shift in how we consume water in agriculture, industries, and in our daily life. This will come with systematic changes in our production and consumption patterns, along with the deployment of smart technologies and optimization solutions.

2.1. Agriculture: combining water-smart farming practices and technology deployment

Agriculture is the most water-dependent sector, accounting for 72% of freshwater use[25], and one of the main causes of the degradation of water quality, partly due to the widespread use of agrichemicals. In the first part of the equation to solve the water crisis, *using less*, more water conscious farming practices have to involve water optimization technologies.

The development of water-smart cropping is key in all regions, although water-related issues can vary regionally. Up to 60% of freshwater used for agriculture is lost due to natural factors (evaporation) but also due to poor water management, including leaky irrigation systems or the cultivation of crops that are too thirsty for the environment in which they are grown[26].

Water-smart cropping includes enhancing soil moisture and capacity to hold moisture, basic infrastructure for water harvesting and storage, the use of nature-based cover and cropping solutions. More generally, the introduction of agroforestry and other enhanced carbon and water sink solutions is also key to preserve and restore a resilient water cycle. The introduction of more sustainable farming techniques in their supply chain is a key topic for engagement with companies involved in the food and beverage industry.

Change in cropping practices can be further enhanced through the use of **smart agriculture technologies**.

Precision irrigation techniques and real-time data analysis have the potential to reduce water usage by up to 50% in some cases, while increasing both water efficiency and crop yields. Companies involved in this area display significant potential growth, hereby representing attractive opportunities for investors aiming to support sustainable water management.

Among the technologies that participate in reducing water mismanagement, we can mention:

- **Smart irrigation (or “variable rate”):** adjusting the amount of water applied to different parts of the field depending on soil parameters (e.g. moisture) and crop type. Smart irrigation can cut water use by 35-70% over traditional systems, according to industry groups[27]. Globally, this segment is expected to register an annual growth rate of 12% between 2023 and 2032[28].
- **Drip irrigation:** delivering water directly to the base of each plant, thus minimizing water wastage due to evaporation and runoff.
- **Weather intelligence:** leverage weather models could help to better time irrigation or focus on a certain part of land that may not be touched by water during rainfalls.

The deployment of technology at scale cannot solve the problem alone, but it may provide crucially needed improvements. The benefits of these technologies are well understood and generate substantial improvement compared to existing technologies.

2.2. Towards more circular industries

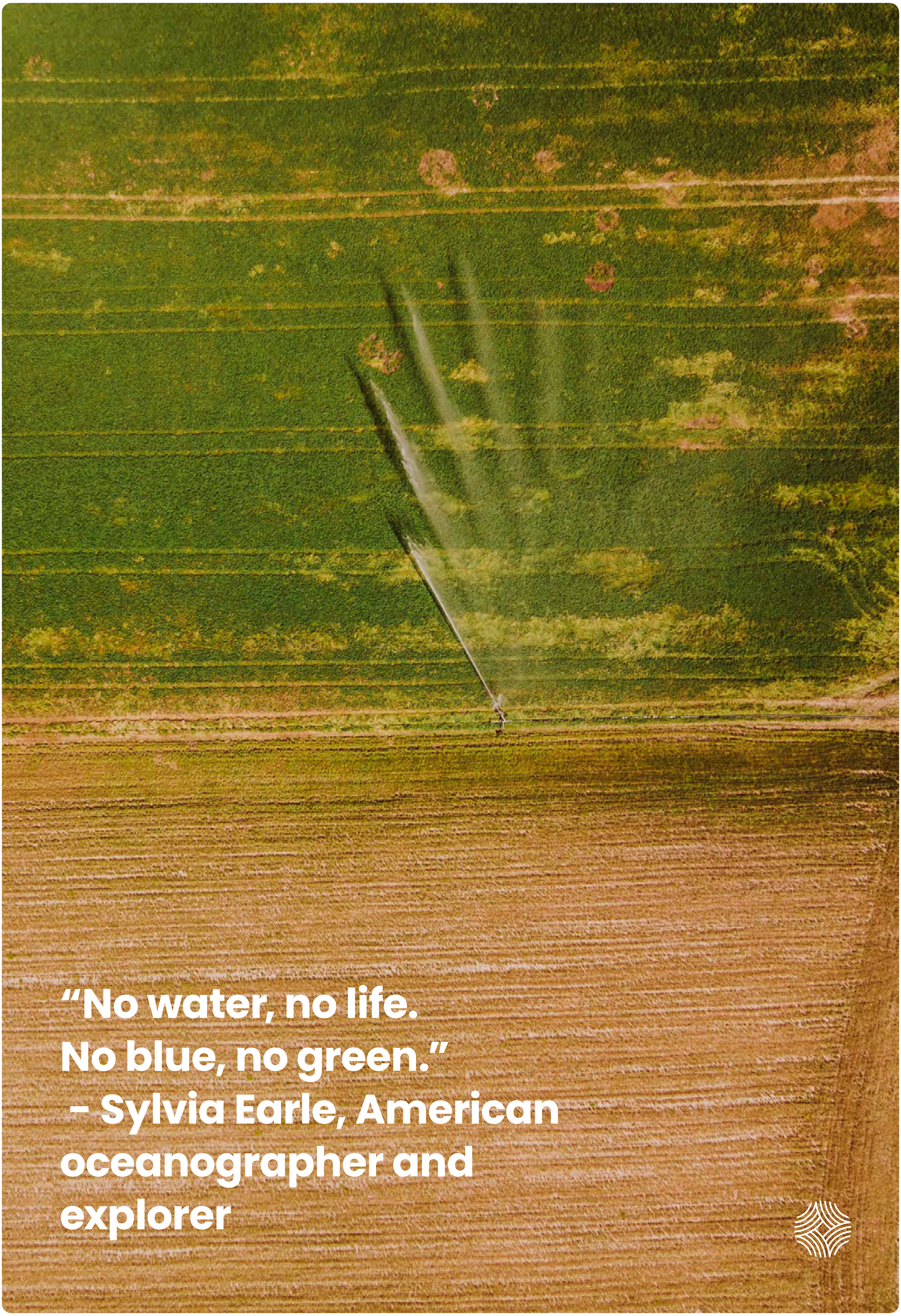
As mentioned earlier, 20% of water demand comes from a wide range of industries, with some being particularly water intensive like thermal and power generation. **A first lever toward reducing water usage is to “reuse” or “recycle” water**, especially for operations that are located in areas of high water stress. This is possible through closed water loops.

A **closed loop water system**, also referred to as a closed recirculating water system, is designed so that water circulates within a closed loop, continuously moving through the system without evaporation or exposure to the atmosphere, potentially undergoing cooling or heating processes, before being reused, sometimes after being treated. Such systems are well suited for the cooling of engines and compressors; they optimize industrial processes while reducing water consumption and environmental impacts, and play a key role in sustainable water management. According to a Grand View Research report from 2023, the global cooling tower market could expand at an annual rate of close to 5% from 2024 to 2030. Closed-circuit towers represent a market share in excess of 30% of the cooling tower market.

How to accelerate this shift? In many industries, **water is already, or increasingly becoming, an operational risk.** For copper mining companies operating in water scarce areas like the Atacama desert in Chile, competition of usage is severely damaging their license to operate and could cause some licenses not to be renewed. In Germany, droughts in the Rhine basin have caused a complete stop of transportation on the Rhine causing major operational disturbances in this industrial region. It is thus crucial that companies provide a comprehensive assessment of their water risks as a first step, and then implement relevant water management strategies. To this aim, a risk management tool such as **Shadow Water Price (SWP)**, on the same model as Shadow Carbon Price, can be a powerful tool to integrate water into strategic planning and capital allocation, and to close the water loop of industrial processes.

The second lever, that is more long-term, is for industries to step up their recycling practices. The simple fact of recycling materials such as packages, textiles, metals or batteries could help cut water use and water pollution significantly:

- Using recycled metals cuts water use by 40%, and water pollution by 76%[29];
- Recycling paper cuts water use by 45% and water pollution by 35%.


"No water, no life.
No blue, no green."
- Sylvia Earle, American oceanographer and explorer

2.3. *Losing less* water: upgrading infrastructures

In addition to changing our daily habits to reduce our consumption, it is also key to remedy water losses in our cities. Fixing household leaks could save up to 1 trillion liters of water annually in Europe alone, as reported by Waterwise, which his equivalent to the annual consumption of 55,000 to 65,000 individuals[30], while advocating for responsible water management at the community level can influence municipal policies and infrastructure improvements. This involves **upgrading ageing water networks** with more modern materials with anti-corrosion properties – a long process - , or can also include digitalizing water networks and introducing **leak-detection systems, smart meters** or communication capabilities that can detect and signal – and even predict ! - leaks or blocages. According to estimates, the **smart water meters market could grow by an annual 11.6%** between 2022 and 2027[31].

Besides fixing potential leakages, **climate adaptation** is another key area to invest in. Climate adaptation needs have been estimated at around $2 trillion per year, while current financing is closer to $50 billion per year. Most countries have listed water as the priority topic of their climate adaptation strategy. Building resilient flood prevention and stormwater systems (that manage the runoff of rainwater or melted snow) is key in order to protect cities from catastrophic events and to prevent industrial pollution accidents. It is an area in which we expect cities and countries to invest massively in the coming years, generating significant opportunities for companies providing flood prevention and management solutions.

Overall, the transition to circular and **water-smart cities** (encompassing water infrastructure monitoring, urban water conservation and smart leak detection) represents a **$540 billion market, that is expected to grow by an annual 15% by 2030[32].**

2.4. Improving companies' water management practices

While technology can bring part of the answer when it comes to improving water efficiency and preserving freshwater sources, the impact of these technologies will depend on companies' ability to improve their water management strategy and practices. Governance and behavior are at least as important as technological improvements.

Corporates and investors need to consider the investment risks and ESG impacts of water. **Water is a local issue, therefore it should be analyzed with a local perspective**, as pointed by the Taskforce for Nature-related Financial Disclosure (TNFD). Indeed, many issues pertaining to water depend on the precise location of companies' assets: the availability of freshwater sources, the quality of these sources, the potential competition with other users, the resilience to climate change impacts. This also means that water management and reduction objectives have to be set in this contextualized way, asset by asset. As a result, science-based targets, when it comes to water, will have to be set at a local level, starting with assets that are assessed with the highest water risks and impacts.

This mindset shift has started happening, and it needs to strongly accelerate. This is where engagement plays a pivotal role in pushing for adequate disclosure and a more localized approach. Stronger regulation is also a *sine qua non* condition in order to push for the adoption of more water-conscious practices.

Engagement

Corporate disclosure and approach on water management remains inadequate and nowhere close what is necessary to comply with the TNFD LEAP approach (Locate, Evaluate, Assess, Prepare). It is crucial that investors encourage companies to act as water stewards, and first provide the relevant level of disclosure on their water related risks and impacts.

Water is a key topic in Candriam's engagement strategy for 2024, with 4 pillars that form the structure of our ESG assessment on water management:

- Water governance and disclosure,
- Water strategy & target setting,
- Water risk assessment and management,
- Water management performance.

Candriam also joined NA100 (Nature Action 100) in order to increase its leverage through collaborative engagement on nature related questions, including water management.

See our latest Engagement & voting report for a deep dive into the key topics covered and our engagement outcomes:

Regulation

Water is a topic that has been mostly regulated at local levels, without very clear national or global roadmap. This will of course change as water becomes a key operational and social risk, and in many areas already a political issue. **We are expecting to see more water-related regulations,** that will in some instances constrain water usage. It is very likely, as it has already been the case in some areas subject to increasing water scarcity, that some of the water volumes extracted freely by businesses will come at a cost, as the resource becomes scarce and competition of usages intensifies.

In addition, there is growing evidence that water contamination is a health issue. Past industrial disasters gave birth to laws and directives aiming to prevent further major accidents (e.g. in Europe, the Seveso directive initially adopted in 1982 and revised since[33]). Regulators in Europe and in the US are increasingly committed to regulating water contamination. This was evidenced recently in the increasingly stringent measures against harmful chemicals, particularly those in the PFAS family (per- and polyfluorinated alkyl substances, also called "forever chemicals"). PFAS have been regulated for some years by EU REACH regulation (on the Registration, Evaluation, Authorization and Restriction of Chemicals) and the Drinking Water Directive, and it is very likely that renewed media and civil society concerns will trigger more restrictive legislation.

Of course, regulation creates additional risks and can change the cost structure of some water-intensive activities. But it also creates investment opportunities, as companies are developing remediation/ decontamination services.

“Forever chemicals” are everywhere – not for much longer... or ?

“Forever chemicals” are a class of chemicals also known as PFAS (per- and polyfluorinated alkyl substances).

They have been used in manufacturing since the 1950s for their non-stick, waterproof or heat-resistant properties. They are found in a range of everyday objects such as stain-resistant carpets, non-stick pans, food packaging, textiles and cosmetics, as well as having many industrial applications (paints, pesticides, fire-fighting foam). They are particularly persistent in the environment (decades, or more) – hence their name - , and are responsible for the contamination of water, air and soil and the entire food chain.

Like in the environment, they can accumulate in our bodies for a long time. According to the European Environment Agency, most PFAS are considered to be moderate to highly toxic to health. They have been linked to various hormonal, reproductive and carcinogenic illnesses.

3. Solving the water gap by *better managing* available resources.

Acting towards a reduction of water demand was the first part of the equation. On the other side of the balance, a second lever is to act on water supply, through a better management of available resources. This includes treating polluted water, desalinating seawater to take advantage of the oceans and seas that were originally given to us, and finally restoring biodiversity.

3.1. Treating wastewater more efficiently

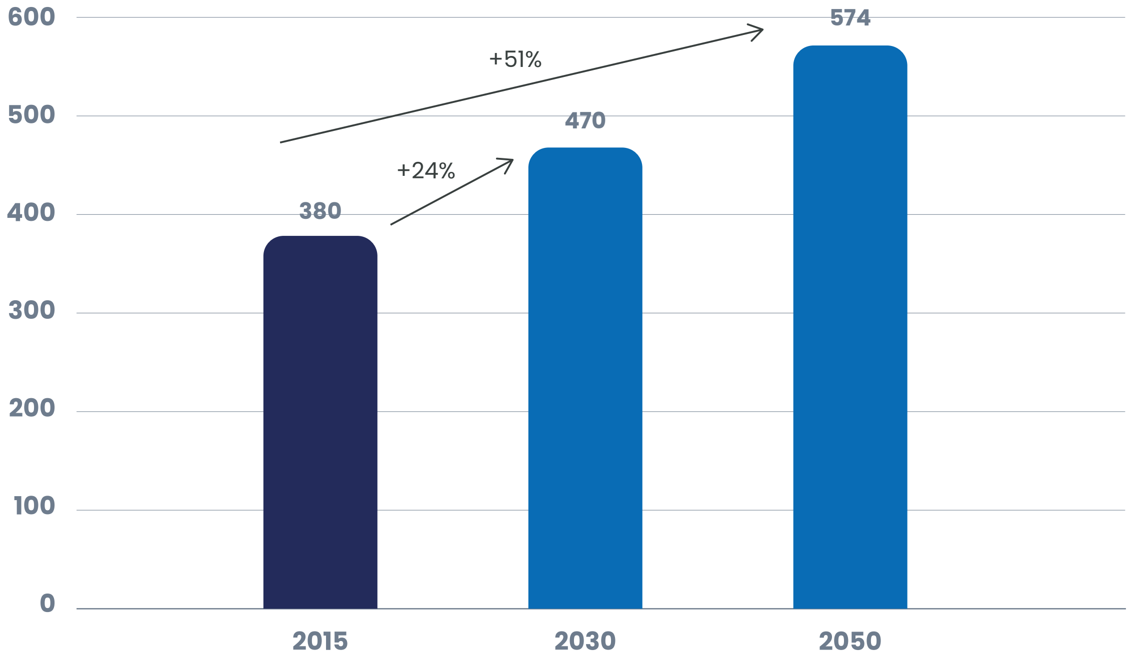
Globally, 70% of industrial wastewater is not treated or inadequately treated before being dumped into the environment[34] (this excludes cooling water used for energy production). Wastewater production is expected to increase by 24% by 2030 and 51% by 2050 from today's levels[35].

The compounding effects of increasing wastewater production and the lack of treatment capabilities implies that contamination of water systems is at risk of increasing further, and this will be further exacerbated by climate change.

Technology and innovation can be harnessed to recycle and purify wastewater. Advanced water reclamation facilities can treat wastewater to such high standards that the resulting water is often purer than water from conventional sources, as indicated by the European Commission.

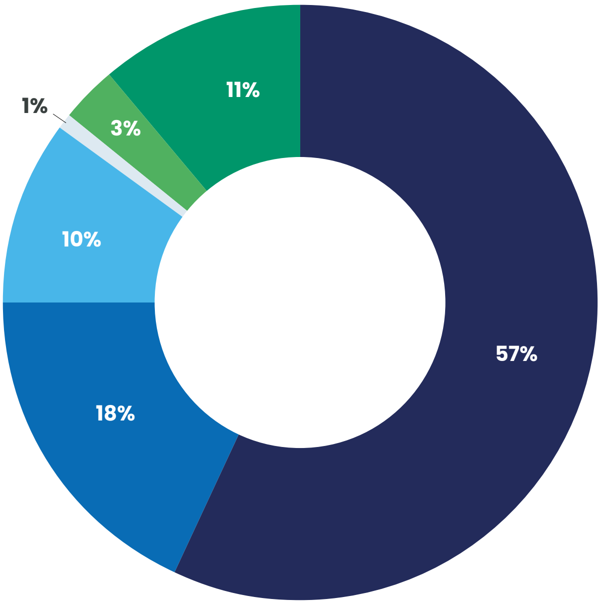
Pollutants across the world become increasingly complex (from "forever chemicals" to pharmaceuticals molecules, from heavy metals to hormones). As a result, water treatment technologies need to evolve to tackle these challenges. Emerging technologies include **nanofiltration membrane technology, physical thermal process** or **UV treatment**.

Figure 5:
World wastewater production in billion cubic meters (m^3)



Source: United Nations University Institute for Water, Environment and Health (UNU-INWEH, 2020)

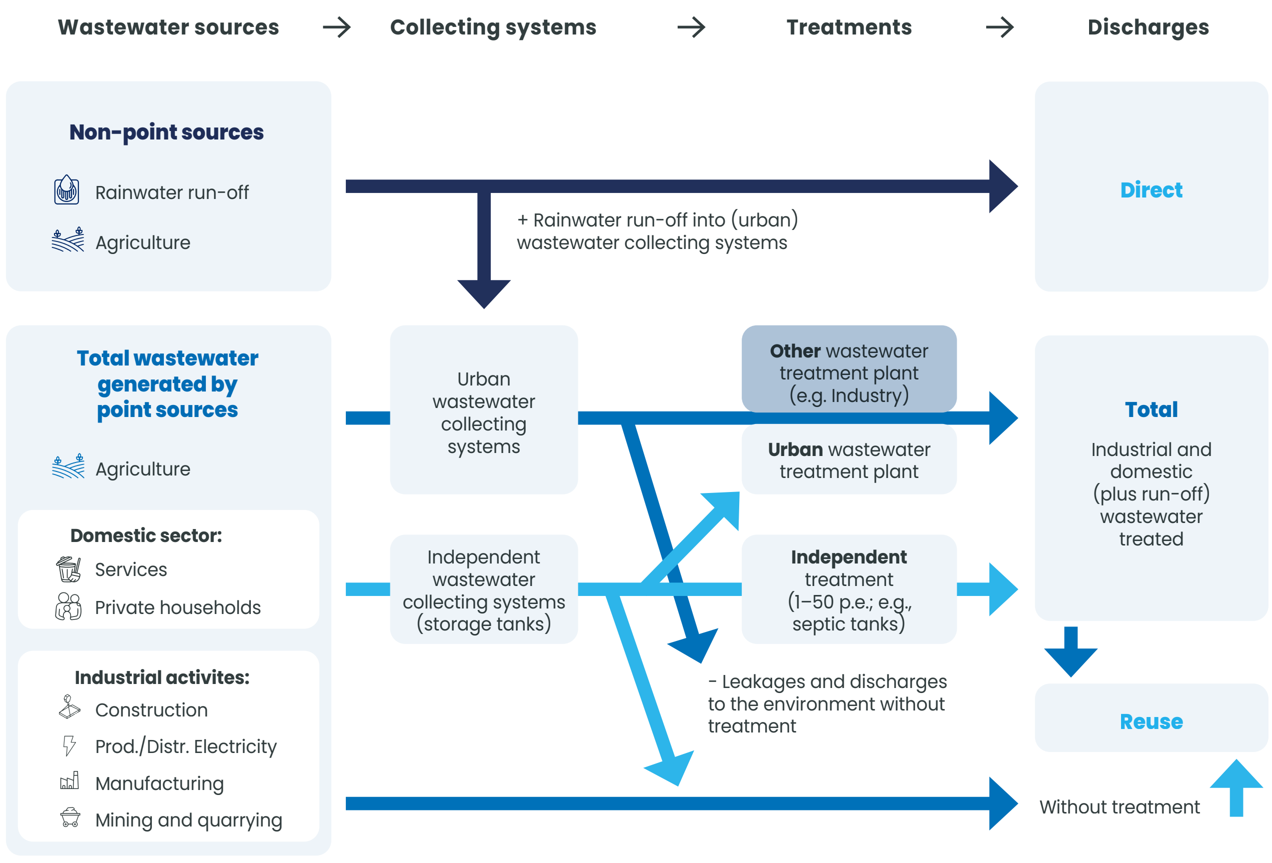
Figure 6:
Global industrial wastewater production



Energy production	57%
Pulp & paper	18%
Metallurgy	10%
Textile	1%
Food industry	3%
Others	11%

Sources: MDPI (2022), Wastewater as a Renewable Energy Source

Figure 7:
Schematic representation of wastewater sources, collecting systems and treatment



Source: United Nations, Progress on Wastewater Treatment, 2021. Graph adapted from OECD/Eurostat (2018).

Nevertheless, whatever the technological progress made that allows to reuse water, regulations must follow. Overall, only 11% of the world's treated wastewater is reused[36], mostly because of regulation. However, in the EU, where the share of wastewater reuse is even lower, regulations are evolving towards facilitating agricultural water reuse[37].

Eventually, we believe that **circular water - including wastewater - will become the norm.** A combination of more stringent regulations and/or financial incentives (or penalties) would be required to get there. But the amount of freshwater that can be spared is truly large.

The potential of reclaimed water to supplement conventional water sources should not be understated, and its adoption is a critical step in ensuring a more resilient water supply for the future.

3.2. Untapping new water sources: Desalination

To address the growing strain on traditional water sources, potential solutions include identifying new supply sources. Making use of the vast amount of seawater on earth is one of the first that come to mind. Desalination technologies have the capacity to turn these vast quantities of seawater into freshwater.

Desalination has been long seen as the unique solution to bring potable water to population living in arid areas (Middle East, North Africa, some parts of Latin America and Australia), but negative externalities such as very high energy need, associated CO2 emissions and discharged brine equally raise concerns.

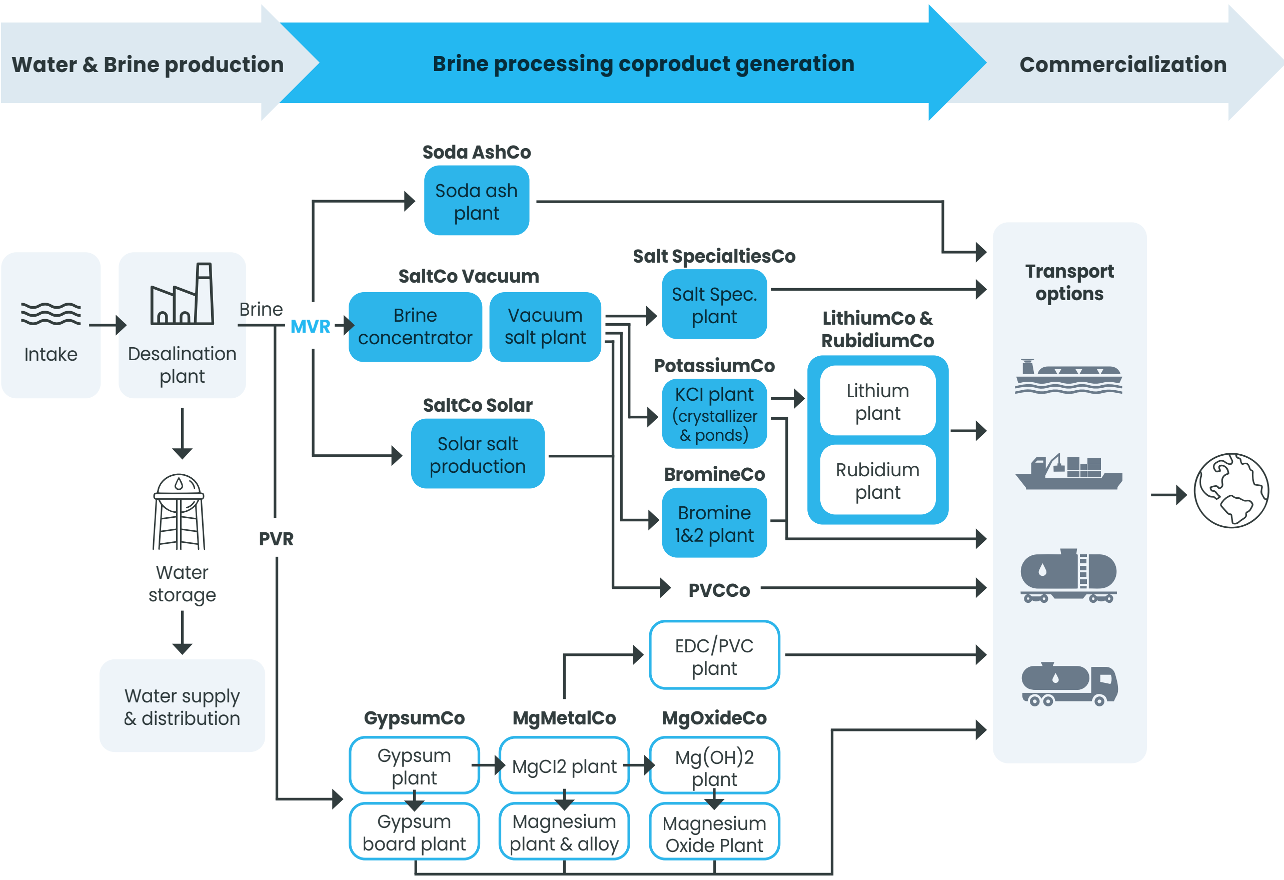
- In terms of **GHG emissions**, the traditional desalination technology known as Multistage Flash (MSF) demands significant energy for water treatment. When the energy used is derived from high-carbon sources, this approach to solving water scarcity ironically exacerbates climate change.
- Regarding **brine treatment**: brine, the "waste" produced by the desalination process, is often discharged back in seawater. This increases the salinity of the seawater and introduces some chemical components that would alter the physio chemical characteristics and impact marine life.

However, things are changing in a positive way:

- Regarding emissions, new treatment technologies exist that are less energy-intensive. The reverse osmosis technology (RO) requires only a fraction of the energy to treat seawater relative to MSF (around 20%). However, it remains one of the most expensive technologies to desalinate water. This had direct consequences on bringing down the cost of desalination. Moreover, solar power, which is cost-competitive against fossil fuels in the usual regions for desalination, can help reduce the carbon intensity of the overall process.
- Regarding brine, it is a waste that can be leveraged. In fact, it contains minerals and metals that can be recovered and monetized for a wide range of applications. At this juncture it is still a concept but a technology exists to build the first fully circular water system using seawater as input.

Of the world's 526 cities with a population over one million, 193 (37%) are located in water-scarce basins (perennial or seasonal) and three out of four are in coastal areas[38]. Needs are huge, equally large is the opportunity. As a result, **the desalination market is expected to grow at a 10-20% rate p.a. by 2030[39],** and the integration of downstream processing could help significantly reduce the negative environmental externalities.

Figure 8:
Integrated desalination & brine processing



Source: ENOWA NEOM

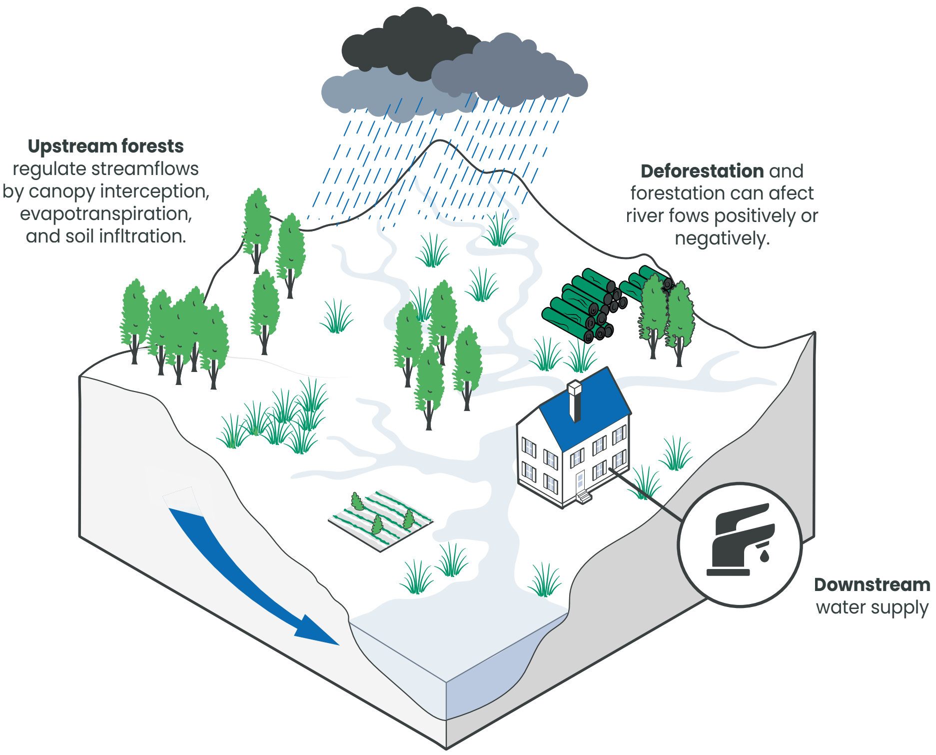
3.3. Preserving water sources through **biodiversity protection**

Preserving and restoring biodiversity can play a pivotal role in increasing freshwater availability. The loss of biodiversity poses a vital threat to freshwater sources as forests and other biodiversity-rich ecosystems are water sinks as much as carbon sinks.

Deforestation is directly correlated with lower freshwater availability

Extensive research by the World Wildlife Fund (WWF) reveals a compelling correlation between deforestation and reduced drinking water availability in affected regions. For every 1% increase in deforestation, there is a significant 0.93% decrease in accessible drinking water: primary forest loss has a direct impact on water resources.

Figure 9:
The complex influence of forests on water supply



Source: Mingfang Zhang, Xiaohua Wei ,Deforestation, forestation, and water supply. Science 371,990-991(2021). https://www.science.org/doi/10.1126/science.abe7821, GRAPHIC: N. DESAI/SCIENCE

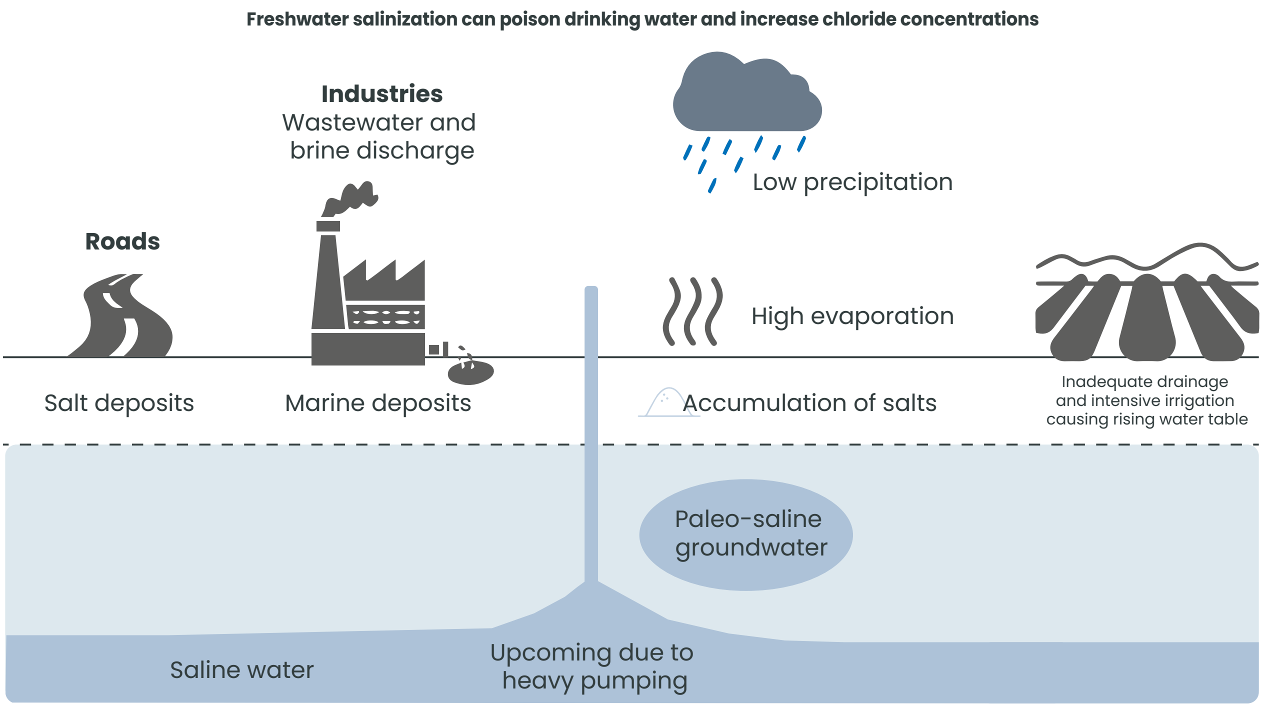
Extensive urbanization disturbs the water cycle

The United States Environmental Protection Agency (EPA) provides insights into the impact of urbanization on freshwater availability. According to their findings, impervious surfaces like concrete and asphalt can generate up to 25,000 liters of runoff per 1000m^2 during a 25mm rainfall event (i.e. one day of rain)[40]. This excess runoff disrupts groundwater recharge, leading to a substantial reduction in available freshwater resources.

Increasing salinity in freshwater bodies

The World Bank's research on water resources highlights the escalating problem of high salinity levels in water bodies. Salinity, due to many causes including increased water extraction, poor irrigation management and sea-level rise, affects approximately 1/10th of river stretches in regions like Latin America, Africa, and Asia. This rising salinity renders water sources unfit for various purposes, including agriculture and drinking, amplifying the challenge of freshwater scarcity.

Figure 10:
The impact of freshwater salinization is a serious environmental problem affecting water quality



Source: Candriam, Study the University of Maryland of April 2021: "Freshwater salinization syndrome: from emerging global problem to managing risks", Illustration based on "Salinization" study from K. Brindha, Michael Schneider, in GIS and Geostatistical Techniques for Groundwater Science, 2019 (sciencedirect.com)

Preserving and restoring biodiversity-rich ecosystems is key to maintaining freshwater availability

One of the first action in order to preserve freshwater sources is thus to preserve biodiversity. It is absolutely crucial that governments, corporates, investors and citizens work together in order to reverse biodiversity loss by 2030 and then act to restore vital ecosystems.

The United Nations Environment Programme (UNEP) leads the "largest river and wetland restoration initiative", which serves as a prime example of large-scale restoration efforts to improve water availability. This ambitious project aims to revitalize critical river and wetland ecosystems, mitigating water risks and enhancing freshwater supplies. Such initiatives demonstrate the potential for dedicated restoration projects to contribute significantly to water resource management.

In short, the same drivers that are causing biodiversity loss – change in land use, overexploitation of nature, climate change, pollution, are posing significant threats to our water sources. **One of the first way to preserve freshwater availability is thus to protect biodiversity, and where needed to restore it.**

Conclu-
sion.

Conclusion : Have we entered the Water Age?

Sheikh Zaki Yamani, a former Saudi Oil Minister said twenty years ago: "*The Stone Age did not end for lack of stone, and the Oil Age will end long before the world runs out of oil*"[41]. This famous quote at a time when energy transition and decarbonization were fringe notions helps us remember that efficiency gains, substitution and disruptive technologies can radically alter our need for commodities that were considered critical before.

The water (economic) cycle can certainly improve its efficiency, but only limited evidence supports that water can be replaced by substitutes or that a new technology can drastically improve the situation. Beyond the obvious statement "water is life", we believe that society has paid a mere fraction of the true cost of water – which has reduced any economic incentives to work on substitution wherever it may be suitable, or on solutions for greater efficiency.

We believe that enhanced regulation and shareholder engagement will eventually prompt corporations (as well as the agriculture sector) to change the way they deal with water, at a time of climate change and increased water stress. This in turn should sustain elevated investments through the end of the decade (and most likely well into the 2030s) providing a unique investment opportunity for companies all along the water value chain to become leaders in water efficiency and circularity. Recent research shows that $2.3 trillion of commercial opportunities could be unlocked for the private sector by investing in water security[42].

The Stone Age is gone. The Oil Age will be gone eventually. Have we entered the Water Age? At least it feels that way. The good news is that exiting the Water Age wouldn't imply that we would have exhausted all our water resources; rather, we would have successfully addressed all the water-related challenges we are facing. But it is certainly a long shot, and that is why we believe this investment theme can span over decades.

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