Beneath the Surface:

The State of the World's Water 2019

WaterAid/Sibtain Haider

WaterAid/
Sibtain Haider

WaterAid/Genaye Eshetu

WaterAid


WaterAid/Genaye Eshetu

Images clockwise from top:

- **Shita, 28, and her sister in law Semira, 21, fetching water from Bilate river in the surrounding area of Kulito, Alaba, southern Ethiopia.**
- **Water disconnections are common in the East Lands of Nairobi, so tankers are installed to save water for the off days. Pangani Primary School, East Lands, Nairobi, Kenya.**
- **Collecting dirty water from a hole dug in the sand, in a partially dried riverbed before there was a safe water point in Sablogo, Koulpelogo Province, Centre-East Region, Burkina Faso.**
- **Salif, third from left, and members of his family weed their millet field, in the village of Talo, Segou Region, Mali. The area suffers from water scarcity.**


WaterAid/Guilhem Alandry

WaterAid/Behailu Shiferaw


WaterAid/Basile Ouedraogo

Introduction

If a bucket contained all the world's water, one teacup of that would be freshwater, and just one teaspoon of that would be available for us to use, from lakes, rivers and underwater reservoirs as groundwater.[1]

In theory, this is enough to meet all the daily, basic needs of all the people around the world. Yet whether you are able to access that water for drinking, cooking, washing and other daily needs depends on who you are and where you live.

One in nine[2] people do not have access to clean water close to home, and just under two thirds of the world's population – 4 billion[3] – live in areas of physical water scarcity, where for at least part of the year demand exceeds supply.

Water scarcity exists for two reasons. Physical scarcity means there isn't enough water to go around. Socio-economic scarcity means there is water present, but it isn't available to all because of lack of investment and political will.[4]

If we were to measure nations' water wealth and water poverty, not only by access to drinking water, but also by their access to water-intensive food, clothing and other products – the so-called 'virtual water' that is used in the cultivation and production of everything we eat, wear and use – the disparity becomes even more stark. Wealthy nations are able to import large amounts of water-intensive goods, which can then drive economic growth in poorer exporting nations. But if this is not done in a sustainable way, in extreme cases poorer nations then see their water supplies depleted by production for export, even as their own people do not have access to enough clean water for basic daily use. This impacts most on those who are already marginalised, for example people who are less physically able or who have caring responsibilities.

In 2015 the global community committed to the UN Sustainable Development Goal 6, which promises that by 2030 everyone will have a safe supply of water available whenever they need it. But progress on delivering safe drinking water to all is threatened: by the lack of political will and financing required to deliver, by the competing demands from industry and agriculture, and by climatic changes. The number of people living in physically water-scarce areas is predicted to rise to 5 billion by 2050,[5] making this promise even more important, and more challenging.

In *Beneath the Surface: The State of the World's Water 2019* we reveal the countries where the most people live with physical water scarcity, how ballooning customer demands jeopardise water access for the poorest and most marginalised people, and how making thoughtful choices as consumers can help ensure access to water for basic needs is prioritised, wherever you are in the world.

What's the impact of water scarcity?

How much water people have depends very much on where they live. Some 60% of the world's population lives in Asia and the Middle East, yet that area only receives slightly more than a third of the world's water runoff – that is, rainfall or melting snow. South America, which has 6% of the world's population, has a quarter of the world's water runoff.[6]

Even within countries there are often huge disparities from region to region, and climate change and urbanisation are amplifying those differences. For example, London is not known as a dry city, but is water-stressed because of the heavy demand imposed by nine million people.[7]

The availability of water, and to what extent that impacts on the prospects of nations and individuals, is also affected by wealth, creating a vicious circle for the poorest and most marginalised people. Spending hours collecting water from an unsafe source that will make you and your family sick makes it much harder to earn a good living. Poorer communities without political influence struggle to persuade authorities and utility companies to provide water services.

Wealthier communities, however, are more likely to have reliable water services, and are better able to cope with water stress. When Cape Town's drought last year threatened to make it the first modern city to run out of water, wealthier residents fitted high-tech filters to the 30,000 private boreholes[8] in suburban gardens and bought bottled water, while poorer residents queued at standpipes.

Below left: Gallons of water lined up for sale at the Garki Village Primary Health Centre, which is required because of the lack of clean water supply. Abuja, Nigeria.

Below right: Claudine collects water from a swamp-like river. "The water tastes bitter, but we don't have any other option. At school in the dry season, the teachers ask us to bring in water with us." Kibungo, Rweru, Bugesera, Rwanda.


WaterAid/Simi Vijay


WaterAid/Jacques Nkinzingabo


WaterAid/Basile Ouedraogo

Above: Moustapha watering crops in a garden with water drawn from a hole dug in the sand around a riverbed. WaterAid assists the community to monitor groundwater levels to manage threats to water security. Lalgaye Commune, Koulpelogo Province, Region of Centre-East, Burkina Faso.

Defining water wealth and poverty through 'virtual water'

This buffer zone of wealth protecting against water stress extends to what is known as **virtual water** – the water included in the production of everything we eat, buy and wear. The amount of water needed to create a product is its water footprint. Take your morning cup of coffee, of about 125 ml of actual water. The water used to produce the ground coffee, from irrigating coffee plants and processing the beans, is more than 1,000 times that amount, at 132 litres or nearly seven 20-litre jerrycans full.[9] A lunchtime hamburger of about 110 grams might not appear to contain much water, but, on average, it took 1,700 litres of water, or 85 jerrycans, to get it to your plate.[10]

The amount of water we each use physically each day for washing and drinking is dwarfed by our virtual water use.

The amount of water needed to produce everything that the United Kingdom consumes in a year, added to the water physically used in the country, is 75 billion cubic metres[11] – or 3,400 litres per person per day. That's the equivalent of 170 jerrycans every day, only nine of which are for drinking, cooking, laundry, flushing toilets and other daily physical uses.[12]

Yet in London and the South East of the UK, the amount of water physically available is only half of that – 1,700 litres per person per day.[13]

The UK imports 75 per cent of its virtual water from other countries. This is around the same percentage as the water-scarce and desalination-dependent United Arab Emirates.[14]

Virtual water's role in global trade

G7 countries

Country	Water footprint per capita[15]	% of water from inside the country/ % imported[16]	Average rainfall (mm/year)[17]
USA	7,800 litres/day	80/20	715
France	4,900 litres/day	53/47	867
Germany	3,900 litres/day	31/69	700
Canada	6,400 litres/day	79/21	537
Italy	6,300 litres/day	39/61	832
Japan	3,800 litres/day	23/77	1668
UK	3,400 litres/day	25/75	1220

Countries with large populations living with physical water scarcity

Country	Population living with water scarcity during at least one part of the year[18]	National water footprint (litres per person per day including virtual)[19]	% of water from inside the country/ % imported[20]
India	1 billion	3,000	97/3
China	900 million	2,900	90/10
Bangladesh	130 million	2,100	83/17
USA	130 million	7,800	80/20
Pakistan	120 million	3,600	84/16
Nigeria	110 million	3,400	95/5
Mexico	90 million	5,400	57/43

Virtual water underpins global trade, with an estimated 22% of global water use going towards producing goods for export.[21]

This provides valuable income for exporting countries and enables importing countries to be less dependent on water within their geographic borders. It also means consumers can eat food and wear cheaper clothes that could not be produced in their own country.

However, globally, we now use six times as much water as we did 100 years ago – and that figure is growing by 1% every year. Population growth and changes in diet are expected to increase the water demands of agriculture by around 60% by 2025.[22]

Globally, each year there should be enough freshwater available to meet the demands of agriculture, industry and domestic use.[23] The challenge is to ensure that enough water is available where people live, throughout the year, to meet basic needs.

How do we balance the growing trade in virtual water, and countries' desires to build prosperity through exporting, with the human right to have available and affordable access to water for daily needs?

Green water: soil moisture

Blue water: irrigation

Grey water: diluting pollutants

A bit about water footprints

The water footprint of any item is made up of three different types of water. 'Green water' in this context is soil moisture; 'blue water' is used in irrigation, drawn from lakes, rivers and from groundwater sources below our feet. And 'grey water' is the amount of water needed to dilute any pollutants created in production before release back into the environment.

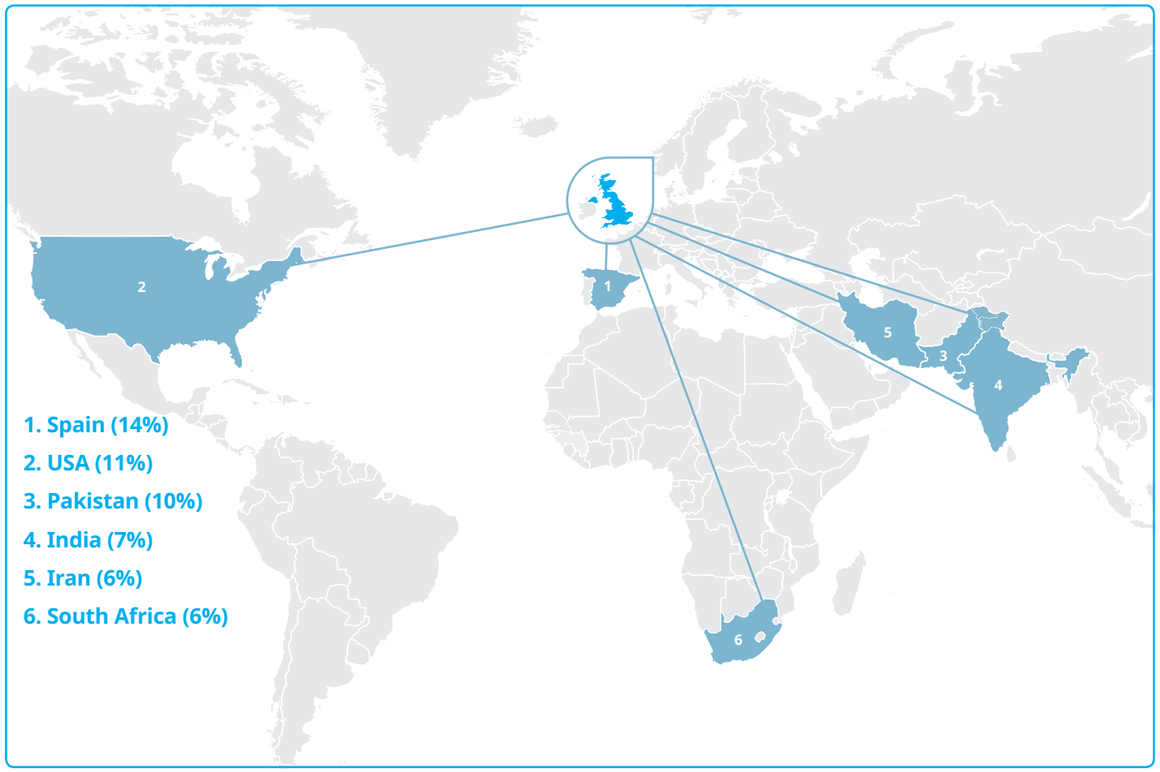
Rain-fed crops largely do not compete for water with households or industry, but are more vulnerable to drought and are likely to have lower yields, resulting in lower incomes for farmers.

Blue water for irrigation comes from the same sources as for household use. When demand is high and reserves are limited, it's critical to balance these demands to protect the amount of water available for basic use. Groundwater is like a hidden savings bank with a low interest rate – whatever is taken out will eventually trickle back in through the ground, but often at a slower rate than it is being used. Overuse erodes groundwater's natural ability to even out the vagaries of cyclical drought and provide a reliable back-up. Around two thirds of global freshwater extraction is used for irrigation.[24]

Mohammed, 31, Shita, 21, and their son Bilal, 1, posing at their farm near Kulito. Mohammed, a farmer, used to rely on the irrigation scheme built on Bilate river, but in the past two years a lot of people started using the system and the river water no longer reaches his farm. Alaba zone, southern Ethiopia.

WaterAid/Genaye Eshetu

Where does virtual water come from?



1. Spain (14%)
2. USA (11%)
3. Pakistan (10%)
4. India (7%)
5. Iran (6%)
6. South Africa (6%)

In an ideal marketplace, the virtual water trade would balance resources between countries blessed with abundant water and those countries where water is in shorter supply.

However, this is not the case. For example, nearly half of the UK's virtual water imports come from countries with unsustainable levels of 'blue' or irrigated water use. This includes such water-scarce countries as Spain (14%), the USA (11%), Pakistan (10%), India (7%), Iran (6%) and South Africa (6%),[25] with sometimes worrying implications for the exporting areas. In the Upper Ganges and Lower Indus aquifers that lie under India and Pakistan the amount of water taken out is more than 50 times the amount that goes back in through natural rainfall and melting snow in the Upper Ganges, and 18 times in the Lower Indus.[26] Meanwhile, importing goods 'saves' the UK about a third of the water it would have to use otherwise – 53 billion cubic metres.[27]

Global groundwater depletion – where the amount of water taken from aquifers exceeds the amount that is restored naturally – increased by 22% between 2000 and 2010.[28]

- **Wheat** – accounts for 22% of groundwater depletion. It has a global average water footprint of 1,827 litres per kilogram, although this varies by region. For instance, a 300-gram baguette from French wheat has a much lower water footprint of 155 litres[29] than the global average.
- **Rice** – accounts for 40% of all global irrigation, and 17% of global groundwater depletion, with an average water footprint of 2,500 litres of water per kilogram.[30]
- **Asparagus** is a thirsty vegetable, with an average global water footprint of 2,150 litres per kilogram.[31] In the Ica Valley in Peru, producers grow the crop in an area receiving 2.5cm of rainfall a year; nearby wells serving a community of 18,000 people have dried up following heavy irrigation.[32]
- **Avocados** have an estimated water footprint of almost 2,000 litres per kilogram.[33] In Chile's arid Petorca region, every cultivated hectare of avocados requires 100,000 litres a day of irrigation. Villagers nearby now depend on trucked-in water supplies, after underground aquifers and rivers dried up.[34]
- **Exports of cut flowers** also often require heavy irrigation. A combination of climatic changes and heavy irrigation for horticulture in Ethiopia have been linked to the shrinking of Lake Abijata.[35]
- **Cotton** is a thirsty crop requiring heavy use of 'blue' irrigated water, which can cause long-lasting damage in arid environments. The Aral Sea, which straddles Kazakhstan and Uzbekistan, has shrunk by 80% since the 1960s because of large-scale irrigation of cotton crops.[36] Cotton fabric grown and produced in India has a water footprint of 22,500 litres per kilogram; in Pakistan, this is an average of 9,800 litres and in the USA about 8,100 litres.[37]

Recent research shows water footprints can change, according to how scarce water is in an area. Take for instance the production of lamb. One kilogram of lamb on average takes about 461 litres of blue water to create. But that amount may be reduced to 88 litres for a pasture-fed flock raised in a rainy area. However, for a lamb raised on feed in a water-scarce area, the amount of blue water used in its production increases by nearly 1,000 times – to 7,826 litres. Water footprint researchers may also apply a 'weighting' to the impact on the environment of using blue water when it is scarce. With that weighting, a kilogram of lamb from sheep raised in water-scarce areas uses the equivalent of an astounding 595,278 litres of water.[38]

This water footprint of food and clothing for export matters a great deal to the four billion people who face physical water scarcity, many of whom are competing for water with the industries that provide items we purchase here in the UK. One billion people in India, 900 million in China and 140 million people in Bangladesh face physical water scarcity for some or all of the year. Other large populations affected include 130 million in the USA (mostly in California, Texas and Florida), 120 million in Pakistan – most of whom are in the water-stressed Indus basin – 110 million in Nigeria and 90 million in Mexico.[39]

India

- India's rate of groundwater depletion increased by 23% between 2000 and 2010.[40]
- India is the third largest exporter of groundwater – 12% of the global total.[41]
- India also uses the largest amount of groundwater – 24% of the global total.[42]
- As many as one billion live in areas of physical water scarcity, of which 600 million are in areas of high to extreme water stress.[43]
- 88% of households have clean water close to home,[44] but...
- 75% of households do not have drinking water on the premises.[45]
- 70% of drinking water is contaminated.[46]

Yogita's breakfast:

- Nothing on the day interviewed.
  Water footprint: 0.


WaterAid/Prashanth Vishwanathan


WaterAid/Prashanth Vishwanathan

Yogita lives in Diwadiya village in the district of Sehore, Madhya Pradesh

Villagers report that the search for water dominates their lives during the summer months, when many hand pumps go dry. At others, people can wait for hours for a single bucket of water.

By April there is no water available in the village, so people go to neighbouring areas or farms to try to get water, or are forced to pay for water from tankers. Most of the farms have private boreholes, but many have run dry. A recent government study showed that the level of water in half of the area's wells had dropped, pre-monsoon, over the previous decade, with 10% dropping by more than four metres.[47]

People here mostly work as farmers or farm labourers, growing wheat for personal consumption, and chickpeas and soybeans to sell.

Yogita is 25 and has an 11-month-old son. Fetching water dominates her life – she has to fetch water up to six times a day from a hand pump around half a kilometre from her house, leaving her son in the care of a neighbour. Sometimes she gets up in the middle of the night and again just before dawn to collect water before the pump runs dry. During the summer her husband cycles 3 km to get the family's water.

"Sometimes my husband shouts at me as I am unable to cook food at the right time as all of my time goes in queueing up and fetching water. I haven't eaten anything all day as fetching water was the most important task at hand. Water is a big problem in this village. I don't know why there is no water but when we are voting, everybody should get equal water. We vote so that the authorities can take away our problems."

WaterAid is working in Diwadiya village, to encourage water conservation and water recharge measures.

- **Top left: Yogita, 25, sits outside her house as her child sleeps.**
- **Top right: Yogita struggles to carry water home in Diwadiya village, India.**

Ethiopia

- Proportion of population living without basic access to water: 61%.[48]
- Agriculture makes up 34% of Ethiopia's GDP, and is worth US$80 billion to the economy.[49]
- Very little agriculture is irrigated, depending mainly on rainfall which makes it vulnerable to drought.

Ahmed's breakfast:

- One cup of coffee.
  Water footprint: 140 litres.
- Cornbread.
  Water footprint: approx. 200 litres.[51]

Sheh Ahmed Alemu lives with his wife and six children, aged from 9 to 21, on their small farm in Alaba, on the left bank of the Bilate river in Ethiopia.

Tobacco, maize and other crops for export are grown in the area, aided by an irrigation system that was set up 13 years ago. Forests have also been cleared for timber, and to create land for agriculture and cattle grazing.

Now, amid heavy demand on water and changing climate patterns, the family is struggling to access water.

"I have been a farmer for the past 27 years. I used the irrigation system made on Bilate river for ten years. But currently we are not able to use the irrigation system anymore, it has all dried up.

"Every day my wife and daughter walk for three hours to fetch water. We also fetch water from Bilate river for washing and cleaning. But that is like cleaning dirt by using dirt. The river water is not clean, that is where the cattle drink water. Daily, we waste the time we could have used for work in fetching water. We spend so much money to buy drinking water and to pay for the donkey-pulled cart. If we had saved the money we spent on drinking water for a year, we would have been able to buy an ox. We waste so much time and money in fetching water.

"We always pray to Allah, to send us someone who will resolve our problem of access to drinking water."

- **Right: Ahmed and his family in front of their house near Kulito. Ahmed's family struggles to access clean drinking water. Alaba zone, southern Ethiopia.**
- **Bottom: A typical breakfast meal for Ahmed and his family, 'korisho', consists of corn bread with cabbage. Alaba zone, southern Ethiopia.**


WaterAid/ Genaye Eshetu


WaterAid/Genaye Eshetu

Pakistan


WaterAid/Sibtain Haider

- **Proportion of population living without basic access to water: 11.6%.**[52]
- **Pakistan is an extremely highly-water-stressed country, with 80% of available water supply withdrawn each year.**[53]
- **Pakistan is the largest groundwater exporter with 7.3 billion cubic meters in 2010.**[54]

Zaitoon's breakfast:

- **One cup of tea. Water footprint: 27 litres.**[55]
- **Two biscuits (50 grams each) – about 160 litres.**[56]

Above left: Zaitoon's breakfast: tea and biscuits.

Above right: Zaitoon, 48, making tea in her kitchen in Keti Bandar City, Sindh Province, Pakistan.


WaterAid/Sibtain Haider

Zaitoon lives in a district of Keti Bandar on the coast of Pakistan where groundwater is unfit to drink.

Coastal erosion, combined with a reduction in the amount of water flowing down the Indus river due to diversion upstream for irrigation and hydroelectricity, has led to seawater contaminating the freshwater supplies.[57]

"In our area the water is saline and we cannot drink it at all. We call water tankers for water and we pay them 2,000 rupees (£11) per tanker. We have been calling them for two days, but they haven't brought any water yet. Currently, our water tank at home is empty, and I have to borrow water from my neighbours in a jug or a bucket."

"In the summer we need more water as it is used more. And sometimes in the summers they block the flow of the Sindhu River. Then we have to pay the rickshaw drivers to bring water for us from places even farther away."

"Because it's a feudal system here, the big landlords stop the supply and say that their fields need more water so they don't care about other people."

Aaron lives in Calabasas, Los Angeles County, California, USA, with his mother and grandfather. This area imports all its water from northern California. The state experienced one of the worst droughts on record from 2011 to 2017; people are regularly asked during summer months to reduce their water use. California produces around 250 different crops, including grapes, almonds, strawberries, oranges and walnuts. Using groundwater for irrigation is common.

In 2018, the state passed a water conservation bill to reduce water consumption.[58] A number of communities across California do not have access to clean, safe water, resulting from poor infrastructure or contamination from agricultural runoff as well as drought.

Still, many households have been slow to change their water-use habits.

"We should water the lawn every day in the summer because it's really hot and it dries up fast but we probably water the lawn every other day. My neighbour waters his lawn a lot and it looks great.

"I like to enjoy showers so I probably take ten-minute showers and I know we are in a drought but I figure everybody else is using water and my use isn't going to impact anything.

"With the drought, we consider how much water we are using – so if I am shaving I turn off the tap, when doing dishes I don't just let the tap run, so we do make an effort. Otherwise I don't think the drought affects me at all."


WaterAid/Karla Gachet

WaterAid/Karla Gachet

Above: Aaron shown in his garden at home in Calabasas, Los Angeles County, California, an area which has previously experienced extreme drought.

Left: Aaron serving breakfast: two eggs, bacon and toast.

California, USA

- **1 percent or 2.7 million people in the USA do not have clean water close to home.**
- **130 million people in the USA face severe water scarcity during at least part of the year – most of them in California and southern states.**[59]
- **The groundwater deficit (i.e. the gap between what is used and what is returned to the natural supply) in the USA rose by 31% between 2000 and 2010.**[60]
- **The groundwater deficit from goods for export has increased in the US by 57% in that time.**[61]

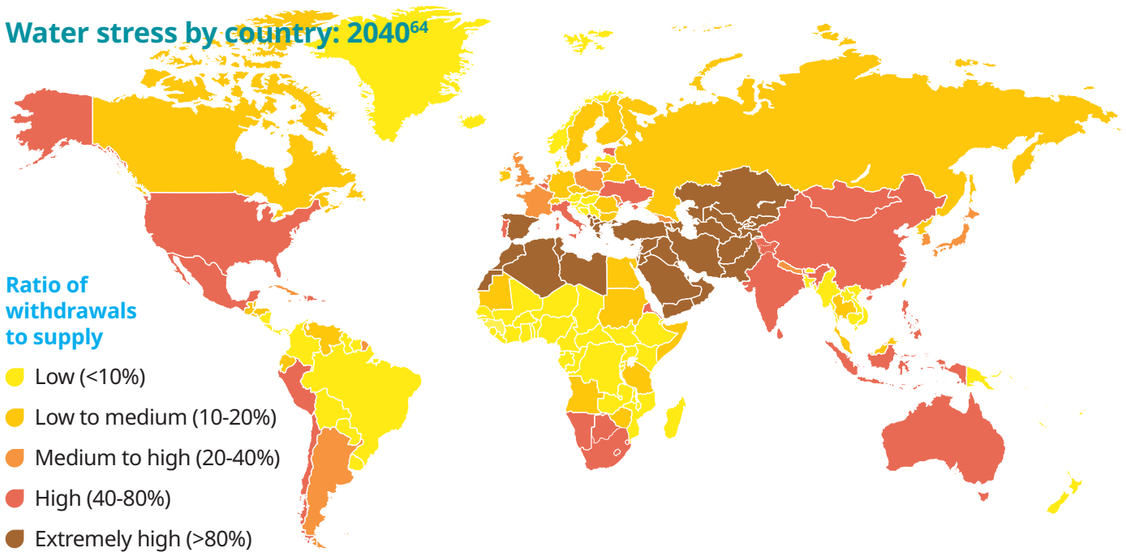
Aaron's breakfast:

- **2 eggs, 2 strips of bacon, 2 pieces of toast, cup of coffee.**
- **Water footprint: 1,000 litres.**[62]

So what needs to be done?

Physical water scarcity is getting worse, exacerbated by growing demand on water resources and and by climate and population changes. By 2040 it is predicted that 33 countries are likely to face extremely high water stress – including 15 in the Middle East, most of Northern Africa, Pakistan, Turkey, Afghanistan and Spain. Many – including India, China, Southern Africa, USA and Australia – will face high water stress. 5 billion people are projected to live in water scarce[63] areas by 2050, equating to one more person every two seconds having to worry about getting water. Within countries, there will also be regions facing crunch points – London, Tokyo and Moscow are among the cities likely to struggle with water availability over the coming years. The consequences of water scarcity will be global, and require a global response.

Water stress by country: 2040[64]



The progress made since 2000, delivering clean water to 1.5 billion[65] people around the world, is now under threat. The human right to water must take priority ahead of other competing demands.

Exporting food and crops are important sources of income for most countries. What's important is that production is made sustainable, so it does not impede people's day-to-day ability to get clean water for their basic needs.

Corporations' role in virtual water

Consumers can drive change with their purchasing power. Responsibility also lies with corporations to improve their practices and ensure that access to water for basic human needs is prioritised in the communities and regions in which they work. As these examples show, companies are beginning to recognise that sustainable use of water is better for business as well as for the Earth.

Diageo

Diageo's Water Blueprint strategy includes reducing water use in its production plants by 50%, returning all waste water to the environment safely and replenishing water-stressed areas with the equivalent amount used in its final products, all by 2020.

According to Michael Alexander, Diageo's Head of Water, Environment & Agriculture Sustainability, alongside the environmental and societal imperatives, there is a clear business drive for this work:

"We use a lot of water in our products, it is fundamental to our products and we have had to mothball facilities before because of a lack of available water."

It takes an estimated 75 litres of water to produce one glass of beer, mostly in the production of raw ingredients including thirsty barley. In addition to reducing the amount of water used in production, the brewing giant is working with smallholder farmers on improving water efficiency and providing seeds for more drought-resistant varieties. The brewer is also replacing some of the barley in beer with drought-tolerant sorghum.

Alexander is clear that Diageo also has a part to play in ensuring the communities surrounding their suppliers and production plants have equitable access to water and sanitation. "We work to support better local access to clean water and sanitation, and use our influence where possible to encourage local government and others to do more to provide access.

"Not only morally does it feel right but it also works from a productivity point of view and is a message that we are here for the long term."

Diageo works in partnership with WaterAid in Africa, helping to provide clean water and sanitation to communities.

Above: Amina, 26, fetching water from a WaterAid-installed hand pump close to her home. Previously Amina had to walk to a canal to fetch water four times a day, with each round trip taking an hour of her time. Thatta District, Sindh Province, Pakistan.

Left: Mohammed, 32, pauses by an irrigation scheme on Bilate river. The water from this scheme is no longer reaching his farm. Alaba zone, southern Ethiopia.

Mars

Rice is a thirsty crop, accounting for 40% of all irrigation globally. Food giant Mars, which owns the Uncle Ben's brand, estimates the crop accounts for over half of the company's unsustainable water use, where groundwater is being extracted at faster rates than it is replenished. Under its Water Stewardship Action Plan, the company has worked with around 2,000 farmers in India and Pakistan to help them adopt a 'wet/dry' growing method in which paddy fields are only flooded at certain times rather than being kept permanently submerged.

Their records show that in Pakistan this has resulted in a 32% increase in farmers' income, 17% increase in yields and 30% decrease in water usage over three years.

Ian Knight, Global Sustainability Manager, said: "We want to make sure of the long-term sustainability of the rice supply chain, not just for the future prosperity of the farmers, but because there is a reputational risk benefit for the business if it is working in a sustainable way. We work to reduce water use but also preferentially source from locations which are less water stressed to reduce our impact on the area."

WaterAid/Guilhem Alandry

Nana, 44, mother of 8, on her way to the communal garden in Samabogo, Segou Region, Mali.

H&M Group

H&M Group's water sustainability roadmap for supply chain considers the quantity of water used, the quality of water discharge and increasing water recycling in production. The company commits to reduce the amount of water used in the production of every product by 25%.

In Karachi, where textile production is high-quality but water is scarce, H&M's head of water sustainability Shariful Hoque said the company was able to coax business partners to recycle 80 to 90% of water usage back into production. "This is reducing the cost of water because the incoming water was very highly priced but recycled water is absolutely fine for those goods," he said.

The company also works with the Better Cotton initiative to reduce the intense water footprint of cotton which can take up to 15,000 litres of water per kilo of finished garment. H&M says it sourced 59% of its cotton from sustainable sources in 2017, and aims for all its materials to be either from recycled or sustainable sources by 2030.

The H&M Foundation funded by the founding family of H&M works with WaterAid on the SusWASH programme to provide sustainable access to clean water, sanitation and hygiene to communities in Cambodia, Ethiopia, Uganda, and Pakistan.

We are calling for:

- **Everyone, everywhere to have secure access to water when and where they need it by 2030.** Investing in water, sanitation and hygiene needs to be a priority if we are to achieve the promises made in the UN Sustainable Development Goals, to eradicate extreme poverty and deliver a fairer, more sustainable world.
- **Governments** to prioritise the human right to clean water, ensure that effective regulations and monitoring systems are in place for sustainable water use and safely managed sanitation, and to recognise water's true value. This means imposing limits on the amount of water that can be extracted from aquifers for irrigation or manufacturing and monitoring the impact of production on shared aquifers to help ward off shortages. It means ensuring the safe separation and treatment of human waste to prevent water contamination. And it also means supporting producers to change inefficient water use practices and providing incentives for companies to recycle water, harvest rainwater, irrigate more efficiently and reduce the amount of water used in production. The focus should be on reducing water consumption in areas of greatest shortage, rather than setting general targets.
- **Businesses and investors** to actively look at the threats that water shortages pose to their future growth, and understand their role as employers and taxpaying corporations to influence decision-makers and water utilities to ensure that their workers and their neighbours also have a reliable supply of clean water. Adhering to standards like those set by the Alliance for Water Stewardship helps ensure that water consumption by companies does not have adverse impact on community access.
- **Companies** to investigate the impact that their activities have on water and to actively reduce the amount of water used in production, especially in areas where water is scarce or predicted to become more so. Rainwater harvesting to stop rainwater running off the land and other conservation methods will not alone make up for the rate at which water is extracted.
- **Retailers** to ensure their supplies come from sustainable sources, and help suppliers make the business case for more water-efficient processes. In the UK the amount that we spend on food as a percentage of household income has halved over the past 60 years to 6%. The average percentage of household income spent on food in water-scarce food-exporting countries is on average much higher – 41% in Pakistan, 30% in India and 59% in Nigeria.[66,67]
- **Consumers** to think about what they are buying and where it comes from. It can be difficult to get enough information to reduce your water footprint on particular items, because producers don't often identify how much water is used in production, or where it comes from. But easy steps include eating less meat (a vegan diet has an estimated 19% lower impact on water supplies),[68] not wasting food (a third of food produced globally is thrown away)[69] and simply buying less. For instance, throwing away a half an avocado and buying another wastes over 500 litres of water, or more than six bathtubs' worth.[70] Every year 450 million pairs of jeans are sold in the USA, accounting for around 3.6 billion litres of water.[71] And the average American already owns seven pairs.[72]

Having reliable access to water of sufficient quality is a human right. Urgent attention must be given to ensuring that the push for economic development through exports of food and clothing do not imperil current and future generations' access to water, especially in the context of the growing unpredictability of water in relation to climate change.

There can be no sustainable economic development without sustainable and equitable access to water. The desire of consumers in more prosperous communities around the world to buy cheap food and clothing cannot be put above the human right to water.

Appendix: Global progress on basic household access to water, 2000 to 2015[73]

Country, area or territory	At least basic drinking water % ('clean water') 2000 national	2015 national
Afghanistan	27	63
Albania	88	91
Algeria	90	93
American Samoa	99	99
Andorra	100	100
Angola	38	41
Anguilla	93	98
Antigua and Barbuda	98	97
Argentina	99	100
Armenia	96	99
Aruba	94	98
Australia	100	100
Austria	100	100
Azerbaijan	76	84
Bahamas	98	98
Bahrain	100	100
Bangladesh	95	97
Barbados	99	98
Belarus	98	98
Belgium	100	100
Belize	88	97
Benin	60	67
Bermuda	100	100
Bhutan	81	98
Bolivia (Plurinational State of)	79	93
Bosnia and Herzegovina	96	98
Botswana	77	79
Brazil	94	97
British Virgin Islands	95	100
Brunei Darussalam	-	100

Country, area or territory	At least basic drinking water % ('clean water') 2000 national	2015 national
Bulgaria	100	99
Burkina Faso	47	54
Burundi	52	56
Cabo Verde	78	86
Cambodia	52	75
Cameroon	55	65
Canada	100	99
Caribbean Netherlands	-	-
Cayman Islands	-	96
Central African Republic	52	54
Chad	39	43
Channel Islands	-	94
Chile	95	100
China	78	96
China, Hong Kong Special Administrative Region	99	100
China, Macao Special Administrative Region	100	100
Colombia	90	97
Comoros	86	84
Congo	57	68
Cook Islands	100	100
Costa Rica	94	100
Côte d'Ivoire	72	73
Croatia	99	100
Cuba	93	95
Curaçao	-	99
Cyprus	100	100
Czech Republic	100	100

Country, area or territory	At least basic drinking water % ('clean water') 2000 national	2015 national
Democratic People's Republic of Korea	100	100
Democratic Republic of the Congo	34	42
Denmark	100	100
Djibouti	75	77
Dominica	93	97
Dominican Republic	91	94
Ecuador	83	93
Egypt	98	98
El Salvador	80	93
Equatorial Guinea	49	50
Eritrea	17	19
Estonia	99	100
Ethiopia	17	39
Falkland Islands (Malvinas)	-	95
Faroe Islands	100	100
Fiji	95	94
Finland	100	100
France	100	100
French Guiana	-	93
French Polynesia	100	100
Gabon	79	88
Gambia	74	80
Georgia	89	93
Germany	100	100
Ghana	64	78
Gibraltar	100	100
Greece	99	100
Greenland	100	100
Grenada	93	96
Guadeloupe	-	100
Guam	99	100
Guatemala	85	94
Guinea	54	67
Guinea-Bissau	53	69
Guyana	88	95
Haiti	56	64

Country, area or territory	At least basic drinking water % ('clean water') 2000 national	2015 national
Holy See	-	-
Honduras	82	92
Hungary	100	100
Iceland	100	100
India	80	88*
Indonesia	75	90
Iran (Islamic Republic of)	95	95
Iraq	81	86
Ireland	96	99
Isle of Man	-	96
Israel	100	100
Italy	100	100
Jamaica	91	93
Japan	98	99
Jordan	100	99
Kazakhstan	86	91
Kenya	46	58
Kiribati	61	64
Kuwait	100	100
Kyrgyzstan	80	87
Lao People's Democratic Republic	46	80
Latvia	98	99
Lebanon	85	92
Lesotho	66	72
Liberia	62	70
Libya	-	97
Liechtenstein	100	100
Lithuania	90	97
Luxembourg	100	100
Madagascar	37	51
Malawi	52	67
Malaysia	98	96
Maldives	89	98
Mali	49	74
Malta	100	100
Marshall Islands	-	78
Martinique	100	100
Mauritania	54	70

*Indian government data from 2018 found that 75% of households do not have water on the premises.

Country, area or territory	At least basic drinking water % ('clean water') 2000 national	2015 national
Mauritius	99	100
Mayotte	-	98
Mexico	89	98
Micronesia (Federated States of)	93	88
Monaco	100	100
Mongolia	65	83
Montenegro	-	98
Montserrat	99	97
Morocco	64	83
Mozambique	22	47
Myanmar	55	68
Namibia	77	79
Nauru	95	100
Nepal	80	88
Netherlands	100	100
New Caledonia	95	99
New Zealand	100	100
Nicaragua	81	82
Niger	38	46
Nigeria	46	67
Niue	99	98
Northern Mariana Islands	99	99
Norway	100	100
Oman	-	91
Pakistan	89	89
Palau	92	100
Panama	88	95
Papua New Guinea	37	37
Paraguay	75	99
Peru	81	90
Philippines	86	91
Poland	-	98
Portugal	99	100
Puerto Rico	97	97
Qatar	100	100
Republic of Korea	-	100

Country, area or territory	At least basic drinking water % ('clean water') 2000 national	2015 national
Republic of Moldova	84	87
Réunion	100	100
Romania	100	100
Russian Federation	95	96
Rwanda	47	57
Saint Helena	-	99
Saint Kitts and Nevis	98	-
Saint Lucia	88	98
Saint Pierre and Miquelon	-	91
Saint Vincent and the Grenadines	93	95
Samoa	93	96
San Marino	100	100
Sao Tome and Principe	67	80
Saudi Arabia	97	100
Senegal	62	75
Serbia	92	91
Seychelles	93	96
Sierra Leone	39	58
Singapore	100	100
Sint Maarten (Dutch part)	-	96
Slovakia	98	98
Slovenia	100	100
Solomon Islands	80	64
Somalia	21	40
South Africa	77	85
South Sudan	-	50
Spain	100	100
Sri Lanka	77	92
Sudan	43	59
Suriname	89	95
Swaziland	52	68
Sweden	100	100
Switzerland	100	100
Syrian Arab Republic	95	97

Country, area or territory	At least basic drinking water % ('clean water') 2000 national	2015 national
Tajikistan	57	74
Thailand	94	98
The former Yugoslav Republic of Macedonia	98	97
Timor-Leste	-	70
Togo	45	63
Tokelau	99	100
Tonga	98	100
Trinidad and Tobago	92	97
Tunisia	88	94
Turkey	95	99
Turkmenistan	84	94
Turks and Caicos Islands	86	94
Tuvalu	-	99
Uganda	30	39
Ukraine	96	98
United Arab Emirates	100	100
United Kingdom	100	100
United Republic of Tanzania	32	50
United States Virgin Islands	100	100
United States of America	-	99
Uruguay	97	99
Uzbekistan	85	-
Vanuatu	82	91
Venezuela (Bolivarian Republic of)	96	97
Viet Nam	78	91
Wallis and Futuna Islands	100	100
West Bank and Gaza Strip	88	88
Western Sahara	-	-
Yemen	43	70
Zambia	49	61
Zimbabwe	70	67


WaterAid/Sibtain Haider


WaterAid/Behailu Shiferaw

Top: Ghulam Husain, 38, makes roti in a fishing boat in Khaskheli Muhallah, Sindh Province, Pakistan.

Bottom: cattle struggle to drink at a dried-up pond of water in Siaya district, Kenya.

References

1 Courtesy of Dr James Jenkins, University of Hertfordshire

2 WHO/Unicef Joint Monitoring Programme (2017). Available at: https://washdata.org/data/household

3 Mekonnan, M and Hoekstra, A. (2016). 'Four billion people facing water scarcity' in *Science Advances*, Vol. 2, No. 2. Available at: http://advances.sciencemag.org/content/2/2/e1500323

4 UN Water (no date). Available at: http://www.unwater.org/water-facts/scarcity/

5 UN Water (2018). *The United Nations world water development report 2018: nature-based solutions for water*. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000261424

6 Rekacewicz, Philippe (2006). *GRID Arendal with UNEP, World's Surface Water: Evaporation and Runoff.* Available at: http://www.grida.no/resources/5601

7 Courtesy of Dr James Jenkins, University of Hertfordshire

8 Chambers, D. (2018). 'Day Zero: The city of Cape Town is about to run out of water,' in *The Independent*. Available at: https://www.independent.co.uk/news/long_reads/day-zero-cape-town-drought-no-water-run-out-reservoir-supply-12-per-cent-16-april-south-africa-a8195011.html

9 Water Footprint Network. Available at: https://waterfootprint.org/en/water-footprint/product-water-footprint/

10 Ibid.

11 Water Footprint Assessment Tool. Available at: http://www.waterfootprintassessmenttool.org/national-explorer/

12 South West Water. *How much water does an average person use?* Available at: https://www.southwestwater.co.uk/frequently-asked-questions/saving-water/how-much-water-does-an-average-person-use/

13 Rowe, M. (2010). *Geographical Magazine*, pp 36-43. London: Royal Geographic Society.

14 Water Footprint Assessment Tool. Available at: http://www.waterfootprintassessmenttool.org/national-explorer/

15 Water Footprint Assessment Tool. Available at: http://www.waterfootprintassessmenttool.org/national-explorer/

16 Water Footprint Assessment Tool. Available at: http://www.waterfootprintassessmenttool.org/national-explorer/

17 Food and Agriculture Organization (2014). Average precipitation in depth, The World Bank Data Indicators. Available at: https://data.worldbank.org/indicator/AG.LND.PRCP.MM?end=2014&locations=US&start=2014&view=bar

18 Mekonnan, M and Hoekstra, A. (2016). 'Four billion people facing water scarcity' in *Science Advances,* Vol. 2, No. 2. Available at: http://advances.sciencemag.org/content/2/2/e1500323

19 Water Footprint Assessment Tool. Available at: http://www.waterfootprintassessmenttool.org/national-explorer

20 Water Footprint Assessment Tool. Available at: http://www.waterfootprintassessmenttool.org/national-explorer/

21 Hoekstra, A. and Wiedmann, T. (2014) 'Humanity's unsustainable environmental footprint,' in *Science*, Vol. 344, Issue 6188, pp 1114-1117. Available at: http://www.ayhoekstra.nl/pubs/Hoekstra-Wiedmann-2014-EnvironmentalFootprint.pdf

22 UN Water (2018). *The United Nations world water development report 2018: nature-based solutions for water.* Available at: https://unesdoc.unesco.org/ark:/48223/pf0000261424

23 Mekonnan, M and Hoekstra, A. (2016). 'Four billion people facing water scarcity' in *Science Advances,* Vol. 2, No. 2. Available at: http://advances.sciencemag.org/content/2/2/e1500323

24 Mekonnan, M and Hoekstra, A. (2011). *National Water Footprint Accounts: The green, blue and grey water footprint of production and consumption.* Available at: https://waterfootprint.org/media/downloads/Report50-NationalWaterFootprints-Vol1.pdf

25 Hoekstra, A. and Mekonnen, M. (2016) 'Imported water risk: the case of the UK' in Environmental Research Letters, Issue 11, Vol. 055002. Available at: https://iopscience.iop.org/article/10.1088/1748-9326/11/5/055002/pdf

26 Villholth, K. et al. (2018) Advances in Groundwater Governance. Available at: http://bnfwv4fm4l13stiajd7sf413.wpengine.netdna-cdn.com/wp-content/uploads/sites/2/2019/01/advances-in-groundwater-governance.pdf

27 Mekonnan, M and Hoekstra, A. (2011). *National Water Footprint Accounts: The green, blue and grey water footprint of production and consumption.* Available at: https://waterfootprint.org/media/downloads/Report50-NationalWaterFootprints-Vol1.pdf

28 Dalin, C., Wada, Y., Kastner, T. and Puma, M. (2017). 'Groundwater depletion embedded in international food trade,' in *Nature*, Vol. 543, pages 700–704, Available at: https://www.nature.com/articles/nature21403

29 Water Footprint Network. Available at: https://waterfootprint.org/en/water-footprint/product-water-footprint/

30 Water Footprint Network. Available at: https://waterfootprint.org/en/water-footprint/product-water-footprint/

31 Mekonnan, M and Hoekstra, A. (2011). National Water Footprint Accounts: The green, blue and grey water footprint of production and consumption - Appendices. Available at: https://waterfootprint.org/media/downloads/Report50-NationalWaterFootprints-Vol1.pdf Calculation by WaterAid.

32 Lawrence, F. (2010). 'How Peru's wells are being sucked dry by British asparagus' in *The Guardian*. Available at: https://www.theguardian.com/environment/2010/sep/15/peru-asparagus-british-wells

33 Water Footprint Network. Available at: https://waterfootprint.org/en/water-footprint/product-water-footprint/

34 Faccini, A. and Laville, S. (2018) 'Chilean villagers claim British appetite for avocados is draining region dry,' in The Guardian. Available at: https://www.theguardian.com/environment/2018/may/17/chilean-villagers-claim-british-appetite-for-avocados-is-draining-region-dry

35 Addis Standard. (2018) *Analysis: Climate change, excessive water extraction behind vanishing Ethiopian lakes.* Available at: http://addisstandard.com/analysis-climate-change-excessive-water-extraction-behind-vanishing-ethiopian-lakes/

36 MacFarquhar, N. (2018) 'The tragic story of the sea that disappeared,' in *The Independent.* Available on: https://www.independent.co.uk/environment/aral-sea-uzbekistan-soviet-union-agriculture-climate-change-irrigation-a8489721.html

37 Water Footprint Network. Available at: https://waterfootprint.org/en/water-footprint/product-water-footprint/

38 Poore, J. and Nemecek, T. (2018). 'Reducing food's environmental impacts through producers and consumers,' in *Science*, Vol. 360, pp. 987–992. Available at: http://science.sciencemag.org/content/360/6392/987

39 Mekonnan, M and Hoekstra, A. (2016). 'Four billion people facing water scarcity' in *Science Advances*, Vol. 2, No. 2. Available at: http://advances.sciencemag.org/content/2/2/e1500323

40 Dalin, C., Wada, Y., Kastner, T. and Puma, M. (2017). 'Groundwater depletion embedded in international food trade,' in *Nature*, Vol. 543, pages 700–704, Available at: https://www.nature.com/articles/nature21403

41 Ibid

42 Mekonnan, M and Hoekstra, A. (2011). *National Water Footprint Accounts: The green, blue and grey water footprint of production and consumption.* Available at: https://waterfootprint.org/media/downloads/Report50-NationalWaterFootprints-Vol1.pdf

43 National Institute for Transforming India (2018). *Composite water management index.* Available at: http://niti.gov.in/content/composite-water-management-index-june-2018-0

44 WHO/Unicef Joint Monitoring Programme (2017). Available at: https://washdata.org/data/household

45 National Institute for Transforming India (2018). *Composite water management index.* Available at: http://niti.gov.in/content/composite-water-management-index-june-2018-0

46 National Institute for Transforming India (2018). *Composite water management index.* Available at: http://niti.gov.in/content/composite-water-management-index-june-2018-0

47 Central Groundwater Board (India) (2017). *Ground Water Year Book, Madhya Pradesh,* 2016-17. Available on: http://cgwb.gov.in/Regions/GW-year-Books/GWYB-%202016-17/M.P.pdf

48 WHO/Unicef Joint Monitoring Programme (2017). Available at: https://washdata.org/data/household

49 World Bank. (2017) *World Development Indicators: Structure of Output.* Available at: http://wdi.worldbank.org/table/4.2

50 Water Footprint Network. Available at: https://waterfootprint.org/en/water-footprint/product-water-footprint/

51 Water Footprint Network. Available at: https://waterfootprint.org/en/water-footprint/product-water-footprint/

52 WHO/Unicef Joint Monitoring Programme (2017). Available at: https://washdata.org/data/household

53 World Resources Institute (2013). *Water Stress by Country.* Available at: https://www.wri.org/resources/charts-graphs/water-stress-country

54 Dalin, C., Wada, Y., Kastner, T. and Puma, M. (2017). 'Groundwater depletion embedded in international food trade,' in *Nature*, Vol. 543, pages 700–704, Available at: https://www.nature.com/articles/nature21403

55 Water Footprint Network. Available at: https://waterfootprint.org/en/water-footprint/product-water-footprint/

56 Water Footprint Network. Available at: https://waterfootprint.org/en/water-footprint/product-water-footprint/

57 Memon, J.A. and Thapa, G.P. (2010) 'The Indus Irrigation System, Natural Resources and Community Occupational Quality in the Delta Region of Pakistan,' in *Environmental Management,* Vol. 47, Issue 2, pp 173-87. Available at: https://www.researchgate.net/publication/47350012_The_Indus_Irrigation_System_Natural_Resources_and_Community_Occupational_Quality_in_the_Delta_Region_of_Pakistan

58 Jerome, S. (2018). 'Permanent Water Restrictions Approved in California', in *Water Online*. Available at: https://www.wateronline.com/doc/permanent-water-restrictions-approved-in-california-0001

59 Mekonnan, M and Hoekstra, A. (2016). 'Four billion people facing water scarcity' in *Science Advances*, Vol. 2, No. 2. Available at: http://advances.sciencemag.org/content/2/2/e1500323

60 Dalin, C., Wada, Y., Kastner, T. and Puma, M. (2017). 'Groundwater depletion embedded in international food trade,' in *Nature*, Vol. 543, pages 700–704, Available at: https://www.nature.com/articles/nature21403

61 Dalin, C., Wada, Y., Kastner, T. and Puma, M. (2017). 'Groundwater depletion embedded in international food trade,' in *Nature*, Vol. 543, pages 700–704, Available at: https://www.nature.com/articles/nature21403

62 WaterAid calculation, assuming 1 slice of bread is 50 g and 1 strip of bacon is 25 g. Water Footprint Network. Available at: https://waterfootprint.org/en/water-footprint/product-water-footprint/

63 Mekonnan, M and Hoekstra, A. (2016). 'Four billion people facing water scarcity' in *Science Advances*, Vol. 2, No. 2. Available at: http://advances.sciencemag.org/content/2/2/e1500323

64 World Resources Institute.(2015) *Ranking the World's Most Water-Stressed Countries in 2040.* Available at: https://www.wri.org/blog/2015/08/ranking-world-s-most-water-stressed-countries-2040

65 WHO/Unicef Joint Monitoring Programme (2017). Available at: https://washdata.org/data/household

66 Plumer, B. (2015) 'Here's how much every country spends on food', in *Vox.com*. Available at: https://www.vox.com/2014/7/6/5874499/map-heres-how-much-every-country-spends-on-food

67 Chakraborty, R. and Dobson, P. (2018) 'Why the UK has such cheap food,' in *bbc.co.uk*. Available at: https://www.bbc.co.uk/news/business-45559594

68 Poore, J. and Nemecek, T. (2018). 'Reducing food's environmental impacts through producers and consumers,' in *Science*, Vol. 360, pp. 987–992. Available at: http://science.sciencemag.org/content/360/6392/987

69 Food and Agricultural Organization of the United Nations (2019). Key facts on food waste you should know. Available at:http://www.fao.org/save-food/resources/keyfindings/en/

70 Water Footprint Network. Available at: https://waterfootprint.org/en/water-footprint/product-water-footprint/

71 Water Footprint Network. Available at: https://waterfootprint.org/en/water-footprint/product-water-footprint/

72 Sashin, D. and Lyles, T. 'Blue jeans celebrate 100 years,' in CNN.com. Available at: https://edition.cnn.com/2013/05/20/living/blue-jeans-history-irpt/index.html

73 WHO/Unicef Joint Monitoring Programme (2017). Available at: https://washdata.org/data/household

Some 4 billion people in the world live in physically water-scarce areas and 844 million don't have access to clean water close to home. The world's water crisis is getting worse, yet globally we use six times as much water today as we did 100 years ago, driven by population growth and changes in diets and consumer habits.

WaterAid's report, *Beneath the Surface: The State of the World's Water 2019*, reveals the countries where the largest populations live with physical water scarcity, how ballooning consumer demands jeopardise water access for the poorest and most marginalised people, and how making thoughtful choices as consumers can help ensure access to water for basic needs is prioritised – wherever you are in the world.

Written by Fiona Callister with support from Carolynne Wheeler, David Thomson, Yola Verbruggen, Sam Taylor, Ruth Romer, Clare Battle, Jonathan Farr, Virginia Newton-Lewis, Vincent Casey, Stuart Kempster, WaterAid India, WaterAid Pakistan, WaterAid Ethiopia and WaterAid America. With thanks to the Water Footprint Network and Tony Allan, Dr James Jenkins and Joseph Poore.

March 2019

wateraid.org
#StateofWater #WorldWaterDay

Front cover images, clockwise from top:

- **Imamzadi, 16, with her water pot ready to start her walk to fetch water in Thatta District, Sindh Province, Pakistan.**
- **A water source crowded with people fetching water at Alaba, southern Ethiopia.**
- **Zaitoon, 48, has to buy water from tankers which bring water from a river that is not clean, and is only drinkable compared to the salty water available nearby. Thatta District, Sindh Province, Pakistan.**

For more information or to arrange interviews, please contact WaterAid's global media team:

Global/UK:
Yola Verbruggen, YolaVerbruggen@wateraid.org
Carolynne Wheeler, CarolynneWheeler@wateraid.org
Fiona Callister, FionaCallister@wateraid.org

Australia:
Kevin Hawkins, Kevin.Hawkins@wateraid.org.au

Canada:
Aneesha Hampton, AHampton@wateraidcanada.com

India:
Pragya Gupta, PragyaGupta@wateraid.org

Sweden:
Magdalena Olsson, Magdalena.Olsson@wateraid.se
Petter Gustafsson, Petter.Gustafsson@wateraid.se

USA:
Emily Haile, EmilyHaile@wateraid.org

Japan:
Marina Sugiyama, MarinaSugiyama@wateraid.org

WaterAid