



Water challenges in the world and the UK

Freshwater is not an unlimited resource, and the world has seen its water consumption levels rise rapidly in the past hundred years. Population growth, affluence, pollution and climate change are seen as causes for this increase, and it is expected that this will create great challenges in the future. Not only will water scarcity become more common in future years, flooding will become increasingly problematic and damaging.

In this briefing, the different causes for water scarcity are considered in more detail. Moreover, the implications this has for humanity, wildlife and the health of our environment will be discussed. We conclude that technological developments and sustainable life choices can reduce water consumption levels per capita, but that these ultimately will not be sufficient. As population stabilisation is the only permanent solution for the problem, it is important that the government incorporates policies that promote it in its water strategy.

Water demand through time

Global

The world has seen its population triple in the last hundred years. Water consumption, however, has increased six-fold in the same timeframe and is projected to continue to grow.^{1,2} Demand for freshwater is increasing by 64 billion cubic meters per year.³ Currently, around one billion people in developing nations do not have access to clean drinking water on a daily basis.⁴ Additionally, 1.7 billion people face water scarcity for at least one month per year.⁵

It is expected that the gap between water supply and demand will grow to 40 per cent by 2030 if current water consumption levels continue unchanged.⁶ However, climate change will probably affect this prediction adversely.⁷ By 2040, it is expected that there will no longer be enough water to both quench the thirst of all humans and satisfy the demand from industry.⁸

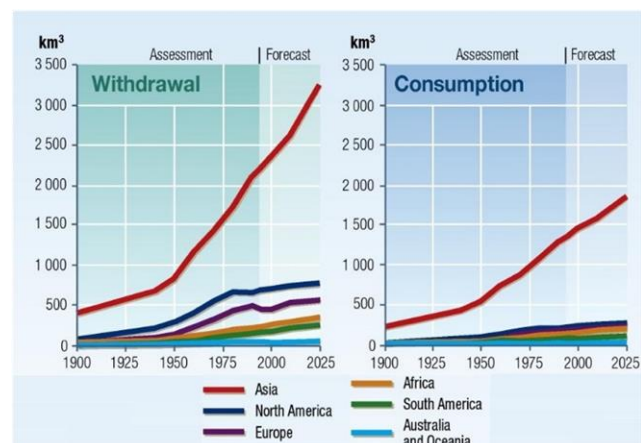


Chart adapted from: UNEP

Globally, 70 per cent of water consumption is used for agriculture, while 20 per cent is used for industry and 10 per cent for domestic purposes. In industrialised nations, however, more than half of the available water is consumed by industries.⁹

UK

Water consumption in the UK has grown by an average of 1 per cent per year since 1930.¹⁰ Currently, people use 150 litres of water, on average, per day.¹¹ Londoners exceed that, with 164 litres.¹² If all the water used in the production process of other goods we consume daily is taken into consideration, the average person consumes 3,400 litres a day.¹³

Figure 3: EU per capita water consumption (l/p/d)

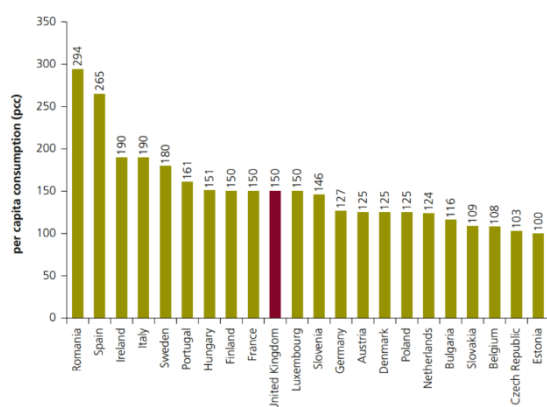


Chart: GOV

Annually, 18 billion tonnes of water are taken from rivers, reservoirs and underground aquifers. Of this, six billion tonnes are for domestic use. Industries consume 2.1 billion tonnes, while nine billion tonnes are used for electricity generation, and agriculture accounts for 0.2 billion tonnes.¹⁴

Water challenges

Climate change and population growth are highlighted as causes for greater water demand in the future. It is forecast that water demand in England and Wales could grow by 35 per cent by 2050.¹⁵ This creates great challenges for society.

Scarcity

Water scarcity has a wide range of causes. The following are of major importance:

Water overuse

Overuse of water occurs when there is a higher demand for the resource than the environment can sustain. It is estimated that between 1,100 and 3,300 megalitres are over-abstracted in the UK every day.¹⁶

Over-abstraction can be triggered by:

- Population growth — which increases the number of water consumers per day. Naturally, this leads to a higher demand.¹⁷
- The ease with which one can access water — which has for a long time caused people to treat water as an unlimited resource. While many people lack access to water, it is estimated that the United States wastes seven billion gallons of water per day.¹⁸



Pollution

Large quantities of water are polluted as a result of human activity. Contamination of clean water happens in many different ways.

- Farmers use chemical fertilizers and pesticides to protect their crops. These can seep into the groundwater, toxifying it. Moreover, rain will wash away soil that contains toxic chemicals, which then ends up in rivers.¹⁹
- Industries pollute water by dumping untreated waste into water sources. Moreover, industries

often burn fossil fuels. The ashes and smoke that are a by-product of this procedure are often toxic, creating acid rain.²⁰

- Nuclear power plants produce radioactive waste. The nuclear disaster in Fukushima has so far caused 760,000 tonnes of contaminated water to leak into the sea.²¹
- Sewers also contribute to water pollution. Waste water is often polluted through use of chemical detergents, and sewer leakages have been registered frequently in recent years.²² Southern Water has been prosecuted 166 times in the past few decades for such leakages.²³
- The sea is heavily polluted with plastic and other debris. Annually, at least eight million tonnes of plastic leak into the ocean, greatly harming marine life.²⁴
- Extraction of minerals and coal releases toxic components, which in turn contaminate water.²⁵

Leakages

Not only do leakages contribute to pollution of water, they also cause losses of water that could otherwise have been consumed. Underground transport of resources, such as gas and oil, is not leakage-free. Leakages of these substances, and of sewage waste, make water undrinkable. Overground transport can also be hazardous, with sea tanker oil spills frequently making the news.^{26,27} Finally, landfills pose a hydrological threat because they facilitate the creation of leachates, which could result in the pollution of groundwater.²⁸

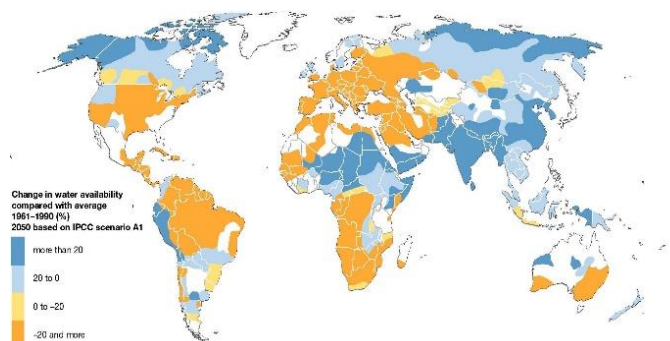


Climate change

Climate change has a strong impact on water supply and demand. The global average temperature of water is expected to increase, causing the extinction of many aquatic species. Sea level rises and pollution will also have a serious impact on humans.²⁹

Agriculture

Climate change causes drought and flooding across the world. Both of these changes affect agriculture. On the one hand, droughts require farmers to use more water for irrigation, thereby increasing the total water demand of the agricultural sector even further.³⁰ It is expected that maize, a staple crop, will cease to grow well in Sub-Saharan African countries as result of insufficient rainfall.³¹ On the other hand, flooding causes harvest failure and damages farmland severely, as happened on a large scale in Java and Sumatra.³²



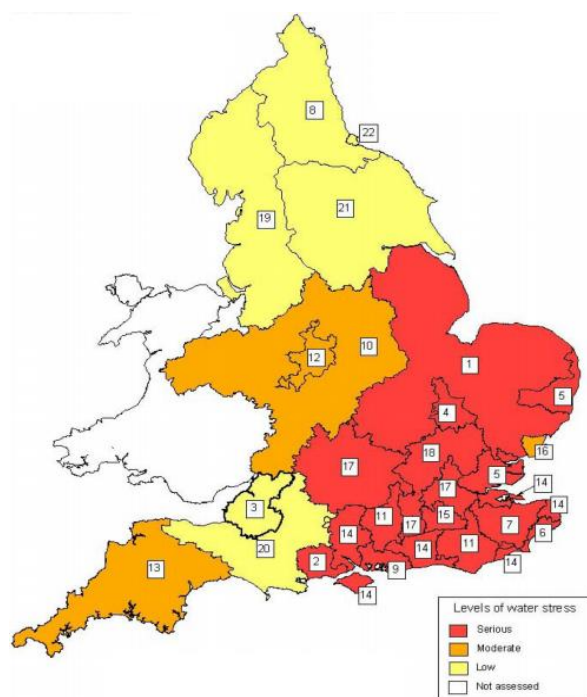
Map: UNEP

It is expected that the climate in the UK will become more prone to extremes. While the South will face drier conditions, Scotland could experience more short, but heavy, bursts of rainfall.³³ Moreover, crops like potatoes and cereal, which traditionally grow well on UK farmland, may not fare as well in these new conditions.³⁴

Uneven distribution

The distribution of water is not consistent, causing temporal variability in water supply worldwide. Areas like the Atacama Desert in Chile hardly experience rainfall, while parts of India cannot cope with the amounts of rain they receive.³⁵

Furthermore, increased urbanisation clusters people in one location, thereby increasing the water demand of that area. Often such areas do not naturally have enough water to meet their needs.³⁶ Urbanisation also causes greater pollution of fresh water bodies. Contamination of water enhances scarcity.³⁷



Map adapted from: IESD

The South East and East of England in particular face an increasing demand for water. Rainfall and available water are relatively low in this region, while population size is high compared to other areas in the UK.³⁸ In several areas current water abstraction levels are already unsustainable.³⁹

Implications of water challenges

Water challenges have serious implications for humanity and the environment.

Health

The contamination of the coastal waters with untreated sewage means that humans are more likely to get sick when consuming seafood or after swimming.⁴⁰ In fact, diseases related to poor-quality water cause 1.6 million deaths a year in developing countries.⁴¹

Environment

Pollution of water is a big problem. Excessive release of untreated sewage into the sea can cause eutrophication, which leads to an increase of algae that reduce oxygen levels in the water and block sunlight, causing the extinction of various marine species.⁴²

River health

River health is a matter of great concern for the UK. Only 17 per cent of the English rivers were judged to be in good health in 2015.⁴³ The poor health of rivers is blamed on over-abstraction and pollution caused by farms and the sewage system.⁴⁴ Rivers, such as the Ouse, dry up earlier than they used to, because there is not enough water left in underground aquifers.⁴⁵ In summer time, half of the water streaming through the river is heavily polluted. An incident in 2001,

during which a strawberry farm accidentally drained pesticides into the Ouse, caused 80 per cent of all fish in the river to die within two days.⁴⁶



Conflict

As more and more people have to compete for resources, conflicts are likely to break out. A dispute between Egypt and Ethiopia over the river Nile has only recently been resolved, and it is likely that more water-related conflicts will erupt.^{47,48} The UK is heavily reliant on food imports, and scarcity would thus increase its dependence on other countries.

Costs

In the UK, the costs of developing new facilities for water collection, abstraction, treatment and transportation are becoming increasingly expensive as cheaper options have been exhausted.⁴⁹ It is estimated that problems stemming from the current level of over-abstraction cost the government between £3.7 billion and £27 billion a year.⁵⁰

Future possibilities

Technology, sustainable lifestyles and population size changes all have the capacity to influence water challenges in the future.

Technology

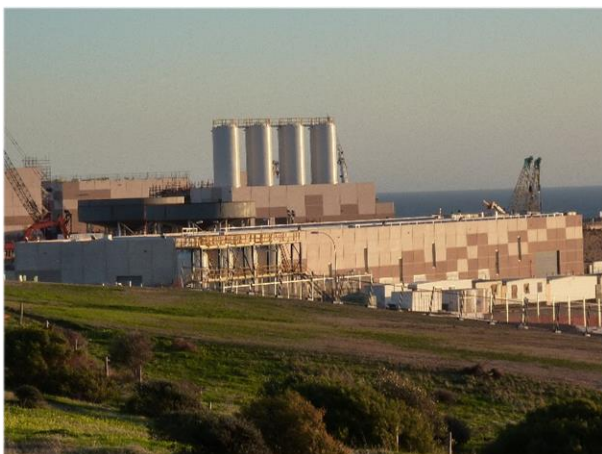
Agriculture

Currently, the majority of farmers globally rely on irrigation canals, but most of the water is lost to evaporation or seepage before it reaches the crops.⁵¹ Technology that reduces losses of water in irrigation systems and allows farmers to use water to its fullest potential would be beneficial.⁵²

Industries

Industries use a lot of water for cleaning purposes, but much could be saved through better water management.

- Each manufactured car requires 40,000 gallons of water, for example. Such water usage could largely be replaced with CO₂ cleaning. In this process, solidified carbon dioxide is used to clean surfaces. The required CO₂ is recycled from other industrial uses, and as such the system would not only limit water shortages, but also reduce CO₂ levels in the atmosphere.⁵³
- Certain industries, such as desalination, could be developed further. Desalination is the process of converting salt water to drinking water. While this is currently expensive and energy-consuming, technological advancement could improve the efficiency of the process.⁵⁴
- Fixing leaking pipes would allow the UK to save up to 158 million litres of water per day.⁵⁵ If technology allows mankind to make transport in general more leakage-proof, pollution levels could also be reduced.
- Improving sewage systems and drains would protect our living environment against climate extremes and pollution.



Households

Most water used by households is required for bathing and toilet facilities. Technological advancements could reduce this, and potentially offer alternatives for those who have no access to water.

- The development of composting toilets would not only save huge quantities of water, but also protect groundwater and soil from sewage pollution.⁵⁶
- While cleaning is associated with water, the further development of dry-bath options would allow those who lack access to clean themselves without needing liquid.⁵⁷ The use of this innovative gel, which cleans the body when rubbed over the skin, had reportedly saved over 35,647,000 litres of water by February 2014.⁵⁸
- Inventions such as the life-saver bottle allow individuals to purify water so that it is safe for drinking. Using this small tool on a larger scale in areas which lack clean water could reduce thirst levels in an environmentally friendly manner.⁵⁹
- The installation of water meters would give people a better idea of how much water they use. Households in the UK that are equipped

with such a meter use 10 to 15 per cent less water, on average, than those without one.⁶⁰

Sustainable behaviour

It is important that attitudes regarding water use are changed in parts of the world where water scarcity is not (yet) apparent.

- In the UK, other countries could be used as examples to illustrate that UK residents on average use a lot of water. While the Danish use 100 litres per day, for example, the British consume 150 litres.⁶¹
- Convince people that nothing is wrong with the consumption of purified sewage water.⁶²
- Promote the use of water tanks to catch greywater — water that may contain traces of dirt, but that is safe for usage. Greywater could be reused for the flushing of toilets, or the watering of plants.⁶³ Moreover, rain can be captured for the same purposes.
- Promote the use of solar thermal collectors, so that the sun is used to heat water for domestic use.⁶⁴
- Promote the replacement of chemical cleaning products with non-hazardous products such as cleaning vinegar and bicarbonate of soda. This reduces the pollution of sewage water.⁶⁵

Population stabilisation

Even though the previous suggestions could significantly reduce water consumption per capita, they will ultimately not be sufficient. A reduction of the UK's water consumption by between 1.1 and 3.3 billion litres a day — the amount of water that is currently over abstracted



— would require between five and 20.5 million households to stop using water altogether.⁶⁶

This suggests that a shrinking population is the only real solution to water scarcity. For that reason, the government should include population stabilisation policies in its fight against water challenges.

Conclusion

Globally, water consumption has increased rapidly in the last hundred years. Yet, fresh water is no

unlimited resource. With the prospect that water demand will continue to grow, the world faces serious water-related challenges.

Not only will water scarcity become more common, but also water pollution and flooding will become increasingly problematic. All of this affects humanity and our environment adversely. While technology and sustainable lifestyles may reduce the problem in part, this is not enough. Consequently, the government should embrace population stabilisation policies both domestically and globally.

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¹¹ <http://www.cambridge-water.co.uk/customers/how-much-water-do-you-use>

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