Policy Position

ROYAL SOCIETY OF CHEMISTRY

Sustainable Water for All

March 2020

Goal 6 of the United Nations Sustainable Development Goals (UN SDG6) aims to 'Ensure availability and sustainable management of water and sanitation for all'. We have engaged with our chemical sciences community and representatives from across the water sector to identify the key priorities and challenges that must be addressed to achieve clean and plentiful water for all, and outlined the actions needed to do this.

1. **Engage people across the world about the challenges faced** within the water sector, the science behind them and citizens' roles in achieving sustainable water. Achieving many of the changes required to tackle water scarcity and water quality will require a workforce whose learning has sustainability principles at the core. In many parts of the world, citizens' knowledge is also key to clean water and sanitation, along with strategies appropriate to the local area and society.
2. **Regulate and legislate to ensure best practice for chemicals of concern.** Effective and pragmatic regulation and legislation in all parts of the world, strongly informed by the latest science and monitoring data, will be essential for meeting the challenges of achieving a clean, sustainable supply of water for all in the future. We call on the UK Government to ensure regulations are based on high standards to keep citizens and wildlife safe and as a model to drive change elsewhere.
3. **Invest in research and innovation (R&I) to tackle the problems associated with achieving clean and plentiful water.** The chemical sciences have a strong role to play here in many areas of this inter-disciplinary endeavour, such as fundamental research into less hazardous chemical processes and development of new greener materials, methods and technologies for use in industrial processes, agriculture and consumer products.
4. **Government and water companies must take action** to reduce water shortages and slow our increasing demand for water through citizen engagement to boost supply through a resilient leak-free and flexible water system[1]. Town planning/ land use policies and practices must support clean and sustainable water supply.
5. **The pollution prevention principle must remain central to any clean water strategy**, which outlines the importance of eliminating pollution at source[2], given the virtual impossibility of remediating chemically contaminated water. Contamination of water is difficult to reverse.
6. **Effective monitoring strategies looking for trends** in the presence of 'chemicals of concern' in humans, wildlife, air, water and soil should be performed now and annually over the years ahead.
7. **Work together to achieve sustainable water through a 'quadruple helix' approach**. Academia, industry, government and broader civic society must work together to implement the above recommendations.

Clean, accessible water for all is an essential goal for the world we want to live in and there is sufficient fresh water on the planet to achieve this, in theory. In practice this is not achieved. Increasing population, demand for food and energy, and changes in lifestyle are increasing the demand for water[3], and meeting this demand is a huge challenge. Poor infrastructure and inadequately regulated industrial practices can adversely affect both water supply and quality. Water usage most often follows a linear strategy, where water is removed from a water body such as an aquifer, used and then discharged somewhere further downstream, such that the water body is depleted over time. Additionally, climate change looks set to have significant effects on water supply[3]. It is predicted that at the current rate of change, global warming will reach 1.5°C between 2030 and 2052, and this will be accompanied by an increase in extreme weather events and unpredictable rainfall[4].

Increasing demand and decreasing or unreliable water supplies will result in significant water shortages. For many people around the world, water shortages are already a reality: according to the UN more than 2 billion people live in countries experiencing high water stress. Like many of the consequences of climate change, vulnerable and disadvantaged populations tend to be disproportionately affected by water scarcity. However, the issue is not restricted to less economically developed countries: Cape Town, South Africa came close to running out of water in 2018, and this was only avoided through the implementation of strict water rationing.

According to the World Health Organisation, at least 2 billion people use a drinking water source which is contaminated with faeces[8].

The amount of water abstracted from many of the fresh water bodies in England is already unsustainable[1]: the Environment Agency predicts that unless supply is increased, many areas of England will face significant water deficits by 2050[1]. To avoid the deluge of problems that accompany water shortages, national authorities and water companies must use regulation and town planning/land use policies effectively to ensure clean, sustainable water. They need to take action to slow our increasing demand through, better engagement and citizens action to conserve water, and boost supply through a resilient leak-free and flexible water system[1].

As well as water supply, sustainable water policy must consider water quality and contaminants of emerging concern. In some areas of the developing world there are still serious health issues to address due to chronic exposure to hazardous natural and legacy contaminants, such as chromium VI, cadmium, lead and arsenic, or due to untreated industrial or domestic waste water entering the supply.

There is growing concern globally around the increasing number of chemical substances that are entering water supplies through unregulated and unmonitored human activities. Chemicals can enter the water supply via unlawful industrial emissions and agricultural practices (e.g. excess nitrates and pesticides) but also through our day to day discarding of waste (e.g. old batteries, plastics, solvents) and unused pharmaceuticals thrown down the toilet. Avoiding harm to people or the environment from contaminated water relies on accurate measurement and interpretation of chemical monitoring data and trend data over years. In England, regular sampling of drinking water covers parameters that include known hazards - metals, microorganisms and pesticides[5]. Data on the levels of water contamination must be accompanied by an understanding of the risks such contamination poses to human health and wildlife, to implement evidence-based chemicals regulation and the application of effective remediation strategies.

However, many ‘chemicals of concern’ cannot be detected, monitored or removed by the strategies currently employed in the water sector and it is often difficult to understand the risk posed by chronic everyday exposure to low concentrations of mixtures of contaminants in water, including behavioural and indirect effects on wildlife populations. Concern has arisen in society during the past decade in particular

about chemicals in water that may act like hormones in the body, namely endocrine disrupting chemicals (EDCs) and also the highly persistent and toxic per- and polyfluoroalkyl substances (PFAS), which have been termed the 'forever chemicals' that do not degrade.

Sustainable water is a global issue, as water forms part of a constantly repeating global life cycle and takes no notice of national boundares boundaries. This is particularly true when chemical pollutants, such as PFAS, are persistent for hundreds of years and bioaccumulative in the environment, wildlife and people. We call on the UK Government, the EU and all developed countries to play a leading role in helping all parts of the world to achieve SDG6, by being an exemplary world leader in water related policy and enforcing high standards of regulation where necessary. Clean water is too important to take for granted and Ofwat in the UK are developing a new strategy for transformational change[6]. With global influencing and examples of effective and pragmatic evidence-based and risk-based regulation, the UK can be a world leader in improving standards in all parts of the world that also help innovation to thrive.

Essential to achieving these goals is an awareness that the problems and the best solutions to water supply and quality problems will not be the same for all countries. Technologies designed to provide clean and plentiful water in the UK are not necessarily suitable for use elsewhere. For example, in more isolated communities or countries without sewer networks, decentralised technologies such as onsite sewage treatment and solar powered technologies could be of more use than large scale water treatment plants.

We will only tackle the issues and reach the goal of SDG6 through conversation, collaboration and knowledge sharing, and for example through international sector initiatives like the World Water Innovation Fund[7] and UN activities such as 'Water for Life'[9]. It is important to connect researchers, policy makers and industry, so that the scientific expertise is available to decision makers and industries at the right time. Science informs decision making and can be used by those working in the broader water sector to prioritise areas in particular need of research to meet SDG6.

References

1. The State of the Environment: water resource (Environment Agency report) May 2018
2. RSC Principles for the Management of Chemicals in the Environment, 2019
3. Sustainable Development Goal 6 Synthesis Report 2018 on Water and Sanitation, United Nations.
4. Global warming of 1.5^{0}C, IPCC special report (2019)
5. What are the drinking water standards? Drinking Water Inspectorate, Defra.
6. OfWat's emerging strategy: Driving transformational innovation in the sector (2019)
7. World Water Innovation Fund website
8. Drinking Water Factsheet, World Health Organisation (2019)
9. United Nations International Decade for Action 'Water for Life' 2005-2015

Contact

The Royal Society of Chemistry would be happy to discuss any of the issues raised in our statement in more detail. Any questions should be directed to policy@rsc.org.

About us

With about 50,000 members in over 100 countries and a knowledge business that spans the globe, the Royal Society of Chemistry is the UK's professional body for chemical scientists, supporting and representing our members and bringing together chemical scientists from all over the world. Our members include those working in large multinational companies and small to medium enterprises, researchers and students in universities, teachers and regulators.

The Royal Society of Chemistry developed this position drawing on evidence from chemical scientists working on these issues. We thank our members in the Environment, Sustainability & Energy Division who worked with us, especially Glynn Skerratt, Caroline Gauchotte-Lindsay, Martin Rose and David Megson. There are numerous ways in which chemical scientists are working towards a sustainable, clean and healthy planet, and this statement is part of our contribution to do so.