ROYAL SOCIETY OF CHEMISTRY

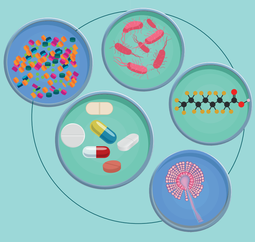
Stemming the tide of Contaminants of Emerging Concern (CECs) in water

Pollution in water is driving an unprecedented global crisis. Water bodies – including lakes, rivers, coastal waters and oceans – make up 71% of the Earth's surface, yet they are widely contaminated with cocktails of toxic chemicals and plastics.

Contaminants of Emerging Concern (CECs) represent a troubling subset of pollutants, which are often unregulated and poorly understood. However, what is well-evidenced is that they are impacting our environment, resulting in adverse consequences for ecosystems and human health.

We urgently need a comprehensive approach to CECs that combines monitoring, regulation, interdisciplinary research and collaboration.

Contaminants of Concern – an invisible threat?



Contaminants of emerging concern (CECs) refer to substances that are often not controlled or monitored in the environment, and even at low concentrations may be harmful to human health or the environment.

CECs are a diverse range of contaminants, including (but not limited to) per- and polyfluoroalkyl substances (PFAS) or 'forever chemicals', pesticides, pharmaceuticals (which include antimicrobials) and antimicrobial resistant genes (carried by bacteria, fungi and parasites) and micro- and nano- plastics.

A diverse and large number of CECs have been detected in rivers, coasts, groundwaters, drinking water, and wastewater influent and effluents.

The hidden dangers of CECs

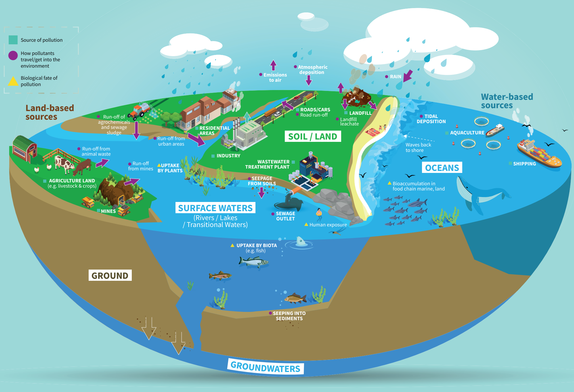
The presence of CECs in the environment is concerning due to their potential toxicity, persistence, and ability to accumulate in organisms.

Some CECs can mimic our hormones, thereby disrupting finely tuned endocrine systems in both animals and people, which in turn can lead to neurological, developmental and reproductive defects (for example, feminisation of male fish).

Antimicrobials and antibiotic-resistant genes in the environment may also drive antimicrobial resistance (AMR), which the World Health Organisation recognises as a top global health threat.

Humans can be exposed to CECs in water through recreational activities (such as swimming and bathing) and through drinking water. Although this exposure may involve low contaminant levels, the long-term effects of exposure to these CECs are not well understood.

CECs can enter our waters from a wide range of sources, and this diversity complicates efforts to effectively manage their presence.



What are the solutions?

The UK government and regulators must act now to protect our waters by taking the following steps:

1. Implement effective, comprehensive and resilient monitoring strategies to identify and monitor trends in CEC occurrence in water, and also in humans, wildlife, air, sediments, and soil.
2. Ensure monitoring programmes are adequately resourced and transparent, and there is a harmonised approach within the UK.
3. Implement improved risk assessments that assess the biological impact that chemical mixtures can have on ecosystems and human health.
4. Implement a stronger 'polluter pays' principle by making additional treatment to remove CECs from urban wastewater mandatory.
5. Commit to identifying and tackling the other major diffuse sources of CECs in waterbodies, such as pollution from road run-off, waste emissions and agriculture.
6. Promote responsible innovation and use in industry to ensure clean and sustainable water.
7. Promote non-technological solutions and raise awareness in the public to achieve clean and sustainable water.
8. Commit funding to ambitious programmes to enhance global collaboration and to enable the UK to provide support for surveillance programmes of CECs.

Find out more about these actions at

rsc.li/CECs