

Contaminants of Emerging Concern – an emerging risk in our waters

Climate change and rising demands to satisfy human and economic needs put increasing pressure on our water resources. The amount of chemicals used in our daily life has increased tremendously over the last decades and new chemical substances are regularly put on the market. During or after their use, these compounds find their way into our water bodies and into our environment.

Designated as Contaminants of Emerging Concern (CECs) or Emerging Pollutants (EPs) these substances are not regulated and therefore not included in routine monitoring programmes. Their continuous input and widespread occurrence in the environment raises specific concerns because their potential adverse effects on environmental and human health are not yet fully understood.

The concern is not limited to chemicals, but involves other emerging concerns, such as antibiotic resistance, (micro)plastics and novel pathogenic organisms. Our knowledge of their fate and behaviour in the environment as well as their effects and potential risks on environmental and human health is still limited.

Certain CECs have been detected at 'effect-triggering' concentrations in surface and ground water bodies, and are causing environmental and ecological stress, effects on human and animal reproduction, cancer, antibiotic resistance, to name only a few. However, by far not all correlations between the occurrence of CECs and their effects are understood, new chemicals are detected on a regular basis and we do not know what effects they could trigger in the environment and in humans.

Findings also indicate that effects from CECs take time to have an impact on environmental systems. Decreases in fertility and reduction of resilience, for example, may not affect an individual, but result in a steady weakening of the populations in the environment and human society over time. This is even amplified by the situation that both, in the aquatic environment and in the urban water cycle, we observe a multitude of different CECs at the same time. This results in exposure to a complex mixture of CECs which can boost impacts exponentially.

Knowledge of emerging pollutants in our society must be improved – it is assumed that the CECs and related risk potential we are aware of today are just the tip of the iceberg.

We need to use a precautionary principle to protect future generations. Research on how these substances behave, their toxicity and environmental/health impact is crucial.

- There are still existing knowledge gaps to be filled by scientific research, there is drive to set immediate actions to tackle the occurrence and risks of CECs in the aquatic environment.
- The implementation of new technologies for monitoring, wastewater treatment and reuse, sewage sludge handling and risk assessment are all interventions/measures that need to support the precautionary principle.
- New technologies and approaches will only be developed if there is accompanying policy measures and legislation in place that could stimulate such preliminary interventions/measures.



Actions needed:

- Consolidation of knowledge on CECs, and development of strategic approaches for research and information management.
- Improve existing monitoring strategies to address CECs and implement new ones to establish a sound database for risk assessment, prioritization, trend observation and success control.
- Implementation of advanced technologies in wastewater treatment and reuse, to significantly decrease the number of and impact of CECs.
- Development of environmental quality standards for surface water, drinking water, wastewater reuse and sludge disposal, following new approaches such as effect-based methods that consider toxicity of a mixture of substances.
- Joined up legislation on with regard to registration of chemicals, biocides, water quality, human health and others.
- Courage and confidence to implement new approaches in policy and legislation.
- Setting up appropriate communication and raising awareness of the impact of CECs on a broad societal base including industry, policy makers and politicians.
- Further financial support for targeted research on various aspects of CECs.

Advances in sustainable energy production and mobility, health care and resilience, IT and digitalisation will all become compromised and meaningless, if we do not react to the proven indications of the environmental and human health effects of CECs. As successful as we have been in handling traditional water quality issues such as organic pollution and nutrients, we are facing even much greater challenges today, that urgently need to be tackled in a changing world leaving its footprint in the water we rely on for drinking, for economic activities and for the future generations towards which we have a huge responsibility.

What is the Water JPI Knowledge Hub?

The purpose of the Water JPI Knowledge Hub is to share knowledge that can be used by regulatory authorities and environmental scientists, and that will allow professionals to make informed decisions. Another purpose is to raise awareness of these issues among the public.

The Water JPI Knowledge Hub brings together experts from several research areas to collaborate and communicate across different scientific disciplines and with decision makers. It closely works together with other European Networks such as the NORMAN Association. Contaminants of Emerging Concern is the first research area developed within the Water JPI Knowledge Hub.

Internet sources

Water JPI: <http://www.waterjpi.eu/>. **Water Framework Directive 2000/60/EC:** http://ec.europa.eu/environment/water/water-framework/index_en.html. **Common Implementation Strategy (CIS) for the Water Framework Directive:** http://ec.europa.eu/environment/water/water-framework/objectives/implementation_en.htm. **The NORMAN network:** <https://www.norman-network.net/>. **Strategic Development Goals of United Nations:** <https://sustainabledevelopment.un.org/?menu=1300>

Literature

Water JPI, Open project database: Link. Berendonk, TU, Manaiá, CM, Merlin, CM, Fatta-Kassinos, D, Cytryn, E, Walsh, F, Bürgmann, H, Sørum, H, Norström, M, Pons, MN, Kreuzinger, N, Huovinen, P, Stefani, S, Schwartz, T, Kisand, V, Baquero, F, Martinez, JL. *Tackling antibiotic resistance: the environmental framework. Nature Reviews Microbiology*.13 (5):310-317

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