

Abstract Information for UNESCO-IWRA Online Conference “Emerging Pollutants: Protecting Water Quality for the Health of People and the Environment”, 17-19 January 2023

Deadline: 10 October 2022

* All fields in the online abstract submission process must be completed.

(*) Presentation	Tick the box if you are submitting an on-line Oral Presentation. <div style="float: right; border: 1px solid black; padding: 2px 10px; text-align: center;">X</div>					
(*) Presentation	Tick the box if you are submitting an on-line Poster Presentation <div style="float: right; border: 1px solid black; width: 50px; height: 30px;"></div>					
(*) Special Youth Submission category	* Tick box if you are the first author and under the age of 35 <div style="float: right; border: 1px solid black; width: 50px; height: 30px;"></div>					
(*) Selected Theme	* Please identify and tick which of the five main themes your abstract topic falls under					
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; padding: 5px; text-align: center;"> <i>Emerging pollutants in aquatic ecosystems</i> </td> <td style="width: 20%; padding: 5px; text-align: center;"> <i>Emerging pollutants and groundwater</i> X </td> <td style="width: 20%; padding: 5px; text-align: center;"> <i>Emerging pollutants and managing wastewater and waste</i> </td> <td style="width: 20%; padding: 5px; text-align: center;"> <i>A circular economy approach: Lifecycle management of emerging pollutants</i> </td> <td style="width: 20%; padding: 5px; text-align: center;"> <i>“Priority” emerging pollutants in the hydrocycle: microplastics, nanomaterial, PFAs and PPCPs</i> </td> </tr> </table> <p style="font-size: small; margin-top: 5px;">More information about the themes available here: https://iwraonlineconference.org/themes-3rd/</p>	<i>Emerging pollutants in aquatic ecosystems</i>	<i>Emerging pollutants and groundwater</i> X	<i>Emerging pollutants and managing wastewater and waste</i>	<i>A circular economy approach: Lifecycle management of emerging pollutants</i>	<i>“Priority” emerging pollutants in the hydrocycle: microplastics, nanomaterial, PFAs and PPCPs</i>
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(*) Title	An Analysis of the Main Categories of the Contaminants of Emerging Concern (CECs) in Global Groundwater					

(*)
Body
(400 rds)

(a) Purpose or objectives and status of study or research hypothesis

This oral presentation is tantamount to a review article, as it analyzes previously published material on CECs, and summarizes the current state of understanding of the main categories of those CECs in groundwater that have undergone varying levels of scientific scrutiny.

(b) Key issue(s) or problem(s) addressed

The presentation summarizes the uses, adverse health effects, and known presence and extent of each category in global groundwater.

(c) Methodology or approach used

The presentation compares the known data of the most extensively-studied CECs (e.g., industrial chemicals such as PFAS) to the more poorly understood CECs (e.g., flame retardants such as polybrominated biphenyls [PBB])

(d) Results and conclusions derived from the project

(e) Policy implications of the project relevant to the selected conference theme, theory and/or practice

(Please do not add graphs, charts, diagrams, images, references, or citations)

Contaminants of emerging concern (CECs) are pollutants that may cause adverse ecological or human health effects, are not regulated under current environmental laws, and are generally not undergoing monitoring by periodic sampling and analytical testing of groundwater. Many CECs have been entering the environment for years, even decades, but their presence and extent have only recently been under investigation.

A literature review indicates the following are the main categories of CECs in groundwater; to varying degrees, all have undergone inadequate levels of toxicological analysis:

1) Pharmaceuticals, 2) personal care or household cleaning products, 3) industrial chemicals, 4) flame retardants, 5) cyanotoxins, and 6) nanomaterials.

1) Pharmaceuticals include antibiotics, anti-inflammatories, analgesics/pain relievers, antiepileptics, antidiabetics, beta-blockers (for heart disease and high blood pressure), and lipid regulators (lipids are fats and vitamins that store energy).

2) Personal care products include non-medicinal consumer chemicals such as cosmetics, deodorants, cleansers (soap, shampoo, toothpaste), moisturizers, perfumes, sunscreens, hair styling sprays and foams, and shaving creams.

3) Existing data indicates industrial chemicals may comprise the most voluminous known category of CECs. The following are the most commonly-known: per- and polyfluoroalkyl substances (PFAS), pesticides, plastics and their common constituent bisphenol A (BPA), and explosives compounds. The following are lesser-known yet significant industrial chemical CECs: 1,4-Dioxane, used in pharmaceutical purification, and plastics production; the cleaning solvent trichloropropane; N-nitroso-dimethylamine (NDMA), which forms during the production of antioxidants and rocket fuel and the chlorination of waste and drinking

	<p>water; and perchlorate, a widespread component in fireworks, explosives, and rocket propellant.</p> <p>4)Brominated flame retardants (BFRs) are an enormous category of CECs, used to reduce flammability in computers, plastics, furniture and clothing.</p> <p>There are many pharmaceuticals, personal care products, industrial chemicals such as PFAS, and flame retardants that act as so-called endocrine disruptors (EDCs). EDCs are compounds that adversely alter the normal functions of hormones. EDCs can cause reproductive effects in aquatic organisms, and evaluating these effects typically require analytical testing methodologies not readily available along with endpoints not previously evaluated using current guidelines.</p> <p>5)Cyanotoxins are toxic chemicals released from bacterial blooms that can proliferate in groundwater as a result of additions of nitrogen and phosphorus from fertilizer runoff and detergents in urban areas. The toxins are generally poorly documented; they reduce water quality and can adversely affect wildlife and humans.</p> <p>6)Nanomaterials, or nanoparticles, are used in hundreds of consumer products and biomedical applications. They are typically 1-100 nanometers (a nanometer is one-millionth of a meter), and examples are metals such as aluminum or silver, or carbon fiber.</p> <p>As the CECs move through the environment or through wastewater treatment plants or drinking water filtration systems, by-products are routinely formed. Definition of the make-up and toxicity of these by-products is lacking.</p> <p>Countries should strive to: a) control the release of these CECs to the environment, b) implement regular oversight of manufacturers' constituents used in their products; and c) implement groundwater monitoring in drinking water wells for (at least) those CECs such as PFAS that have the highest certainty of causing human health problems. Countries should follow the lead of the European Commission as they finalize legislation to eliminate the widespread release of PFAS compounds in biosolids that are used as soil amendments for agricultural areas, as the PFAS compounds currently continue to leach into underlying groundwater.</p> <p>Also presented is the author's involvement in proven groundwater remediation technologies that address the following CECs: PFAS, explosives compounds, perchlorate, 1,4-Dioxane, and nitrogen/nitrate.</p>
<p style="text-align: center;">(*) Keywords</p>	

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