



Emerging Pollutants: Protecting Water Quality for the Health of People and the Environment

Emerging contaminants in groundwater: Improving the evidence base to inform policy and regulation

Dan Lapworth (British Geological Survey)

16:35 CET, 17 January 2023



Motivation– why is this topic so important

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What are PFAS chemicals, and what are they doing to our health?

By Nadia Kounang, CNN
Updated 0858 GMT (1658 HKT) February 14, 2019

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Microplastics found in human for first time

Exclusive: The discovery shows the particles can travel body and may lodge in organs

Damian Carrington
Environment editor
@dpcarrington
Thu 24 Mar 2022 11:00 GMT

UK Parliament

Committees

UK Parliament > Business > Committees > Environmental Audit Committee > News Article

'Chemical cocktail' of sewage, slurry and plastic polluting English rivers puts public health and nature at risk

13 January 2022

the Guardian
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Climate crisis Wildlife Energy Pollution

This article is more than 1 month old

PFAS pollution led to contamination of US drinking water wells, study finds

PFAS chemicals detected in 20% of private wells and 60% of public wells sampled in 16 eastern states

Groundwater needs greater protection

In many settings it is the last/only resource available

A cocktail/timebomb of ECs is a potential threat to groundwater

Clean groundwater is key for a healthy & resilient environment

Groundwater protection is better than remediation



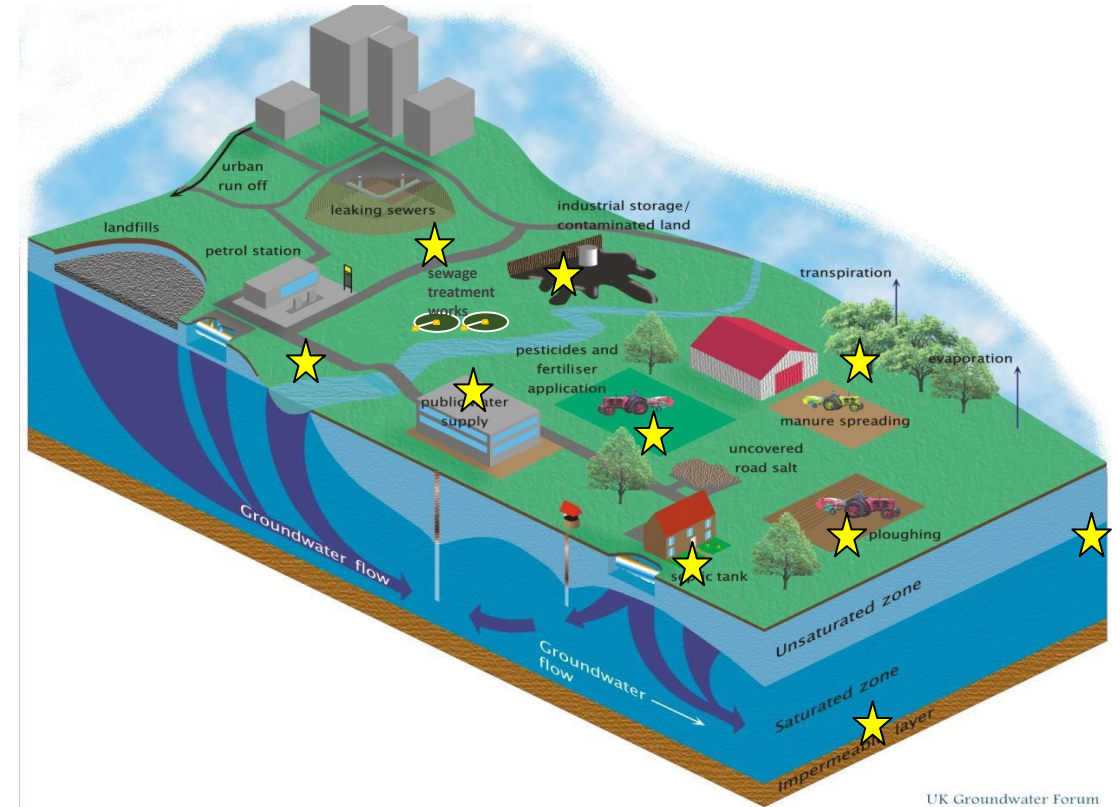
The United Nations World Water Development Report 2022

GROUNDWATER

Making the invisible visible

Definitions and different types of EC

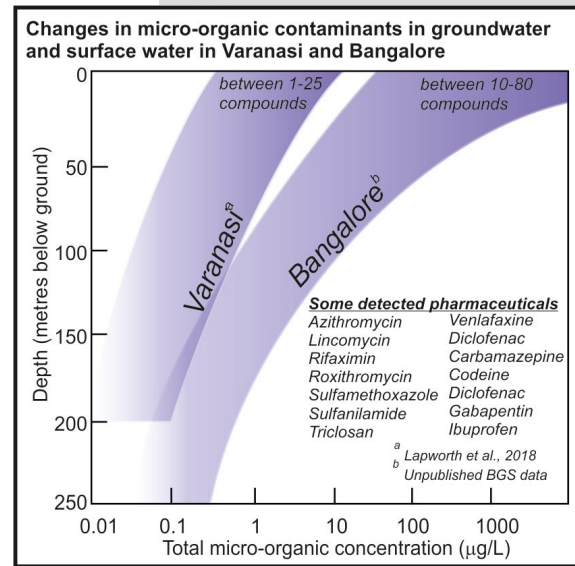
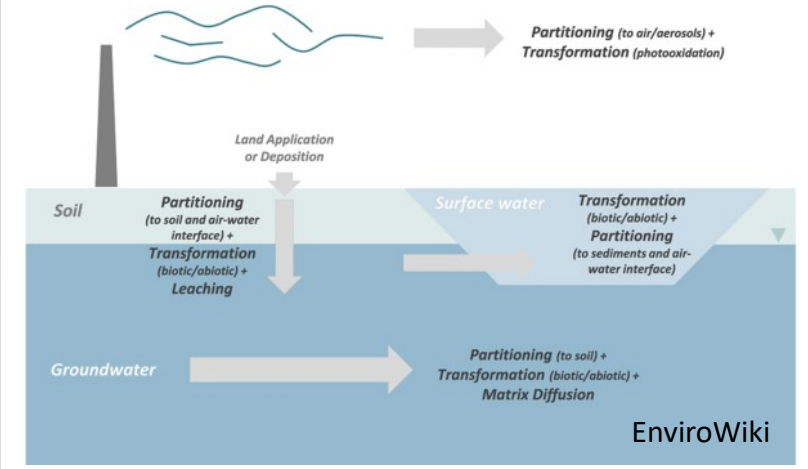
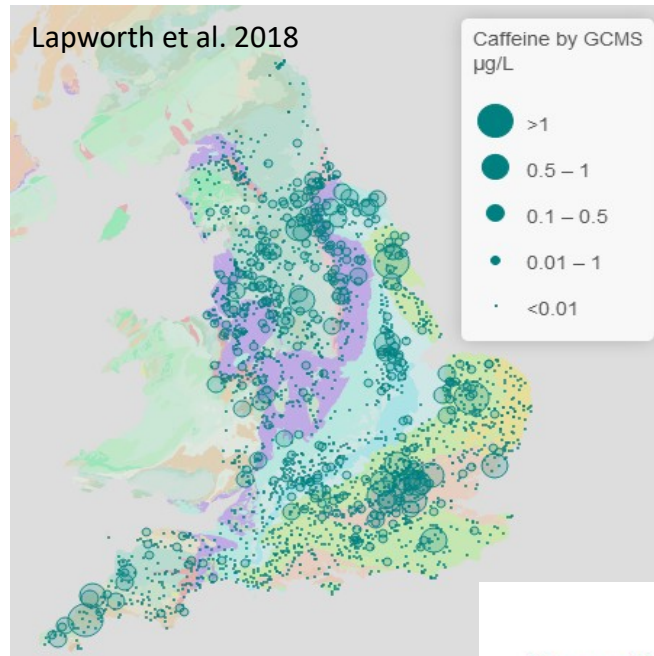
- Anthropogenic organic compounds and their transformation products
- Anthropogenic particles (plastics and other engineered particles)
- Microbiological contaminants of emerging concern e.g. viruses and microbial resistance
- Contaminant mixtures or 'cocktails'
- Groundwater ECs have a different profile compared to surface waters due to subsurface transport and residence times
- Emerge as result of:
 - Changes in use/new manufactured products
 - Advances in analytical techniques (e.g. QTOF- MS methods; omics)
 - Better monitoring
- Much less well characterised than in surface water - perception of lower risk for groundwater
- By definition ECs typically do not have a regulatory standard



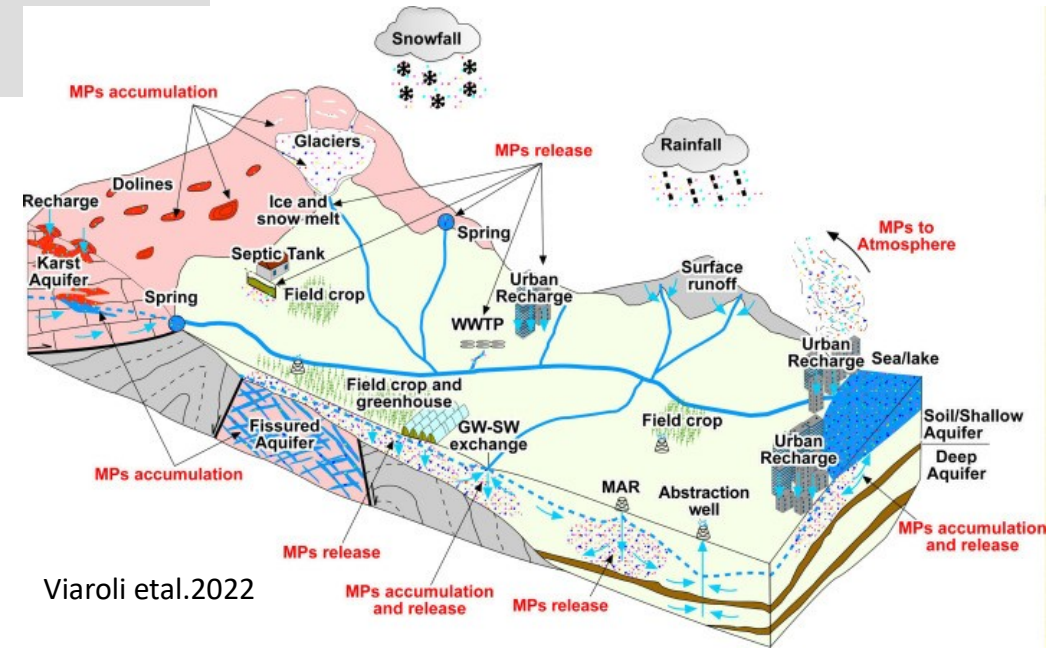
+ SW-GW interactions, MAR, SUDS etc

What has been done so far?

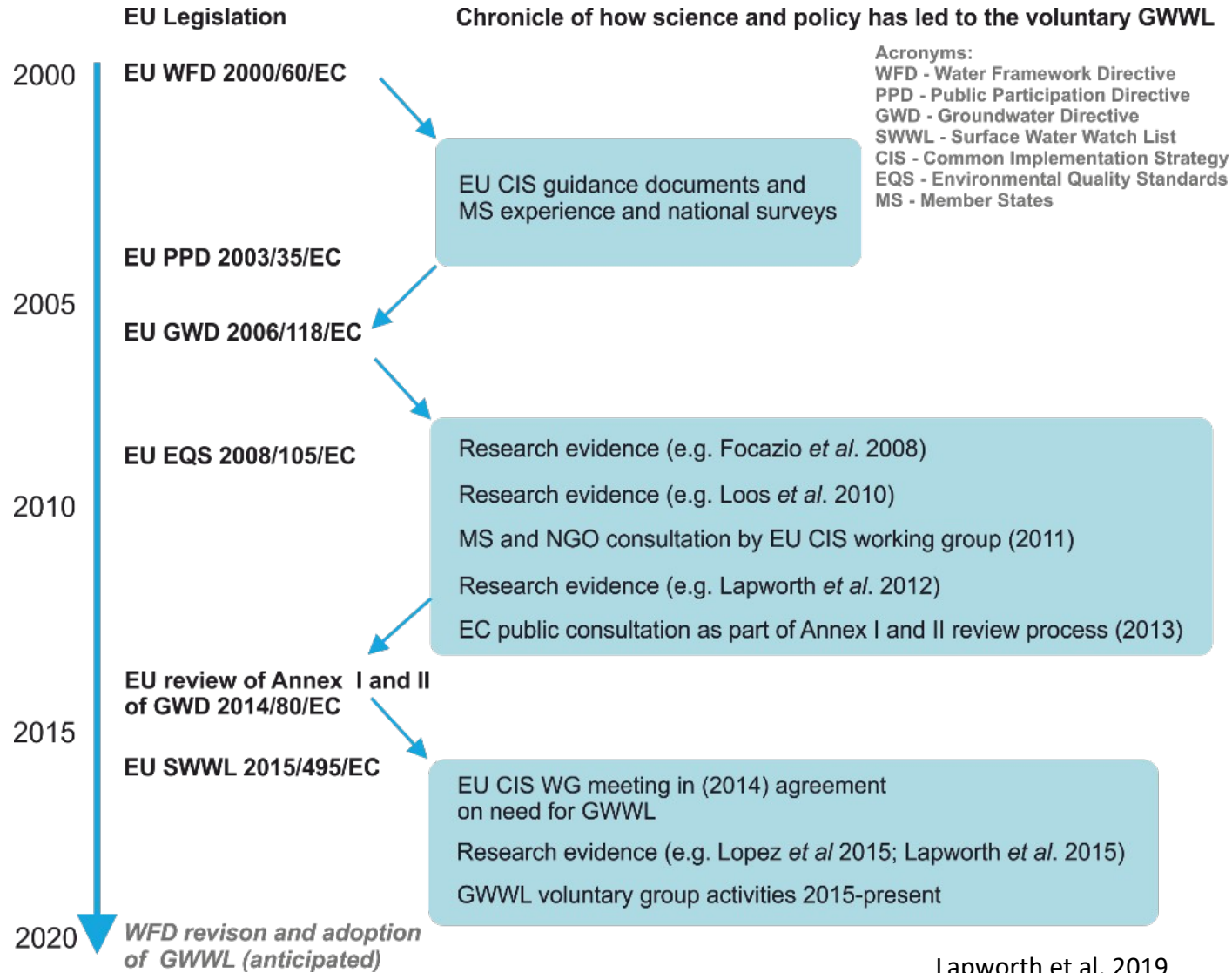
- Growing evidence base of EC pollution in groundwater globally driven by research and surveillance monitoring
- Several regional initiatives to improve monitoring of priority EC (e.g. the first European Groundwater Watch List)
- It has become a high priority for key stakeholders (regulators, water industry, wider society)
- Growing focus on selected ECs – PFAS, plastics, some pharmaceuticals & AMR
- Need a coherent approach to protection of groundwater from key ECs and stronger policy and a change in how society uses/views chemicals



BGS



Case study of the European Groundwater Watch List?

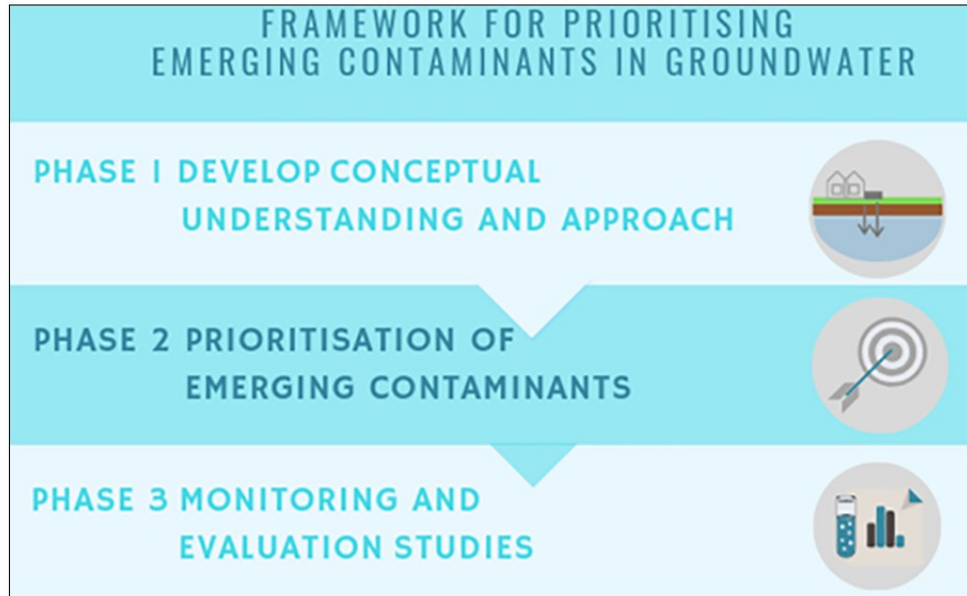


Lapworth et al. 2019

- It has been a long journey to get to this point
- Can this type of voluntary initiative work in other regions to monitor new ECs?
- How do we ensure that evidence is shared more effectively in future, particularly as many of these contaminants are widespread
- There is a need to prioritise the most hazardous groups and at the same time improve analytical capabilities and monitoring



Core principals behind the GWWL



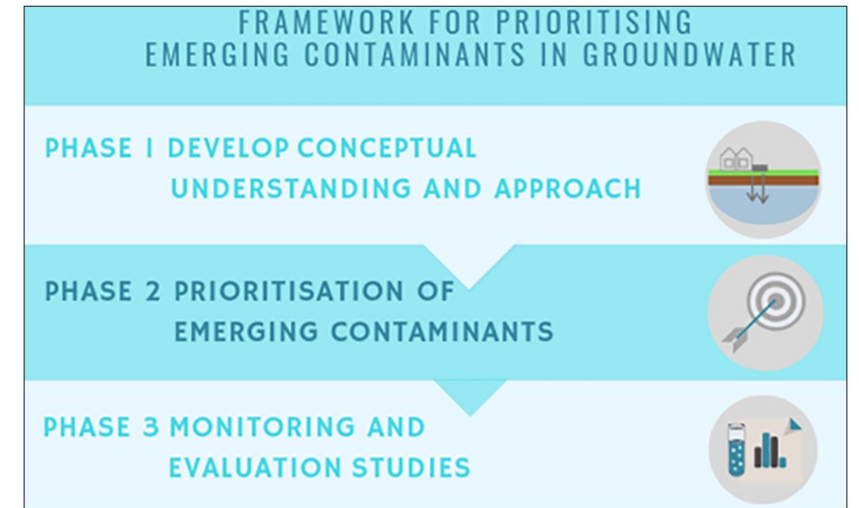
Gaston et al. 2019



- GWWL – dynamic list of c. 10 organic compounds
- Striking a pragmatic balance between:
 - Safeguarding drinking water supply for future generations & costs associated with monitoring for ECs
 - Prioritise based on:
 - Existing monitoring data
 - Environmental exposure, mobility data
 - Toxicity and relative risks posed to groundwater
- Multi stakeholder input to develop methodology
- Voluntary initiative between European countries/agencies
- Regular meetings of the GWWL working group representing different stakeholders to develop a GWWL methodology over 3 years

What are the next steps?

- There is growing awareness in the research community and wider society of a potentially harmful cocktail of ECs which pollutes groundwater
- We need to improve the evidence base and monitoring to inform policy for groundwater protection
- A number of stakeholders need to work together to build a resilient framework for monitoring priority EC in groundwater and reducing future impacts from other ECs



Thanks for listening - time for Questions?

