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EURECA-PRO

SUSTAINABLE APPROACH TO WATER CONSUMPTION

Edyta KUDLEK

Faculty of Energy and Environmental Engineering, Department of Water and Wastewater Engineering

Contents of Chapter 3

- Water scarcity in Europe
- Anthropogenic pollution of water resources
 - Inorganic compounds
 - Organic micropollutants – contaminants of emerging concern
 - Microplastics
- Proper water management
- Water supply systems
- Summary



Water scarcity in Europe

The issue of water scarcity is often associated with countries located in the desert zone



Research studies focuses on drought phenomena in the south of the continent. In the northern part of Europe the drought phenomenon is generally not recognized as a significant issue

The water engineering sector is more focused on water surplus occurring periodically during flooding



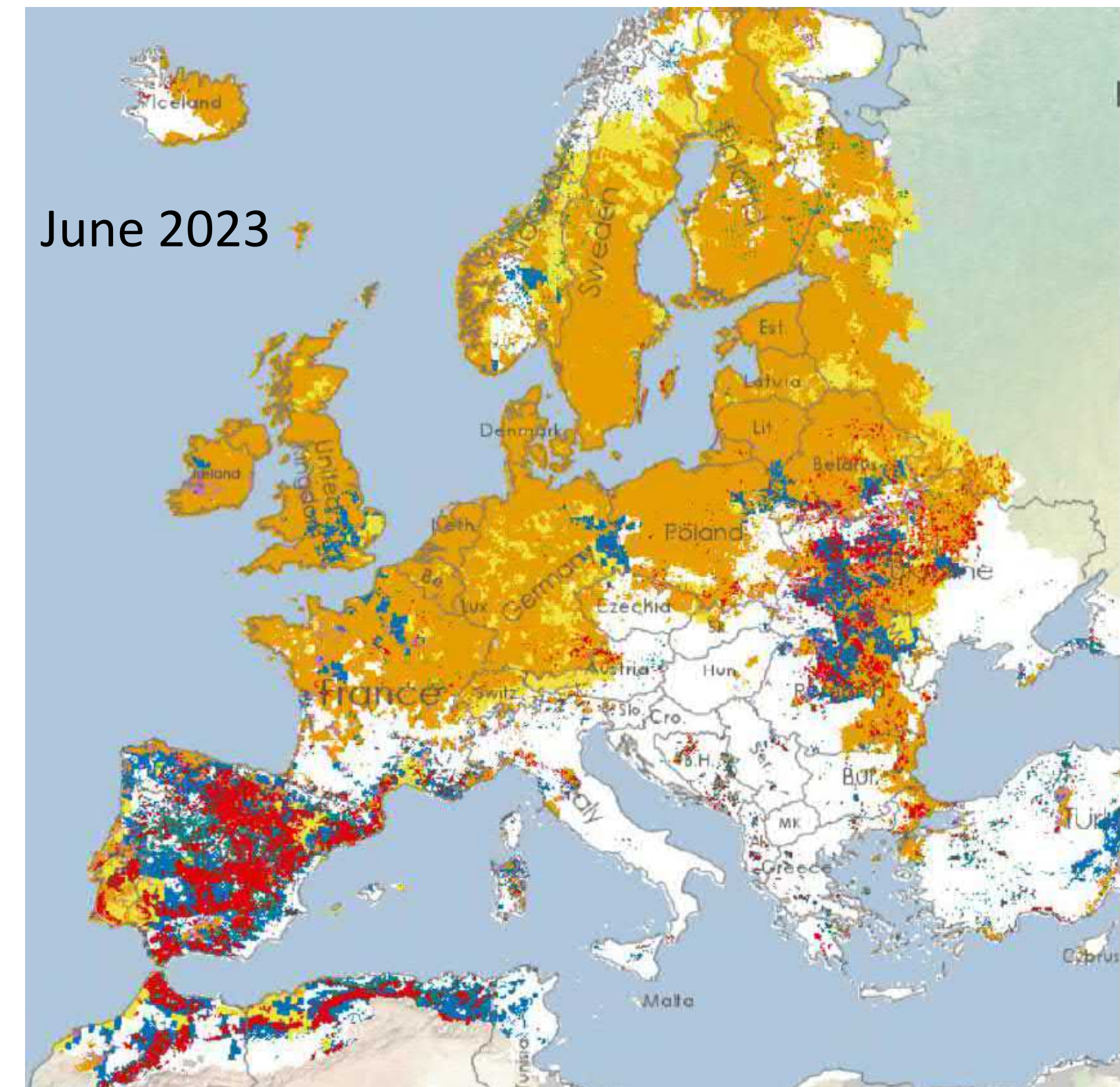
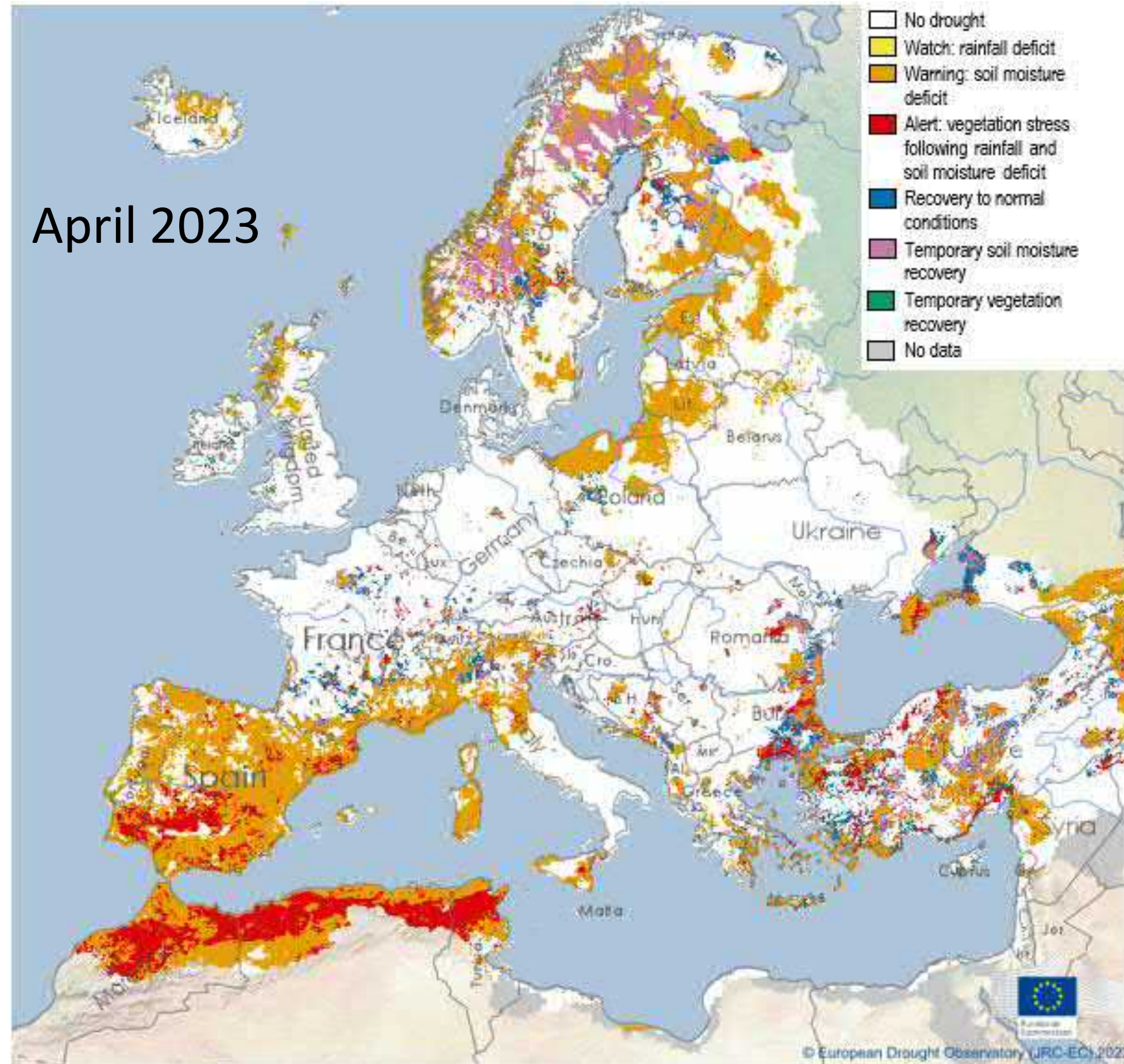
European drought situation



PROGRAMME OF THE EUROPEAN UNION



According to data presented by EDO-European Drought Observatory using the Combined Drought Indicator (CDI) v3.0



<https://edo.jrc.ec.europa.eu/edov2/php/index.php?id=1111>

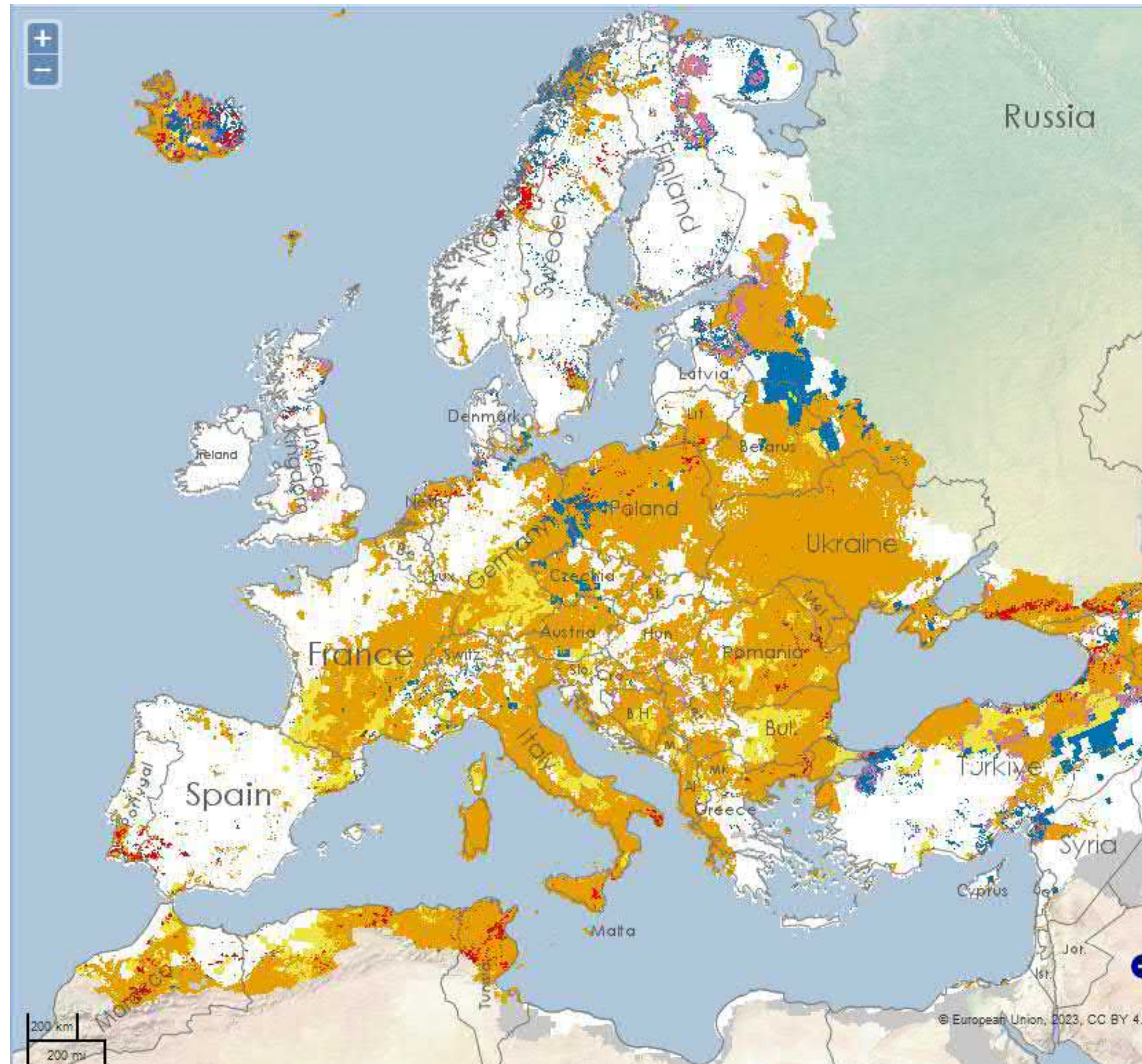
European drought situation



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According to data presented by EDO-European Drought Observatory using the Combined Drought Indicator (CDI) v3.0



Situation as of October 26, 2023.

<https://edo.jrc.ec.europa.eu/edov2/php/index.php?id=1111>

Water scarcity in Europe

During the World Economic Forum in 2015, the water supply crisis was pointed as the top 1 high-impact risk for the human population and the whole planet.

Greve et al. pointed out that global water consumption has increased nearly eight times in the past century and is now about 4600 km³ per year and is expected to increase by 20%–30% by 2050.

He et al. indicated that by 2050 nearly half the number of the world's large cities would be located in regions with high-water scarcity, affecting up to 2.373 billion people.



Greve P., et al.: Global assessment of water challenges under uncertainty in water scarcity projections. *Nature Sustainability*, 1, 2018, p. 486–494.

He C., et al.: Future global urban water scarcity and potential solutions. *Nat. Commun.*, 12, 2021, p. 1–11.

Water Scarcity Indicators

- **Falkenmark indicator** – defined as the per-capita water availability;
- **Criticality ratio** – shows the ratio of water use to availability;
- **International Water Management Institute IWMI indicator** – indicates the proportion of water supply as water availability by accounting for the water infrastructure;
- **Water Poverty Index WPI** – given as an average of water availability, access, capacity, use and environment;
- **Water footprint-based assessment** – defined as the ratio of water footprint to water availability;
- **Life cycle assessment-based water stress indicator** – shows the ratio of water use of water footprint to availability;
- **Cumulative abstraction to demand ratio**;
- **Green-blue water scarcity** – given as the requirement versus availability of green-blue water resources;
- **Quantity–quality–environmental flow requirement (QQE) indicator** – Incorporating water quality, quantity and environmental flow requirements.

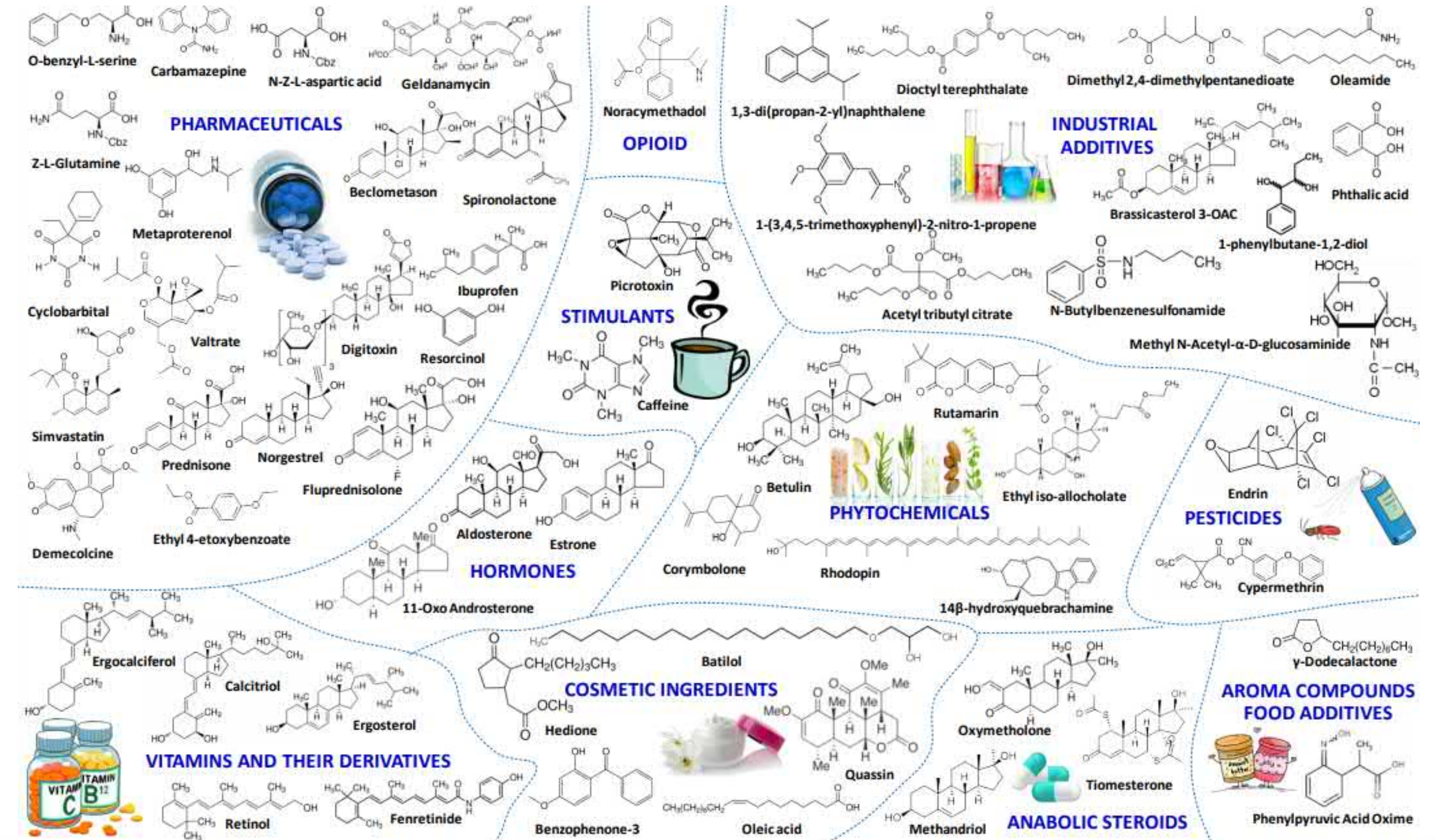
Anthropogenic pollution of water resources

Classification:

- Organic pollutants,
- Pathogens,
- Nutrients and agriculture runoff,
- Suspended solids and sediments,
- Inorganic pollutants (salts and metals),
- Thermal pollution,
- Radioactive pollutants,
- Nanopollutants.

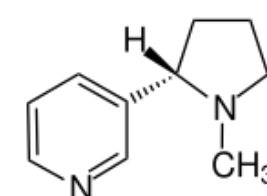
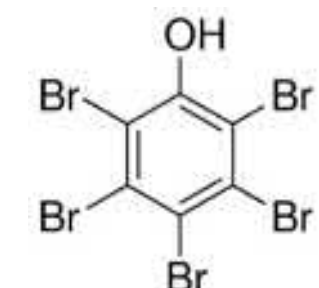
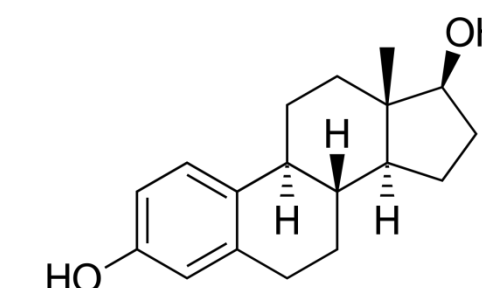
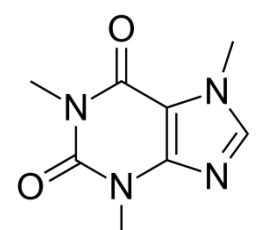
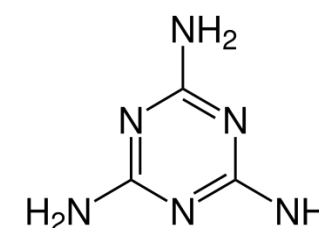
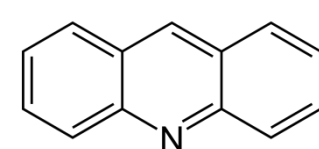
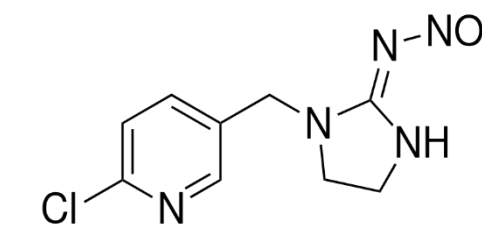
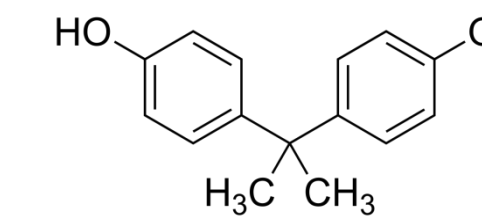
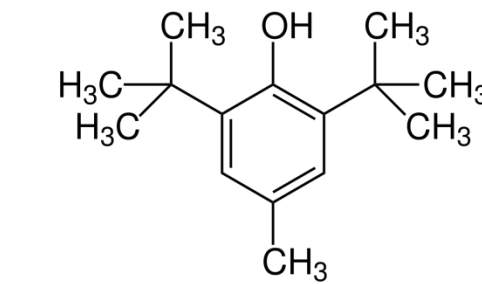
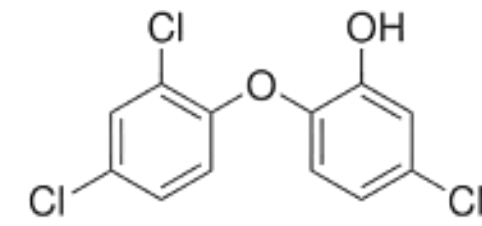
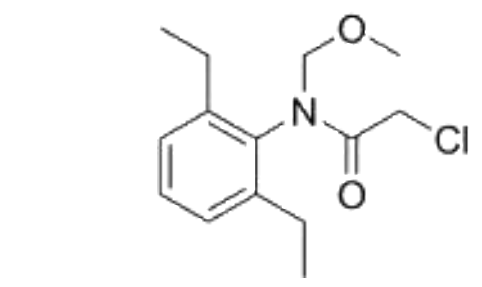
Classification:

- Subjected to legal regulations,
- Non-subjected to legal regulations.



Contaminants of Emerging Concern CECs

- **Pharmaceutical compounds** (painkillers and anti-inflammatory drugs, antiepileptic drugs, antihyperlipidemic drugs, antimicrobials: antibiotics and antiseptics);
- **Personal care products** (preservatives, fragrances, stimulants, surfactants);
- **Estrogenic micropollutants;**
- **Industrial additives** (phenolic compounds, polycyclic aromatic hydrocarbons);
- **Flame retardants;**
- **Pesticides;**
- **Food additives;**
- **Dyes...**



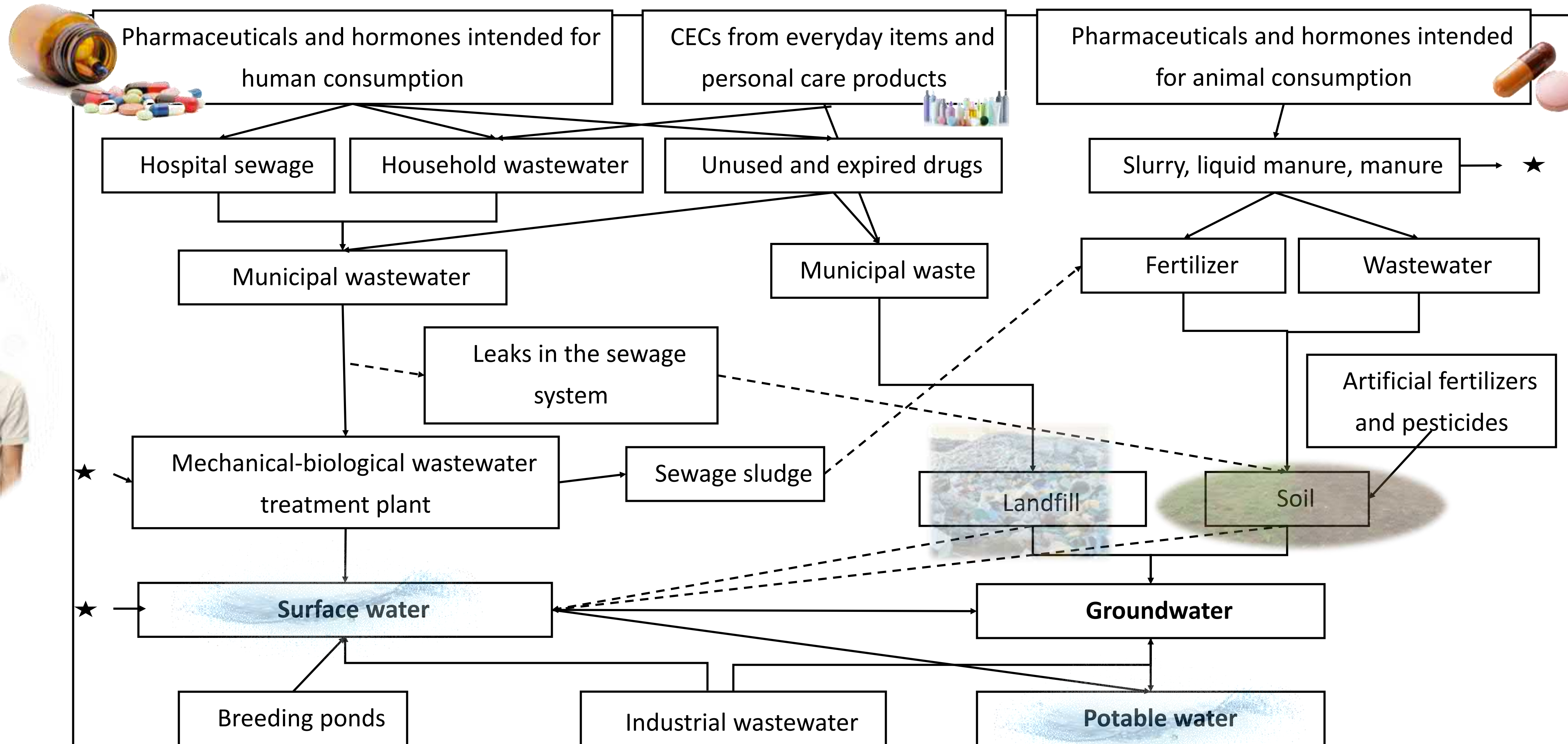
Microplastics

„Our parents collected seashells on the beach, and we collect microplastics..”



[google.com/grafika](https://www.google.com/grafika)

Sources and routes of CECs entering the aquatic environment



Proper water management

Directions for the improvement of policies and regulations connected to circular water technologies:

1. Implementation of the fit-for-purpose water principle.
2. The policy, guidelines, protocols and processes addressed to circular water reuse should reflect the context, required water quality and scale of the system. These should lead to an easier permission process for small-scale solutions.
3. Implementation of cost and financial risk mitigation strategies. Such an approach forces the assessment of the lifecycle's costs, benefits and risks.
4. Identification of the process, performance and route-to-market gaps.
5. The improvement of knowledge and awareness across all sectors and user groups

Qtaishat Y, et al.: Circular Water Economy in the EU: Findings from Demonstrator Projects. *Clean Technologies*, 4, 2022, p. 865–892.



Water supply systems

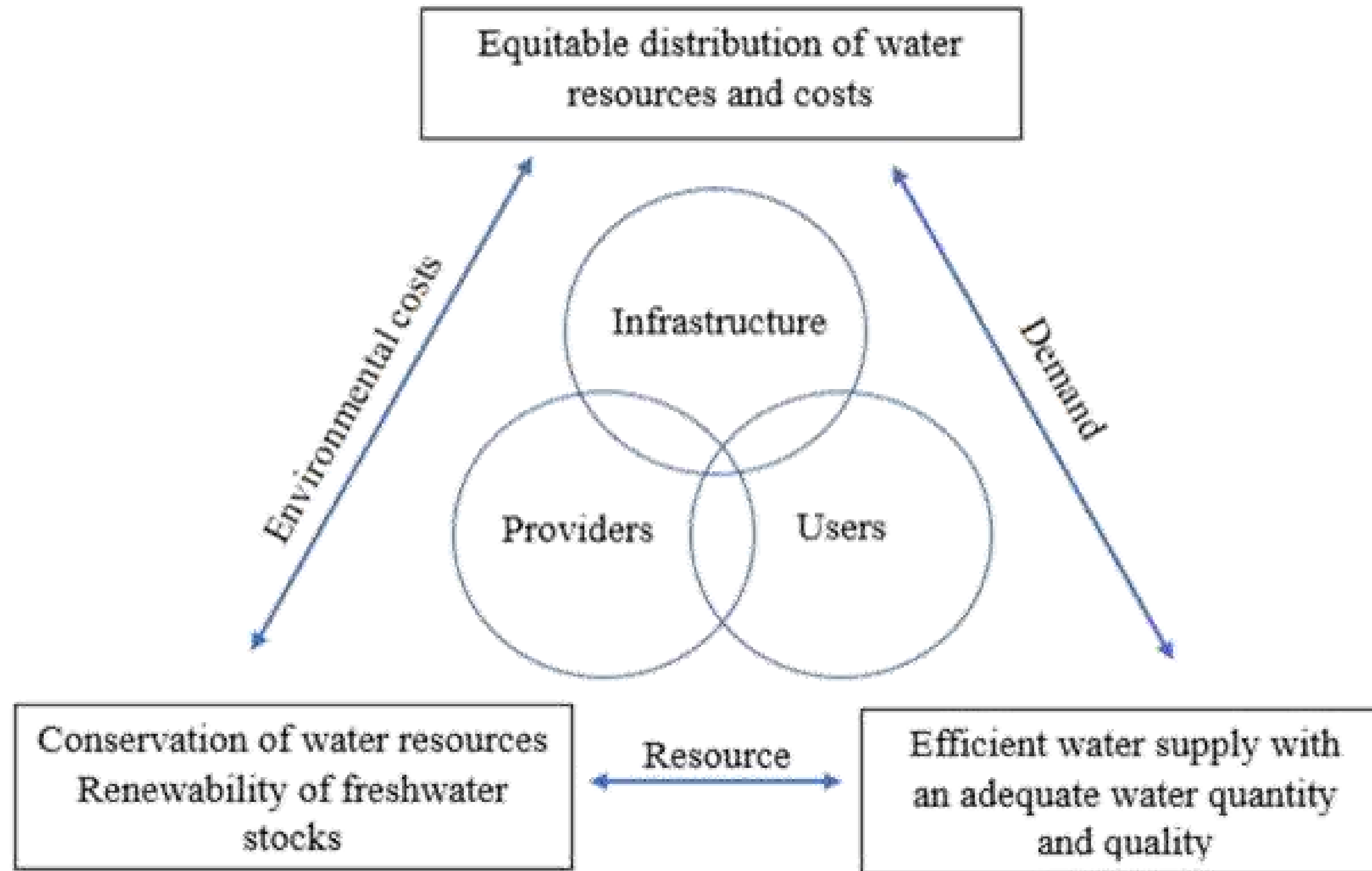


Fig. Schematic concept of sustainable water management

Summary



- Water, as one of the most crucial resources for every part of the industry and every human being, requires special care.
- Even the smallest actions to reduce water consumption, reuse or reduce water pollution can be crucial for the economy and the well-being of the society.
- Proper water management based on the assumptions of the circular economy bring profits to various industry branches.

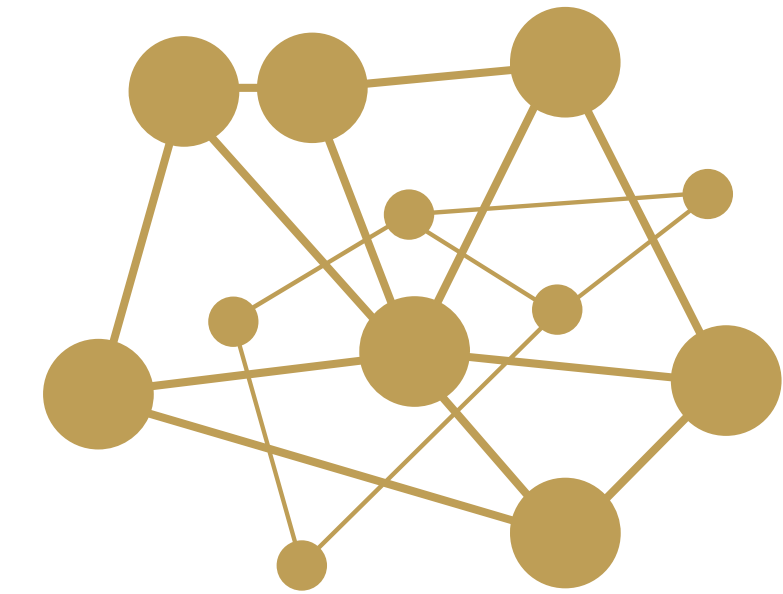


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**THANK YOU
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Edyta Kudlek, PhD, DSc, prof. SUT
e-mail: edyta.kudlek@polsl.pl
ORCID: 0000-0003-0068-1996



Silesian University
of Technology

