

Under the High Patronage of His Majesty King Mohammed VI



XIX WORLD WATER CONGRESS
International Water Resources Association (IWRA)
Marrakech, Morocco | 1-5 December 2025

Kingdom of Morocco



Ministry of
Equipment and Water

The environmental exposure of CECs in developing countries: A case study of CECs in South African freshwater systems

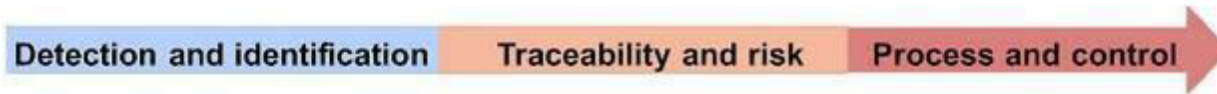
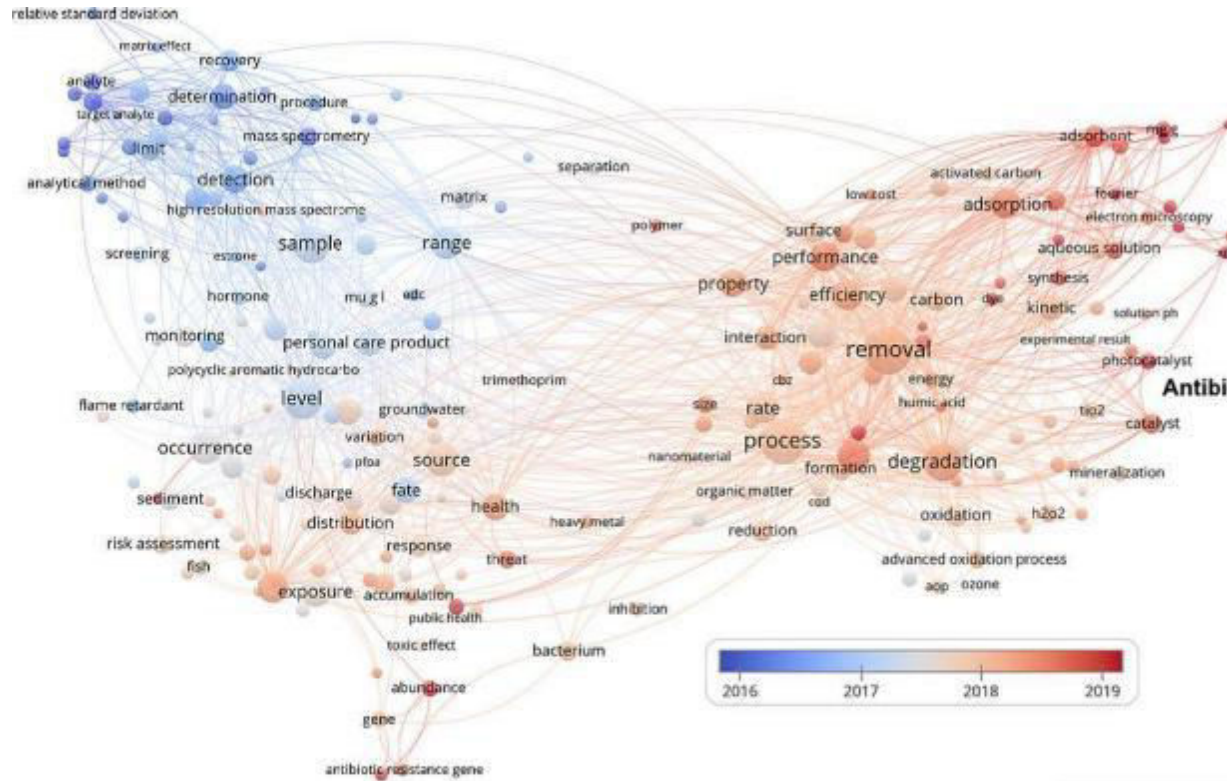
Mbuyiselwa Moloji*, Dana Kühnel
Helmholtz Centre for Environmental Research
02.12.25

Introduction

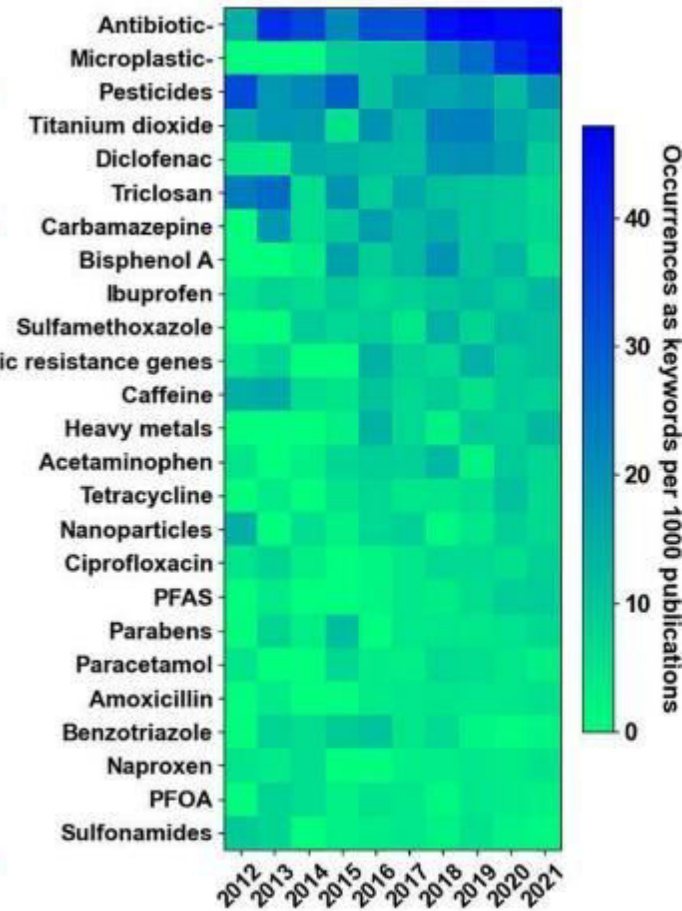


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Yu et al. 2024 (https://doi.org/10.1016/j.scitotenv.2023.168116)

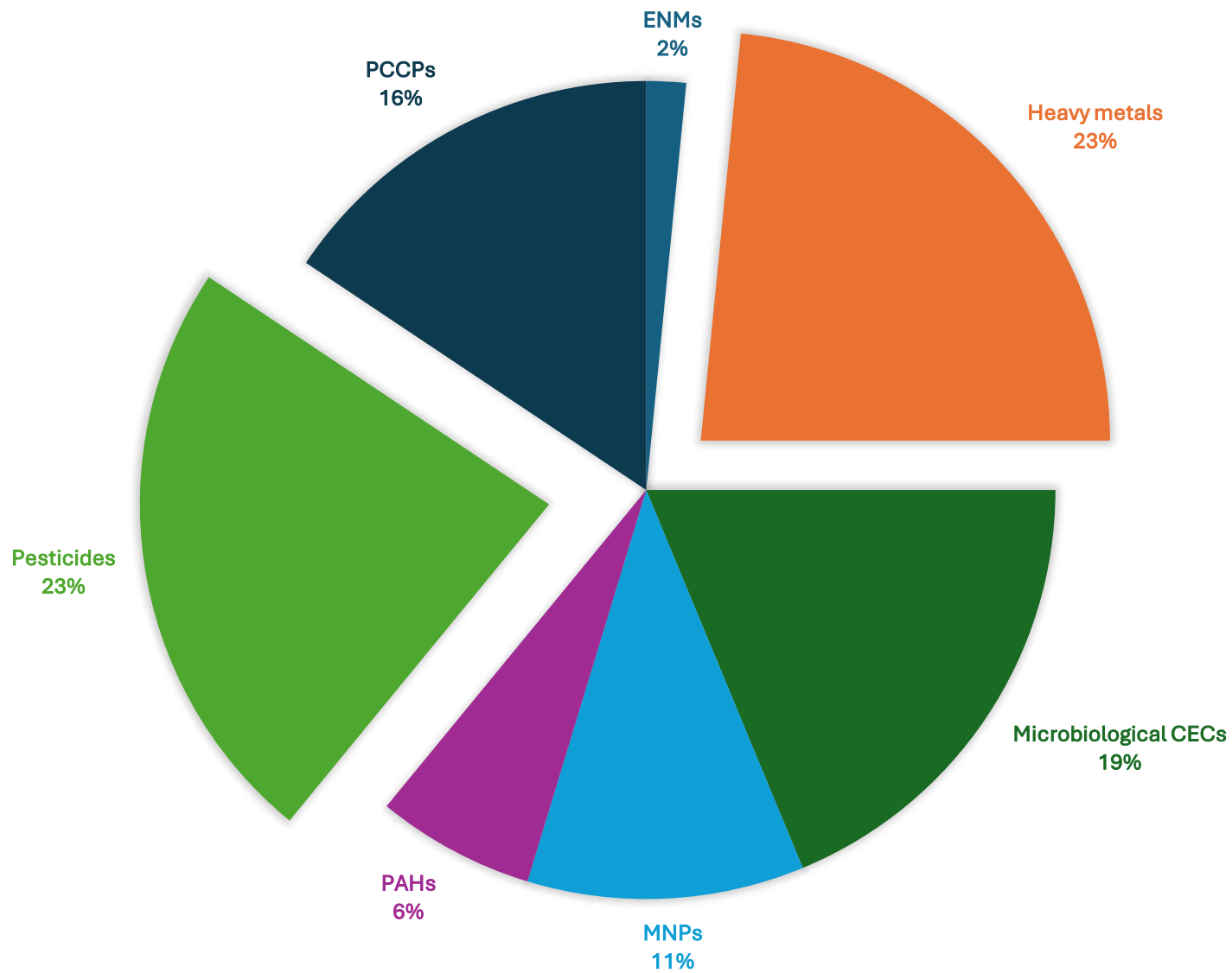


Three typical stages of ECs study along with time



Evolution of hotspots in ECs study





N= 64, Data source: The Knowledge Hub (<https://www.ceckh.agric.za/>)



The Problem



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No law of 'isolation'

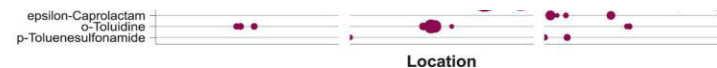
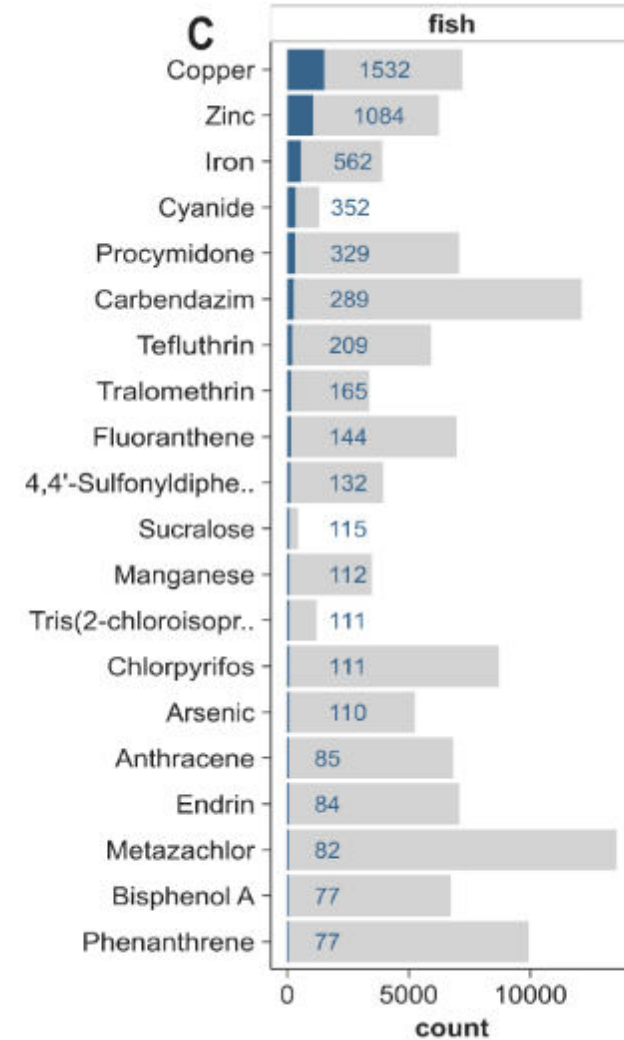
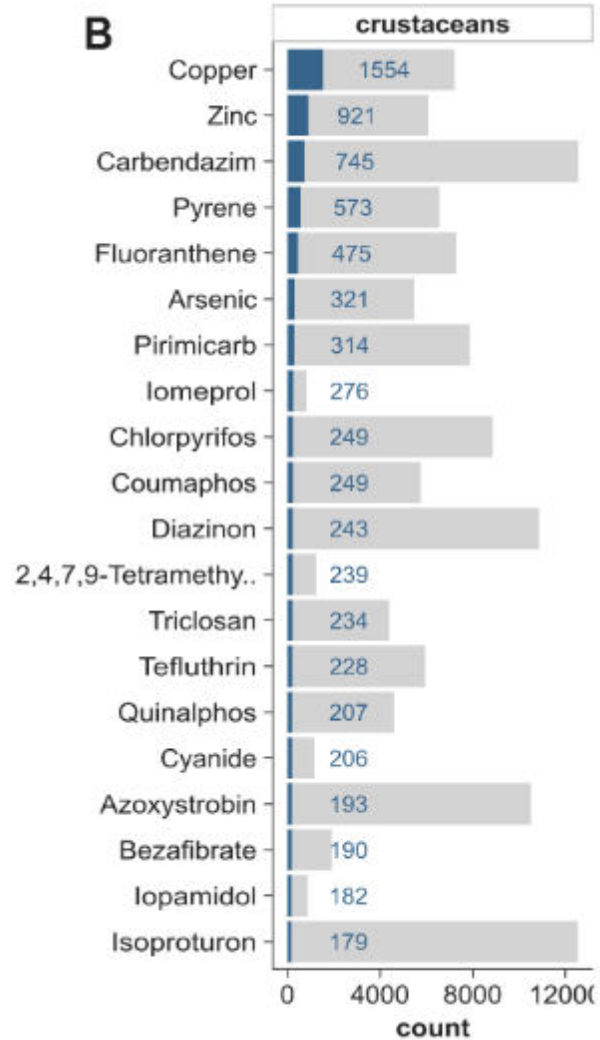
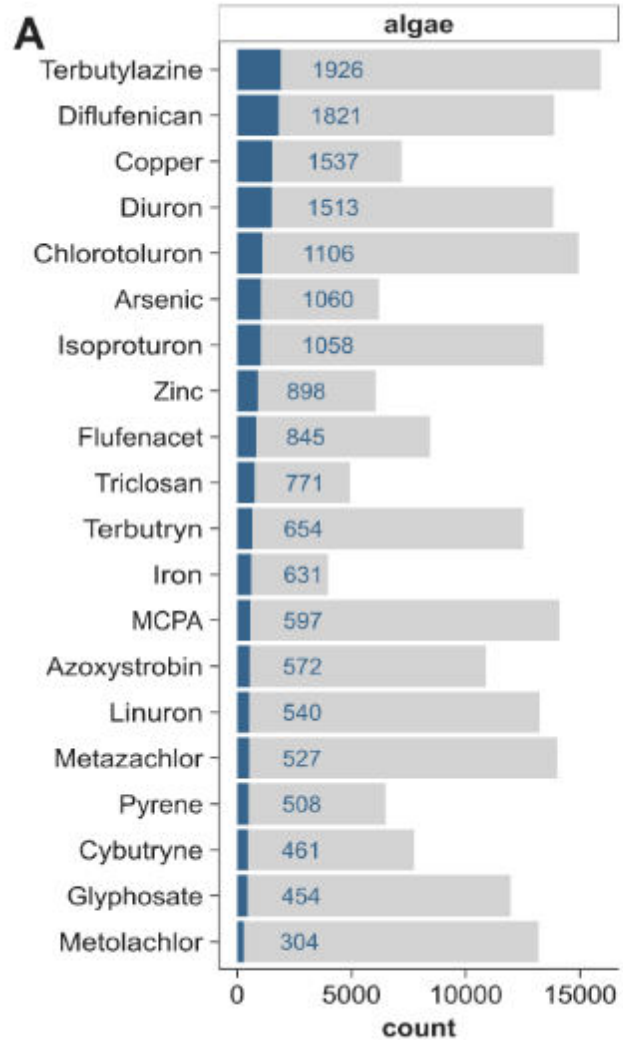
Combined risks to the aquatic ecosystem and human health

Human health risks data

Remediation vs prevention (source reduction)

Point of no return?





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Relative importance
0.25
0.50
0.75

use group
IndustrialChemical_Pesticide
FoodAdditive_Pharmaceutical
FoodAdditive_Natural
FoodAdditive_IndustrialChemical_Pharmaceutica
Natural_Pharmaceutical
IndustrialChemical_Pharmaceutical
FoodAdditive
Biocide_IndustrialChemical_Pesticide
Natural
FoodAdditive_IndustrialChemical
Biocide_IndustrialChemical
Biocide_Pesticide
IndustrialChemical



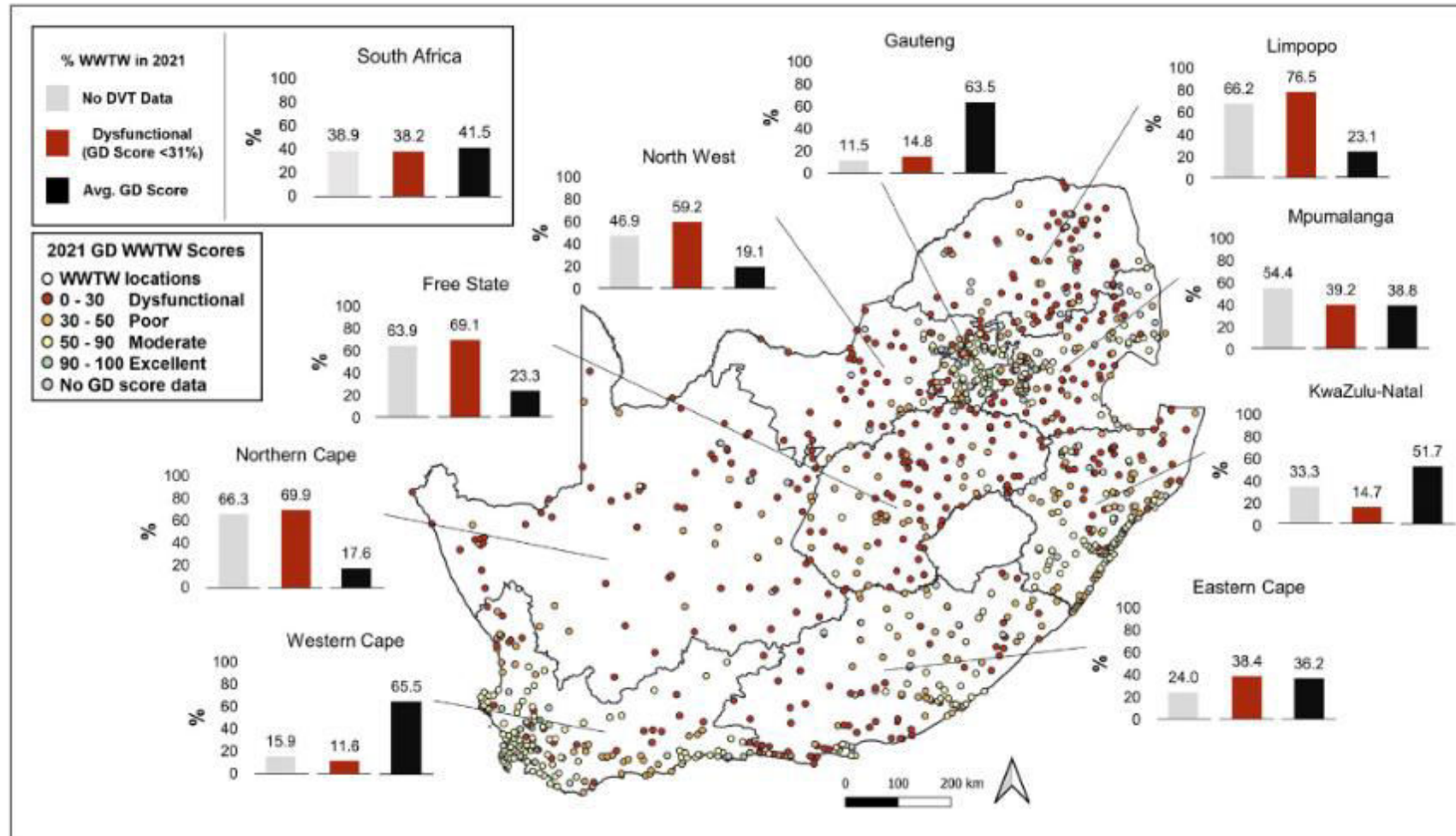
Schor et al. 2025 (<https://doi.org/10.1016/j.envint.2025.109881>)

Contextualisation

1. Wastewater Problem



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Graham *et al.* 2025 (doi:10.17159/wsa/2025.v51.i2.4152)



Contextualisation

2. Solid waste problem



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'Closing the Tap'

Actualization of the Integrated Water Quality Management (IWQM) Policy

Alignment of governance with the Department of Water & Sanitation (DWS), National

Water Resource Infrastructure Agency (NWRIA), Catchment Management Agencies (CMA) charter

Integration of the National Water Act (NWA) and the National Environmental Management Act (NEMA)

Infrastructure investment and governance improvement of wastewater treatment networks

Integration of informal waste pickers into the post-consumer waste management network

Strengthening the capacity for recycling and extended producer responsibility (EPR) schemes

Infrastructure and capacity building for monitoring, data centralization, and data management



The Constitution (1996)

Section 24 (Environment):
to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that— (i) prevent pollution and ecological degradation;
(ii) promote conservation; and
(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development

White Paper on National Water Policy (1997)

Principle 7:
The objective of managing the quantity, quality and reliability of the Nation's water resources is to achieve optimum, long term, environmentally sustainable social and economic benefits for society from their use

The National Water Act (NWA) (1998)

NWA (Act No. 36 of 1998) ensures that water resources are used, developed, conserved, managed, and controlled in ways that take into account, amongst other factors:
(i) protecting aquatic and associated ecosystems and their biological diversity
(ii) reducing and preventing pollution and degradation of water resources

Mine Water Management Policy (2022)

Objectives of the policy include:
(i) Provision of measures for protection of water resources from prospective, operational, and abandoned mines;
(ii) Promotion of mine closure that engenders sustainable societal and environmental benefits, with an emphasis on mine water management

National Water Resources Strategy (NWRS) III (2023)

NWRS II, 2023, aims to ensure the protection and management of water resources to enable equitable and sustainable access to water and sanitation services in support of socio-economic growth and development, and sustained ecosystem functioning

Integrated Water Quality Management (IWQM) Policy (2025)

IWQM Policy's objectives include:
(i) Aligning with legislation and relevant overarching policies and providing resolution on matters not adequately addressed in the existing Policy.
(ii) Guiding further development of legislative and regulatory instruments and appropriate measures to manage water quality

Monitoring, Compliance, performance & risk regulation

Blue Drop, Green Drop, No Drop Programme
National Integrated Water Information System (NIWIS)
National Water Monitoring Plan, 2021
Annual State of the Water Reports

"...poor co-ordination, silo planning and conflicting approaches within the spheres of government, which have, indeed hindered the effective management of water quality"
-Penny Majidina
Minister, Department of Water & Sanitation (DWS) (RSA)





'Closing the Tap'

Large-scale monitoring network

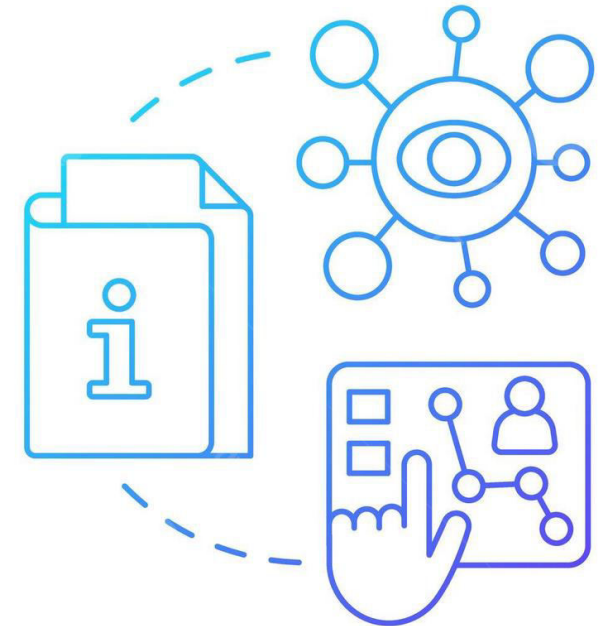
Method harmonization for data comparability

Centralisation of all CECs data → exposure, ecotoxicity, risk

Identification of pollutant hotspots for mitigation and/or remediation

Capacity development and pipeline generation for environmental risk assessment practitioners

Consumer education, environmental awareness, and stakeholder engagement



Conclusions, Acknowledgements, References



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- A different approach is required for developing countries for CECs' risk management
- Governance is central to risk management
 - Collaboration among academia, science, policy makers, and local government
- Science needs to be sped up → training a new generation of scientists and environmentalists
- Pairing of the 'science' with citizen science



UNTERSTÜTZT VON / SUPPORTED BY

Alexander von
HUMBOLDT
STIFTUNG

Graham, P.M. et al. 2025. The state of wastewater management in South Africa: data gaps, missing wastewater, and Green Drop reporting. *Water SA*, 51(2): 78 - 79

Schor, J. et al. 2025. Chemical mixture risk drivers and their heterogeneity in European freshwaters. *Environment International*, 205: 109881

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Thank you!

mbuyiselwa.moloi@ufz.de
www.ufz.de
Mbuyiselwa Moloi (LinkedIn)

www.worldwatercongress.com