Antibiotikaresistenz in der aquatischen Umwelt und dessen Bedeutung für Beregnungswasser (Water Reuse)

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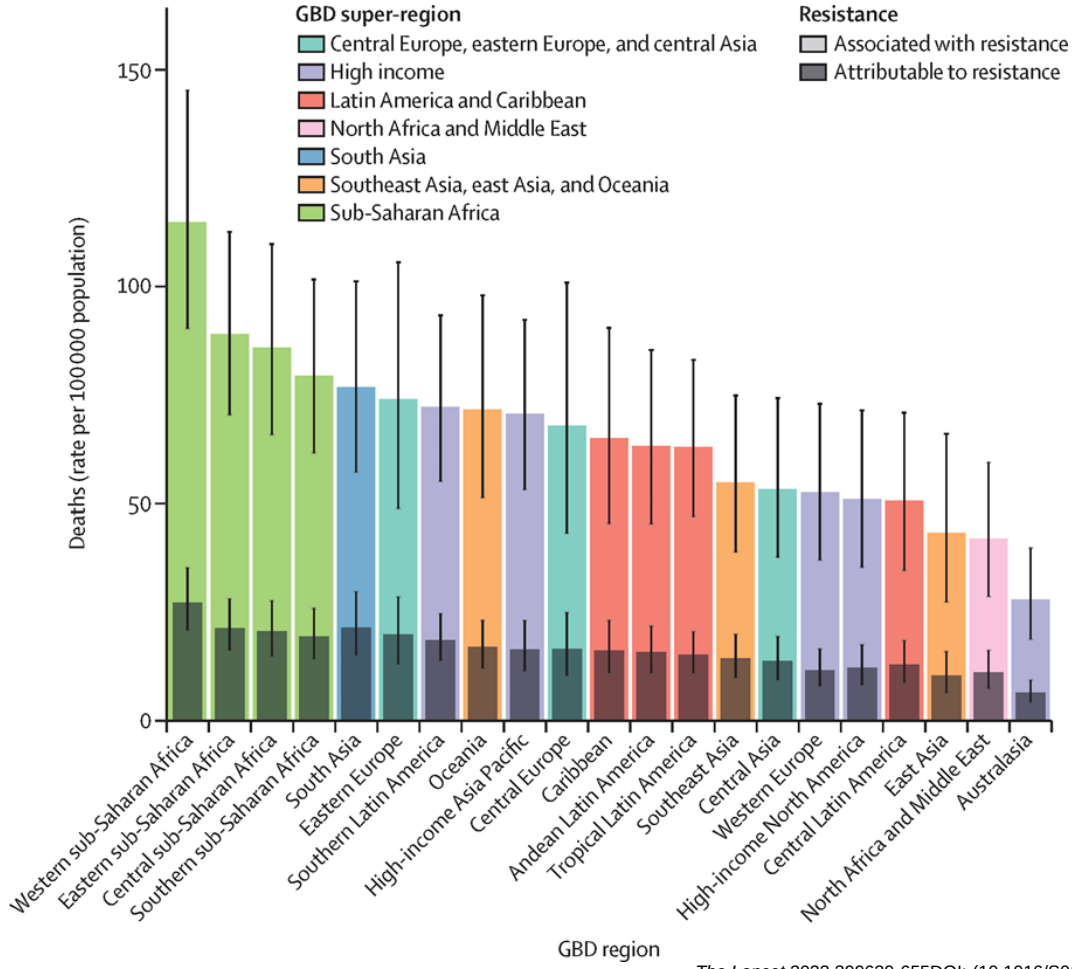
Antimicrobial Resistance – „The silent Pandemic“

- 1.27 Mio. (deaths directly related to antibiotic resistance)



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Article

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Genomic analysis of sewage from 101 countries reveals global landscape of antimicrobial resistance

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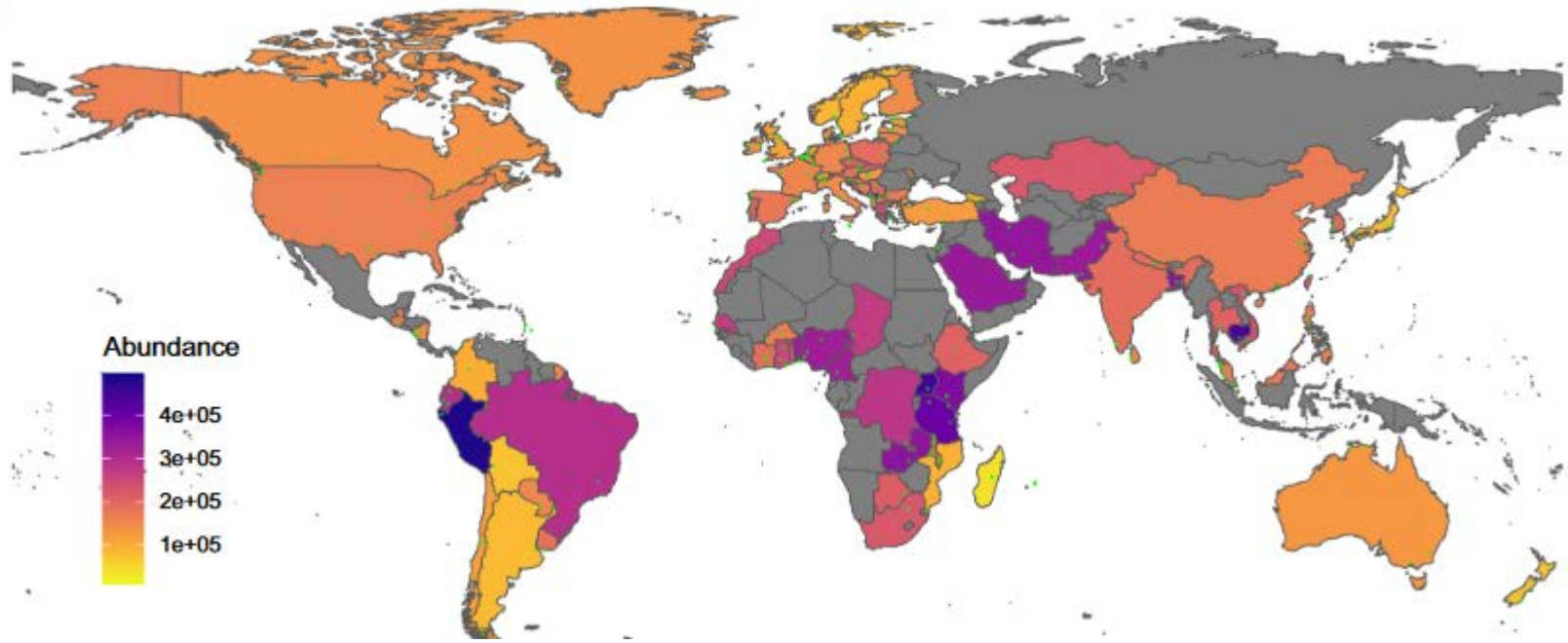
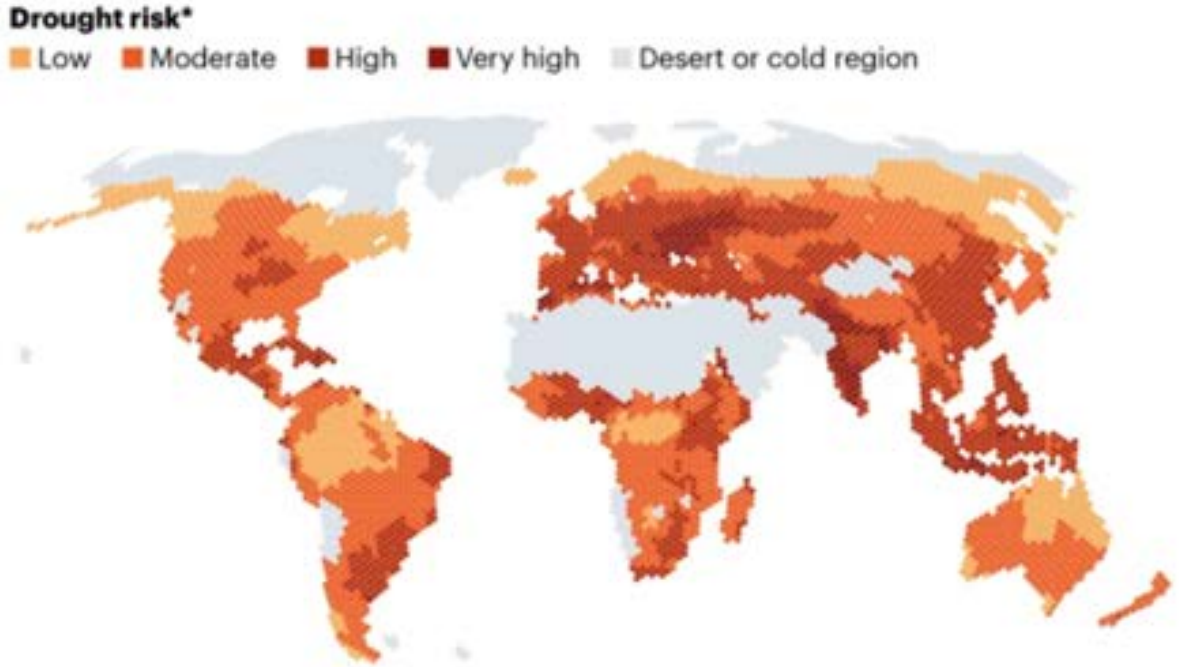


SCORCHED EARTH

Large parts of the world are at high or very high risk of drought, with most drought-related deaths occurring in Africa. The UN estimates that some 43,000 people might have died in Somalia last year because of a lack of rainfall.



*Drought risk is based on data on drought hazard, vulnerability and exposure between 1901 and 2010. The index is scored on a scale of 0 (lowest risk) to 1 (highest risk).

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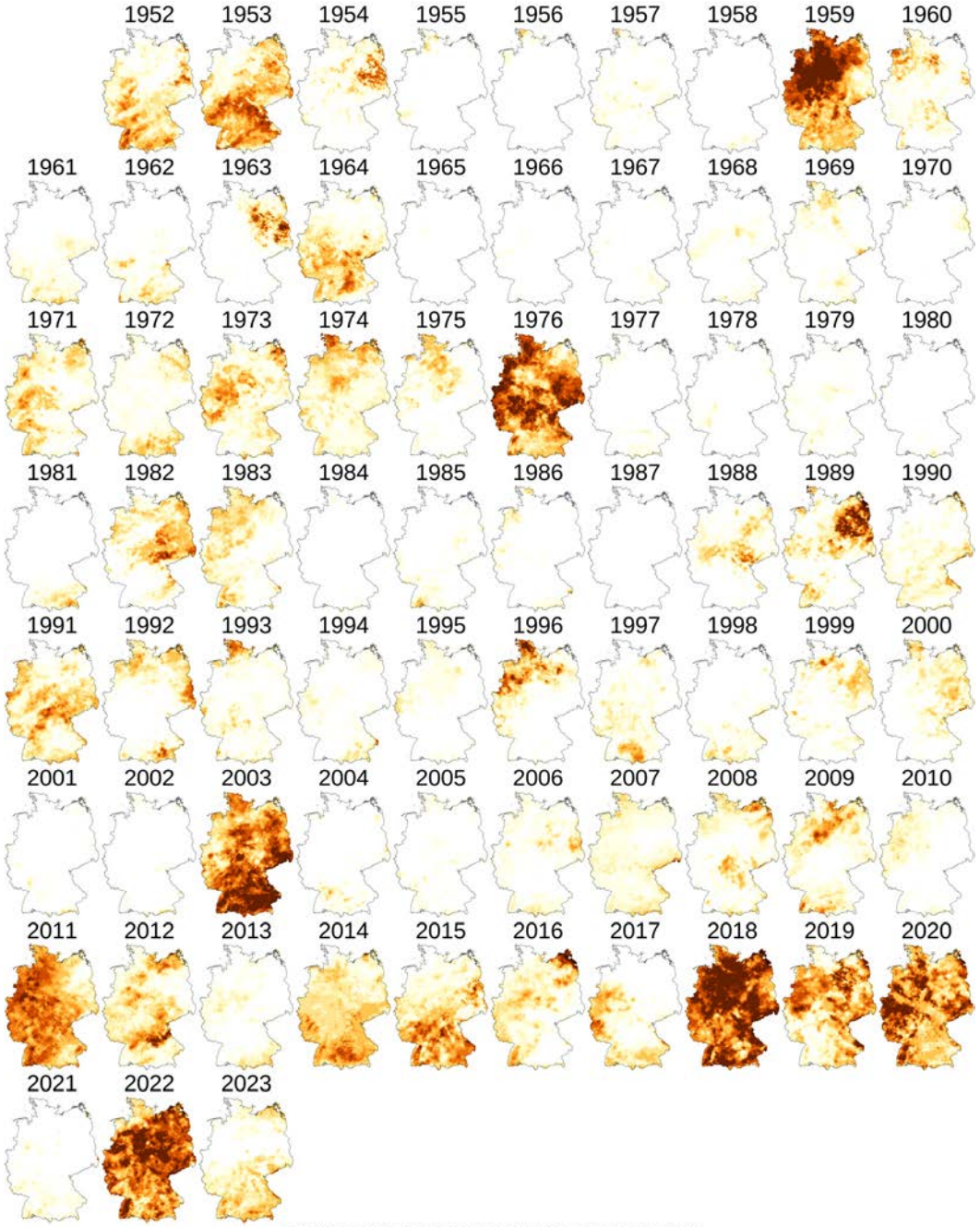
22 March 2023



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(Ab)wasserwiederverwendung

- Direkte Abwasserwiederverwendung

Next phase of recycled water begins for California

State advances nation-leading proposed regulations to convert wastewater to high-quality drinking water

July 11, 2023 **Contact:** Blair Robertson – Information Officer

(Ab)wasserwiederverwendung

- Direkte Abwasserwiederverwendung

As a response to increasing evidence that there is less rain in many parts of Europe, the Union is now equipped with a new piece of legislation that will make the use of treated wastewater to irrigate crops safe, transparent and accessible to farmers: the Regulation on minimum requirements for water reuse for agricultural irrigation (the Water Reuse Regulation (Regulation (EU)2020/741)).

This new Regulation requires that urban wastewater, which has already been treated in accordance with the Urban Wastewater Treatment Directive (UWWTD), is further treated to meet the minimum quality standards of the Regulation to be suitable for agricultural use.

https://suwanu-europe.eu/water-reuse-europe-webinar/

(Ab)wasserwiederverwendung

- Indirekte Abwasserwiederverwendung

Contents lists available at ScienceDirect

Applied Geochemistry

journal homepage: www.elsevier.com/locate/apgeochem

Anthropogenic gadolinium as a microcontaminant in tap water used as drinking water in urban areas and megacities

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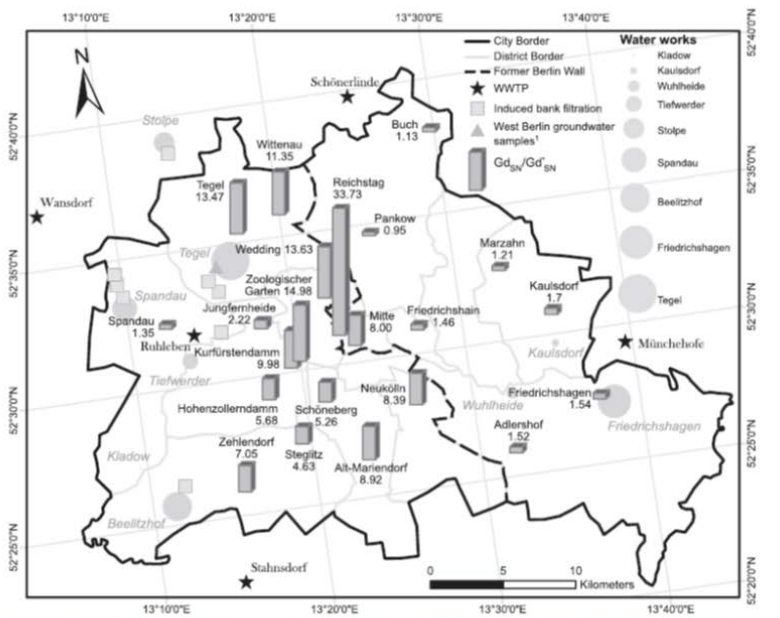
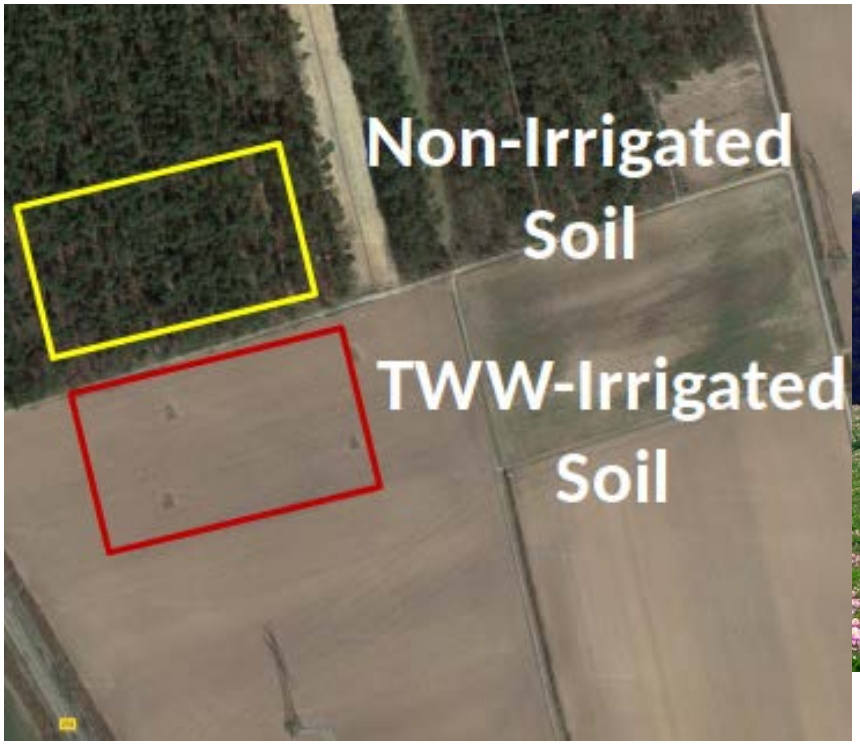


Fig. 6. Map of the City of Berlin, Germany, with the tap water sampling sites indicated by bars proportional to the size of the Gd anomaly in the respective sample. The locations of water works are shown as light-gray circles with sizes proportional to the respective production volume. Light-gray squares indicate zones where surface water is used for induced bank filtration. The dashed line represents the former location of the Berlin Wall. Note that the presence of anthropogenic Gd in tap water is confined to the western districts of Berlin. Sample location for *Reichstag* is just west of the former border.

Fallstudie Wasserwiederverwendung

Hat eine Verregnung mit gereinigtem Abwasser Langzeit Effekte ?



https://www.lwk-niedersachsen.de/lwk/news/39063_Einstieg_in_die_Bewaesserung_-_was_ist_zu_beachten

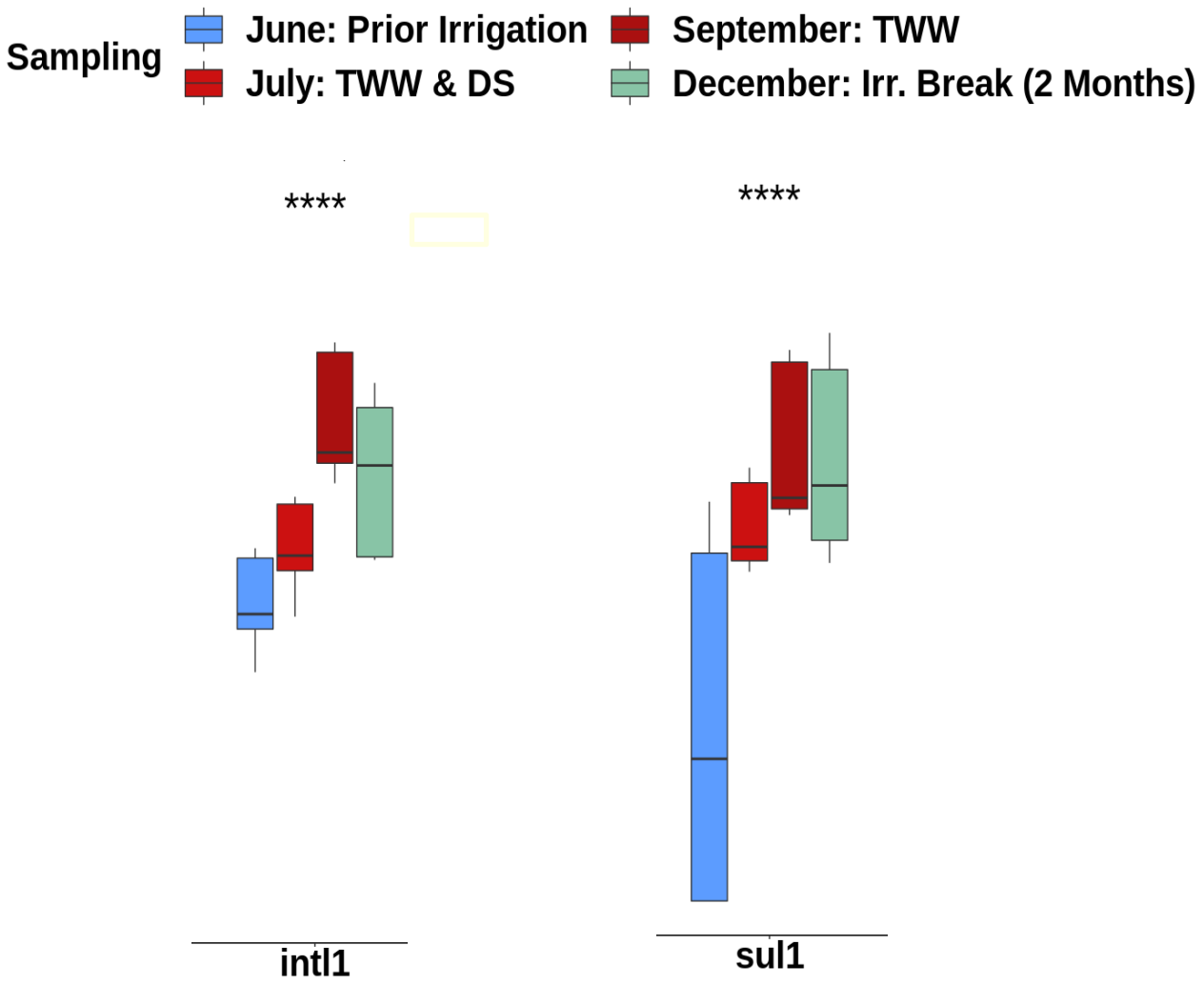
Grundwasserbeprobung

DATE	JUNE 2018	JULY 2018	SEP. 2018	DEC. 2018
IRRIG.	NO-IR.	HIGH-IN.	HIGH-IN.	NO-IR.

- Sampling after a long irrigation break
- Sampling during High Irrigation Intensity
- Sampling 2 months after irrigation break

HIGH-IN.= High Intensity Irrigation, LOW-IN.= Low Intensity Irrigation,
MO-IN.=Moderate Intensity, Irrigation NO-IR.= Irrigation Break

Berregnung mit gereinigtem Abwasser führt zu einer Erhöhung des Resistenzgens *sul1* und des *int1* gens.



TWW: treated wastewater, DS: Digested Sludge

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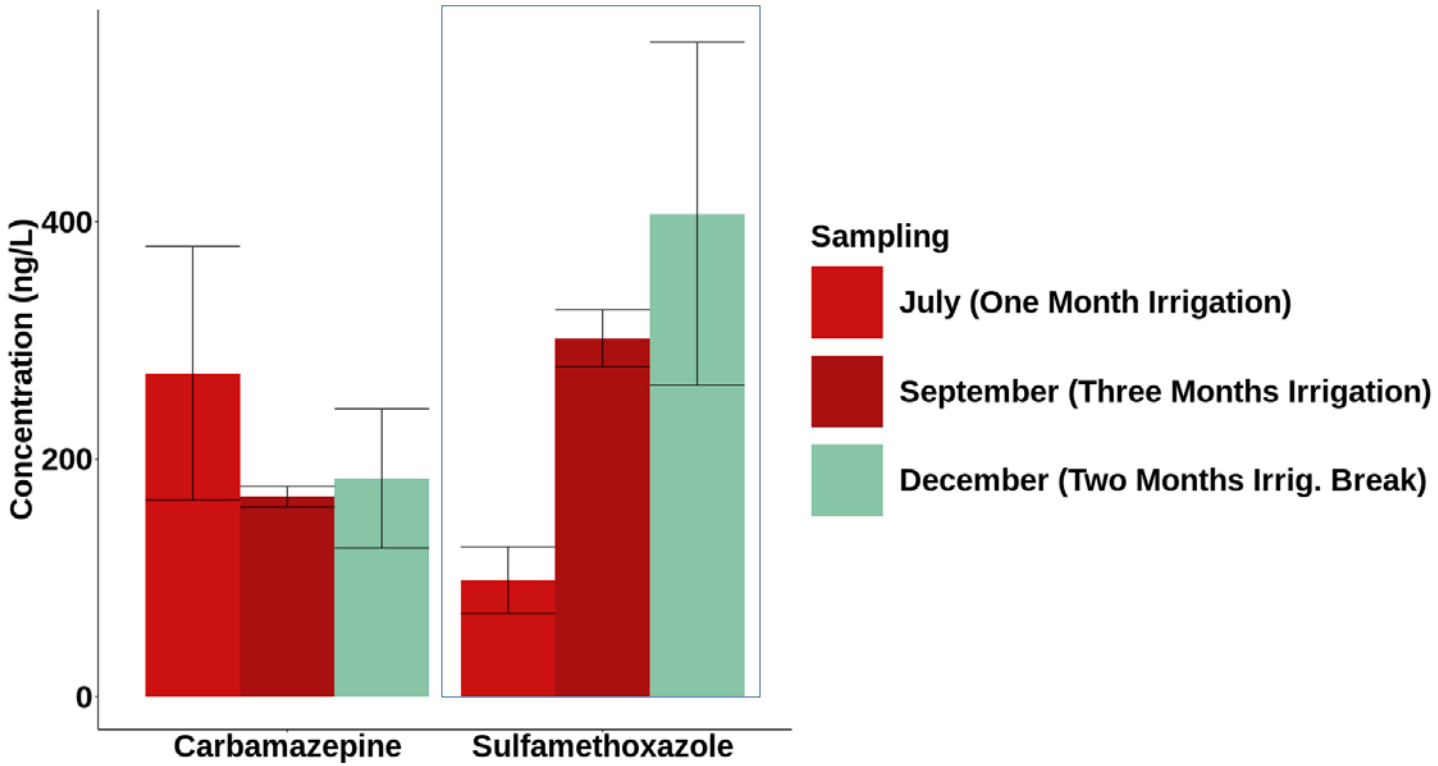
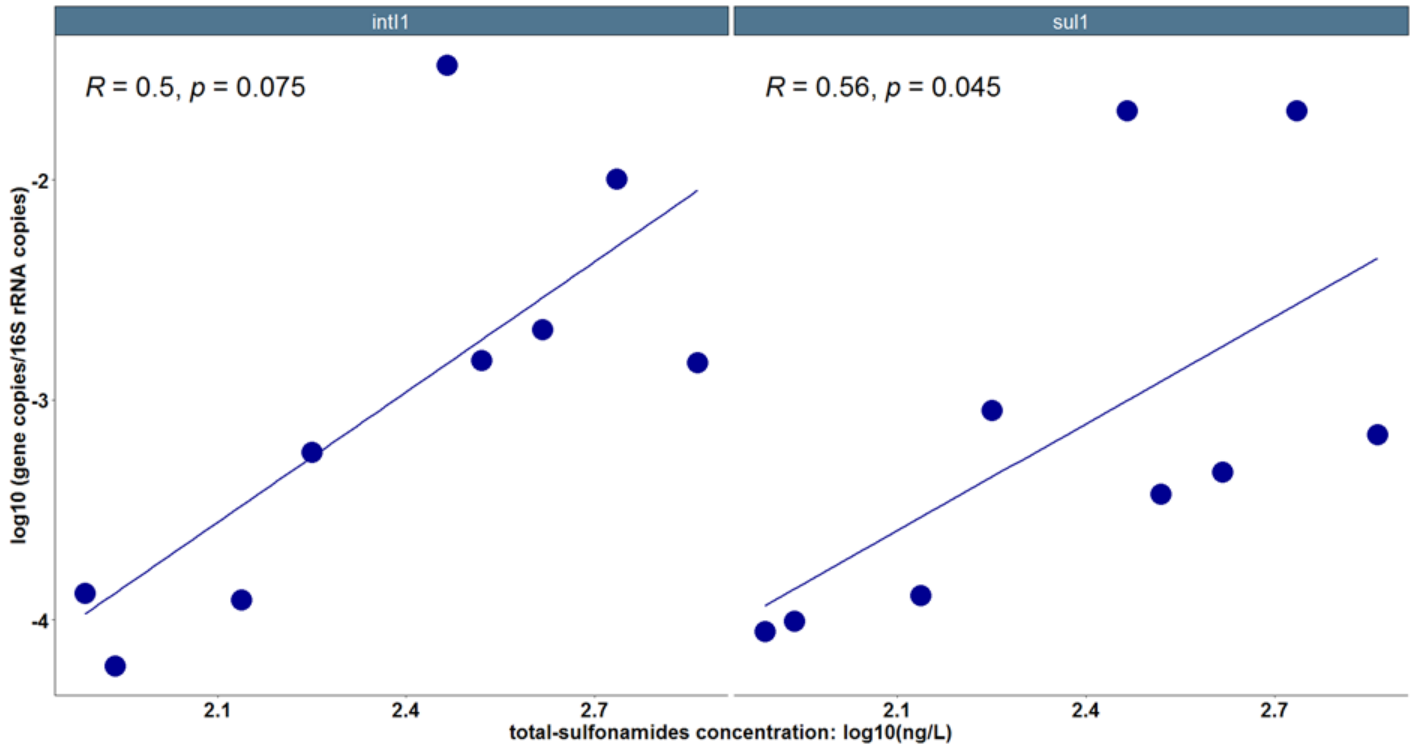
Sulfonamide reichern sich im Grundwasser an



***sul1* confers resistance to sultonamides**

Kampouris et al. 2022 (JHAZMAT)

Die Zunahme der Gene sul1 & intI1 correliert mit der Zunahme der Sulfonamides



Kendall Correlation, n=9

Kampouris et al. 2022 (JHAZMAT)

Facing the challenge of contaminants of emerging concern (incl. pathogens and AMR)

- Daten für die Reinigungseffizienz im Betrieb befindlicher Anlagen, basierend auf unterschiedlichen Technologien ist anektotisch und schwer zu Erfassen.

  ⇨ Kompilierung der verfügbaren publizierten Fallstudien in eine einfach zugängliche Datenbank

  ⇨ Mit web- interface, um sich einfach und schnell einen Überblick über die Effizienz unterschiedlicher Abwasserbehandlungstechnologien zu verschaffen.

Database on Removal efficiency

DSWAP

DSWAP Removal Efficiency Data

limno-live.hydro.tu-dresden.de/dkneis/prototypes/dswap/

DSWAP Removal Efficiency Database

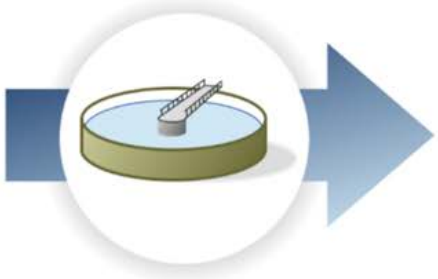
Start page | High-level summaries | Tabular views | SQL mode | Impressum | Legal aspects

This is the web interface to the database of removal efficiencies observed in wastewater treatment. It represents the knowledge reported in the scientific literature as of 2022 with regard to selected chemical or biological contaminants and treatment technologies.

The unit of values reported differs between chemical contaminants (e.g. antibiotics or other drugs) and biological items (such as genetic markers). The values are computed from concentrations (or loads) in a treatment module's input (C_{in}) and output (C_{out}) as follows:

Contaminant group	Reported value	Unit	Definition
Chemical	Percentage removal efficiency	%	$PRE = (C_{in} - C_{out}) / C_{in} * 100$
Biological	Log removal value	-	$LRV = log_{10}(C_{in} / C_{out})$

Use the navigation tabs at the top of the page to check the different functions of this web interface. For security reasons, the provided features differ between an online installation of this app (server mode) and local installations.



SCAN ME

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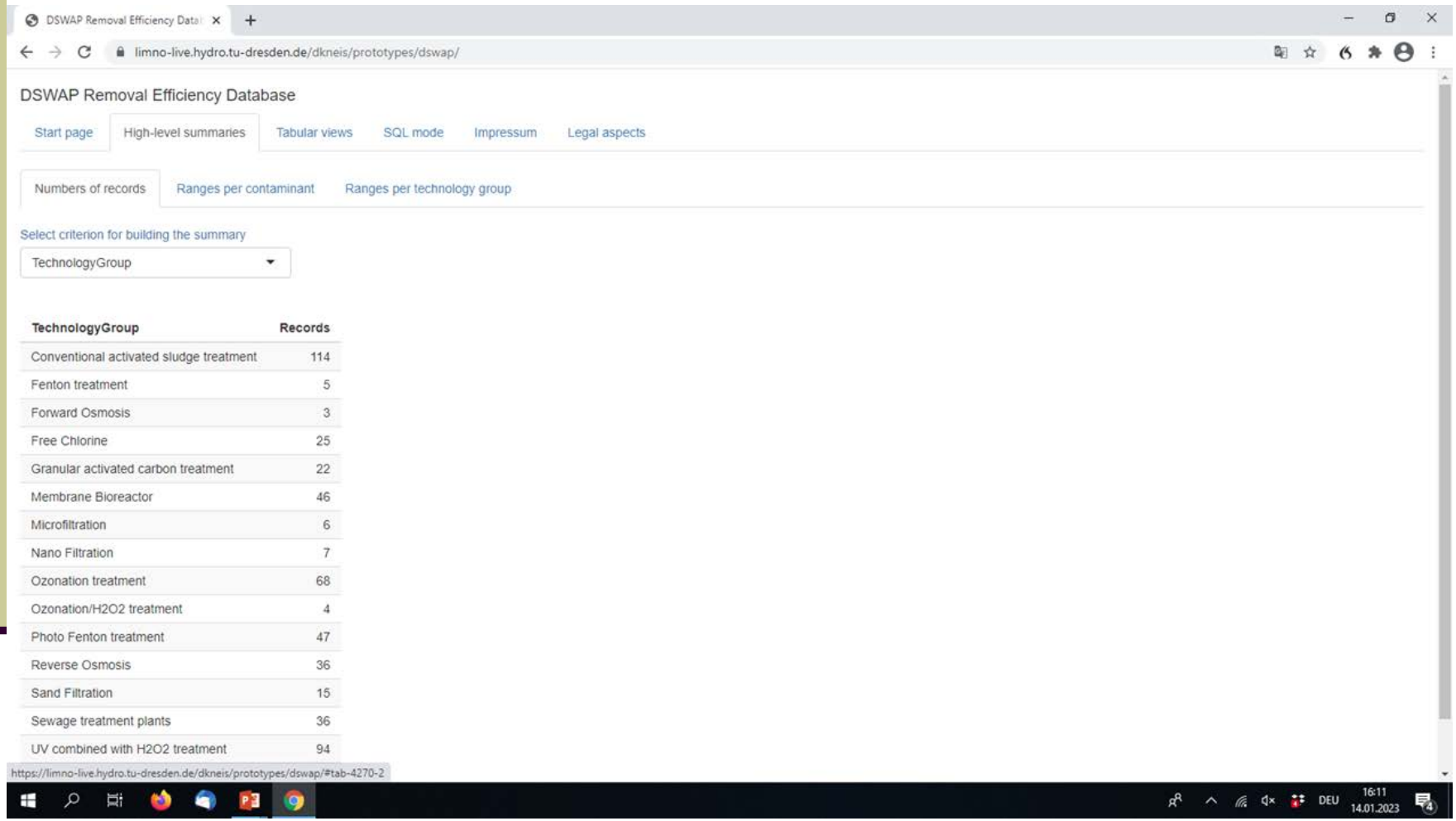
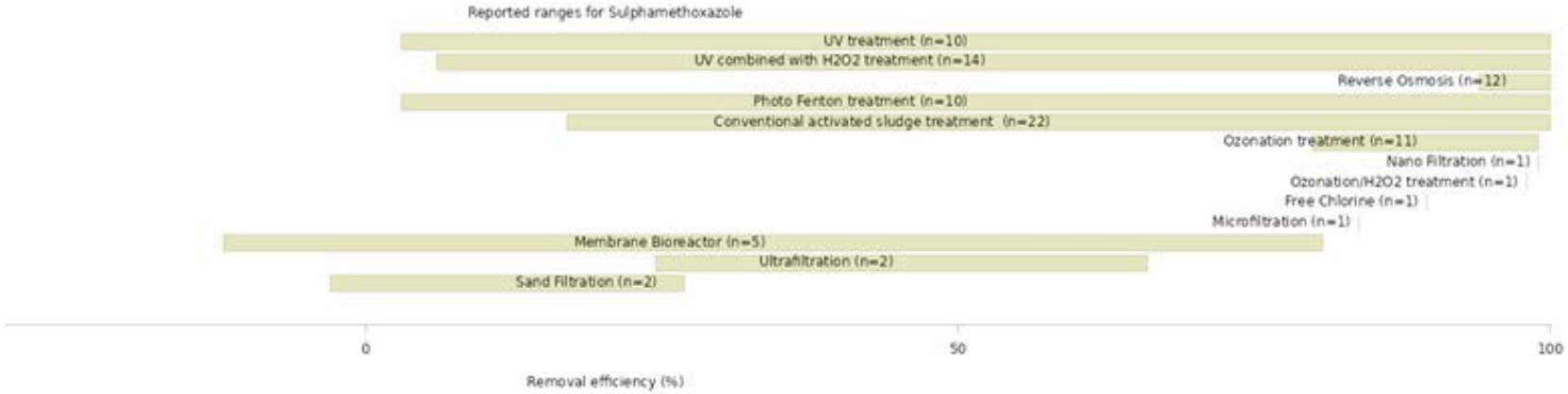
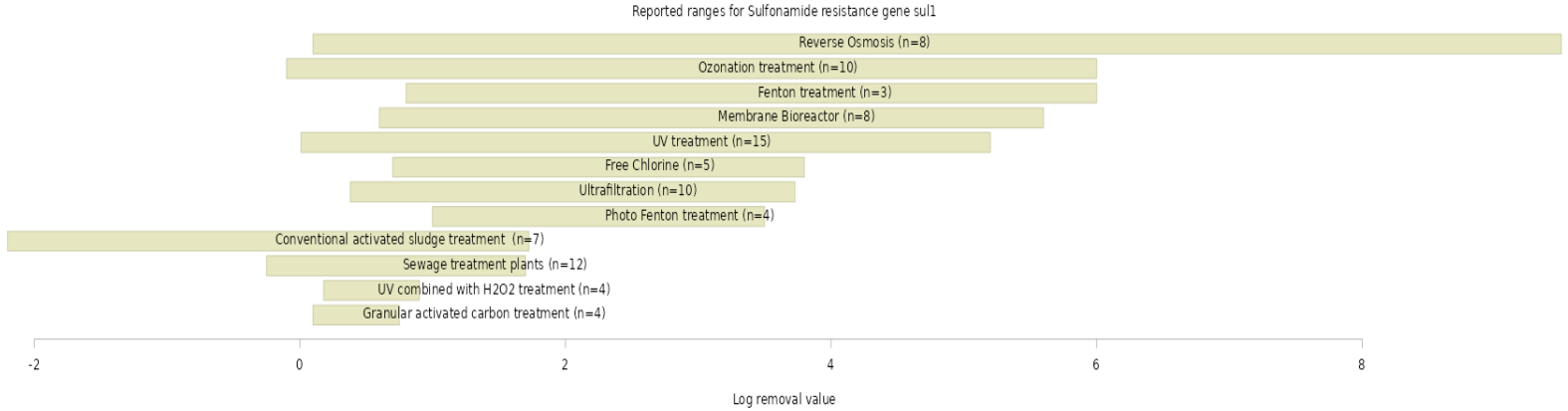
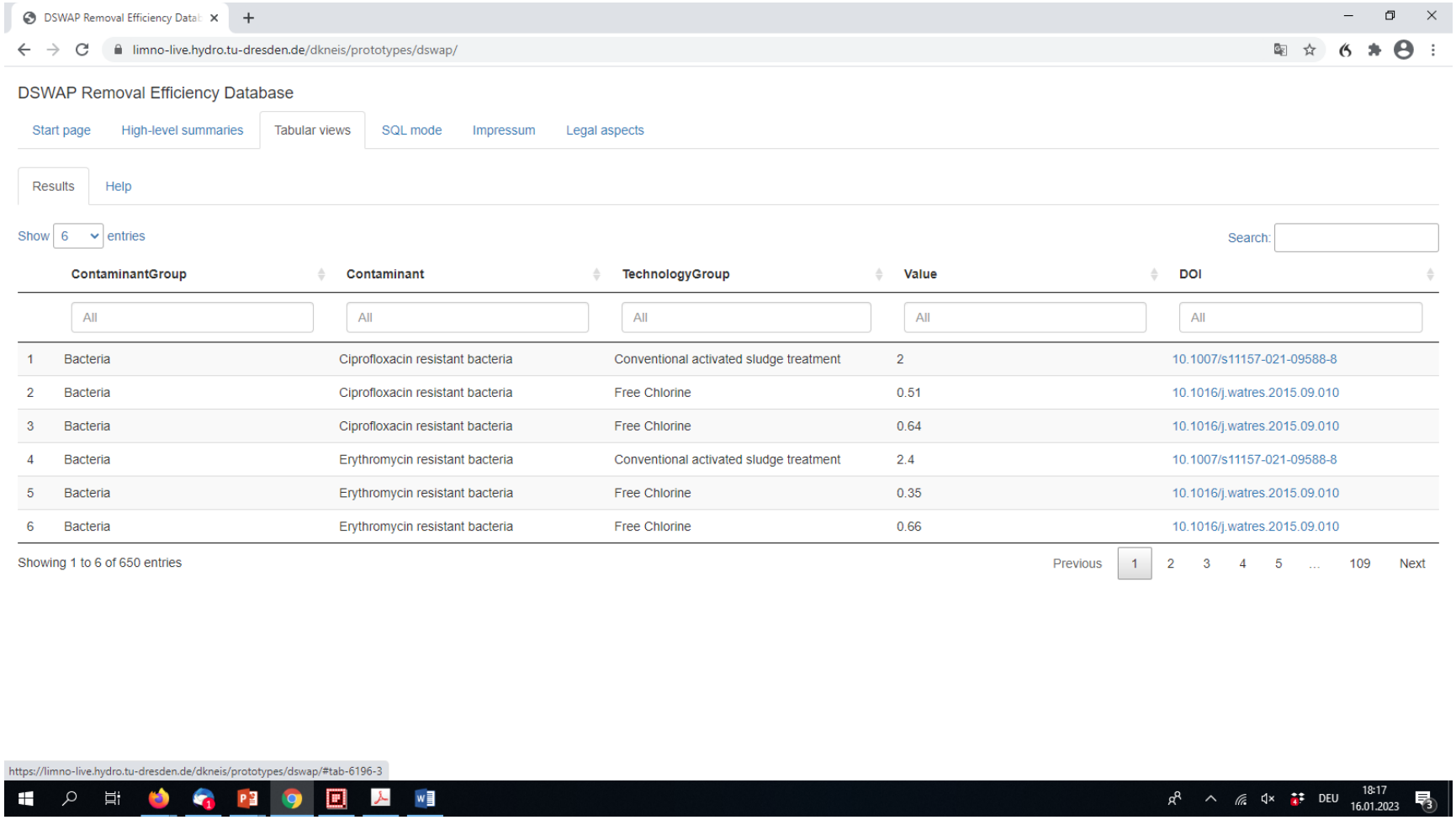


TechnologyGroup	Records
Conventional activated sludge treatment	114
Fenton treatment	5
Forward Osmosis	3
Free Chlorine	25
Granular activated carbon treatment	22
Membrane Bioreactor	46
Microfiltration	6
Nano Filtration	7
Ozonation treatment	68
Ozonation/H2O2 treatment	4
Photo Fenton treatment	47
Reverse Osmosis	36
Sand Filtration	15
Sewage treatment plants	36
UV combined with H2O2 treatment	94

Beispiel für Sulphamethoxazol und Sul1






DSWAP Removal Efficiency Datal
limno-live.hydro.tu-dresden.de/dkneis/prototypes/dswap/
DSWAP Removal Efficiency Database
Start page
High-level summaries
Tabular views
SQL mode
Impressum
Legal aspects
Results
Help
Show 6 entries
Search:
ContaminantGroup
Contaminant
TechnologyGroup
Value
DOI
All
1 Bacteria Ciprofloxacin resistant bacteria Conventional activated sludge treatment 2 10.1007/s11157-021-09588-8
2 Bacteria Ciprofloxacin resistant bacteria Free Chlorine 0.51 10.1016/j.watres.2015.09.010
3 Bacteria Ciprofloxacin resistant bacteria Free Chlorine 0.64 10.1016/j.watres.2015.09.010
4 Bacteria Erythromycin resistant bacteria Conventional activated sludge treatment 2.4 10.1007/s11157-021-09588-8
5 Bacteria Erythromycin resistant bacteria Free Chlorine 0.35 10.1016/j.watres.2015.09.010
6 Bacteria Erythromycin resistant bacteria Free Chlorine 0.66 10.1016/j.watres.2015.09.010
Showing 1 to 6 of 650 entries
Previous 1 2 3 4 5 … 109 Next
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PRIMA
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DSWAP

SCAN ME

ANTI VERSA
Bacterial diversity against AMR

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jpiamr

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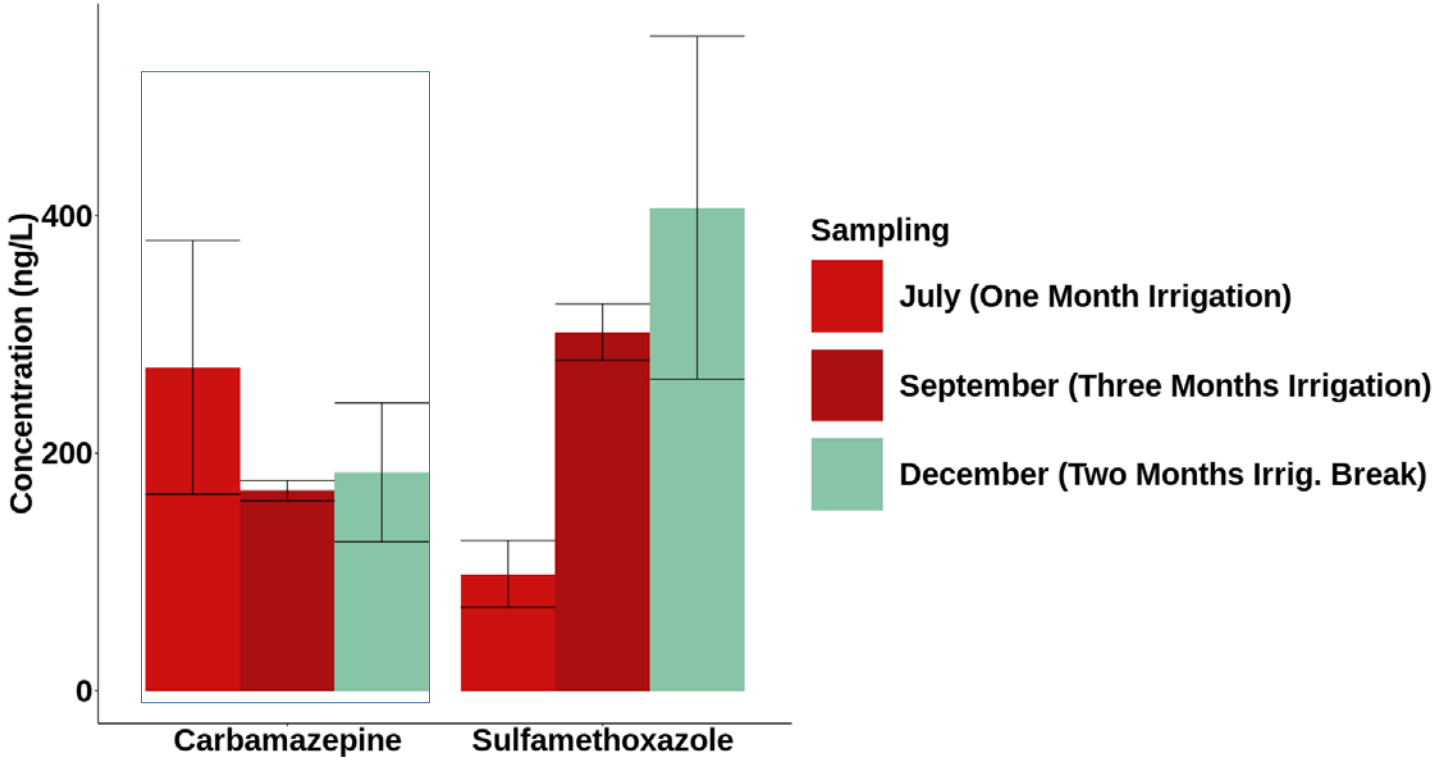
Dr. Nikolaos S. Thomaidis

Abwasserverband Braunschweig

The anti-convulsant drug carbamazepine was detected in high concentrati



Carbamazepine causes stress to bacteria and leads to higher HGT rates

FW: Freshwater, TWW: Treated Wastewater, SPW: Subsoil Pore Water

Kampouris et al. 2022 (JHAZMAT)