

Can bathing water quality (BWQ) be improved by floating macrophyte islands – a first trial to reduce *E. coli* loads

Bathing Water Quality (BWQ):

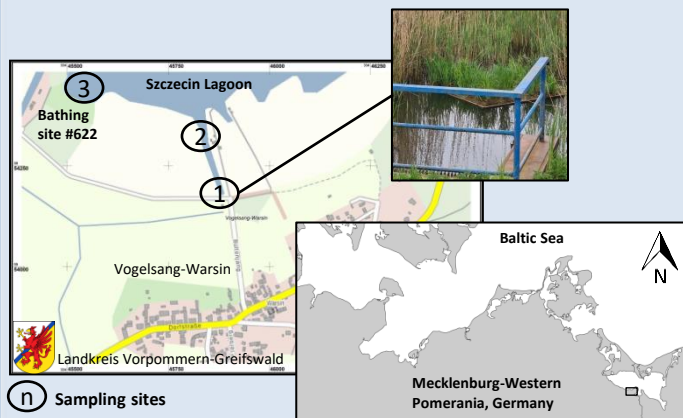
- *Escherichia coli* & Enterococci used as fecal indicators to evaluate BWQ within the EU (2006/7/EC)
- Inner coastal waters show a higher risk of microbial contamination ^[1]
- **Constructed wetlands** are a low cost treatment option and have been applied in various wastewaters (e.g.: domestic, municipal, agro-industrial, industrial, urban/agricultural runoff, sludge dewatering), where they can effectively remove pathogens up to 99 % ^[2]
- Removal of pathogens by different processes often acting in combination (Table 1)
- Combinations of different systems (hybrid constructed wetlands) are preferred as they take advantage of all potential pathogen removal mechanisms ^[2]

Removal mechanism	Process	Parameter
Physical	Sedimentation	System setup, substrate media
	Filtration	System setup, substrate media
	Oxidation	System setup, substrate media
Chemical	UV radiation by sunlight	System setup
	Exposure to plant biocides	Plant species
	Adsorption to organic matter	Wastewater characteristics
Biological	Predation activity	Microbial ecology
	Exposure to root exudates	Plant species
	Bioalytic processes	Microbial ecology
	Retention in biofilm	Microbial ecology
	Natural die-off	Hydraulic retention time

Table 1: Pathogens removal mechanisms in constructed wetlands after Alexandros & Akratos, 2016 ^[2]

Study site:

- Szczecin Lagoon: drainage channel in Vogelsang-Warsin, Germany near the bathing site #622



Study methods:

- **Floating macrophyte island (4m²)** was installed in December 2020
- Microbial sampling at three sites started May 2021 simultaneously to the regular BWQ-monitoring (MPN method)



Plastic-free island made of thermowood and planted with *Carex acutiformis*, *Carex acuta*, *Lythrum salicaria* and *Iris pseudacorus*

Outlook – Results will ...

- help to localize the source of recurring microbial pollution
- identify the potential of floating wetlands to reduce microbial pollution *in situ*
- support municipalities to manage bathing water quality on a cost effective basis
- and hereby strengthen tourism in these rural areas



[1] Buer, A. L., Gyraite, G., Wegener, P., Lange, X., Katarzyte, M., Hauk, G., Schernewski, G. (2018). Long term development of Bathing Water Quality at the German Baltic coast: spatial patterns, problems and model simulations. Mar. Pollut. Bull. 135, 1055–1066. doi:10.1016/j.marpolbul.2018.08.048
[2] Alexandros, S. I., and Akratos, C. S. (2016). "Removal of Pathogenic Bacteria in Constructed Wetlands: Mechanisms and Efficiency," in Phytoremediation: Management of Environmental Contaminants, Volume 4, 327–346. doi:10.1007/978-3-319-41811-7