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Fecal contamination, antibiotic resistance and organic micropollutants in full-scale constructed wetlands in northern portugal rural areas

Posters on boards - shift 03:

Antimicrobials and antimicrobial resistance

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Citation

Teixeira, A.M.R., Matos, D., Coelho, N., Halwatura, L.M., Abaya, L.M., Vaz-Moreira, I., Castro, P.M.L., Aga, D.S., Manaia, C.M. Fecal contamination, antibiotic resistance and organic micropollutants in full-scale constructed wetlands in northern portugal rural areas.

Background and Aims

Constructed wetlands (CWs) are recognized as a promising alternative or complement to traditional wastewater treatments. Their cost-effectiveness and seamless integration into natural landscapes, fostering wildlife habitats, are notable advantages. This study aimed to assess the efficacy of three horizontal subsurface flow CWs with *Phragmites australis* for reducing fecal contamination, antibiotic resistance, and organic micropollutants (OMPs).

Methods

Influent, effluent, and sediments samples (n=36) collected throughout 2023 were examined for cultivable *Escherichia coli* and total coliforms, 10 biomarkers for anthropogenic contamination and 16S rRNA gene by qPCR, 119 OMPs by LC-HRMS, and 16S rRNA-based bacterial community analysis.

Results

The reduction in fecal contamination (log-units) was of <4.8 for *E. coli*, <4.0 for total coliforms, and <3.6 for genetic biomarkers. Target OMPs showed variable removal rates, with different substances persisting after treatment (e.g. acetaminophen, fenofibric acid, irbesartan, oxazepam). The bacterial community was dominated by *Pseudomonadota* (>40%), and treatment

led to the reduction of *Bacillota* and *Actinomycetota* and increase of the "*Halobacterota*" and *Verrumicrobiota* relative abundance.

Conclusions

The results reveal that the growth of macrophytes and climatic conditions, particularly temperature, influenced the treatment effectiveness, improved during summer. However, the capacity of the plants to uptake bacteria/genes from wastewater has been suggested and its meaning in pathogens ecology is being investigated. **Acknowledgements:** AMT acknowledges FCT PhD grant UI/BD/151388/2021 and FSE (Fundo Social Europeu), ARQUIMEDES doctoral cooperation protocol Águas do Norte & UCP, and AWARE project grant N°101084245.