



# Research Topics



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## Wastewater management

- Environmental and technical-economic analysis of alternative strategies for the management of wastewater treatment and collection services.
- *Water-Energy-Food security nexus* and biorefinery approaches applied to wastewater treatment plants (WWTPs) under the new Directive (EU) 2024/3019.



## Circular economy in wastewater treatment

- Investigation of innovative technologies for energy and fertilizer recovery combined with wastewater treatment.
- Development of sustainable treatment chains for the recovery and reuse of recycled products at full-scale plant.



## Treatment of emerging contaminants in (waste)water

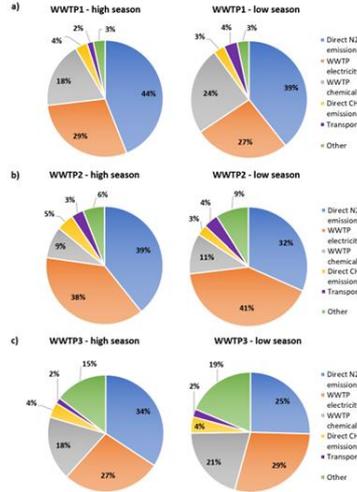
- Development of innovative remote monitoring systems for the detection of uncontrolled discharges in waterways.
- Experimental tests for the removal of contaminants of emerging concern (CEC) and non-biodegradable compounds by electrochemical and physical processes.



# Wastewater management – ongoing activities

## Main research goals and activities:

- Development of **integrated approaches** for wastewater planning, promoting **decarbonization** and **economies of scale**.
- Development of automated sewer design systems.
- Evaluating the best **centralization** level of WWTPs through decision support tools (**DST**).
- Modeling potential configurations for wastewater treatment coupled with **water, energy** and **fertilizer** recovery.
- Life cycle assessment (**LCA**) and life cycle costing (**LCC**) of alternative options.



Contents lists available at ScienceDirect

Journal of Cleaner Production

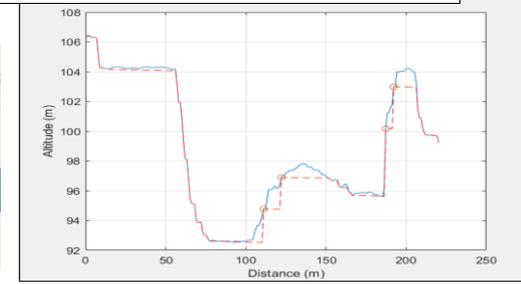
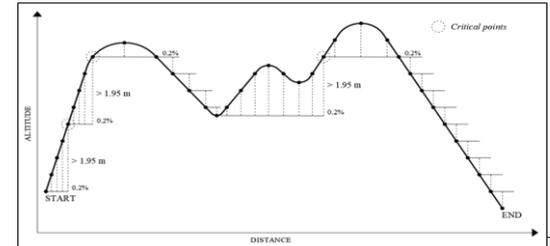
journal homepage: [www.elsevier.com/locate/jclepro](http://www.elsevier.com/locate/jclepro)



### Review

Planning the centralization level in wastewater collection and treatment: A review of assessment methods

Francesco Pasciucco, Isabella Pecorini, Renato Iannelli\*

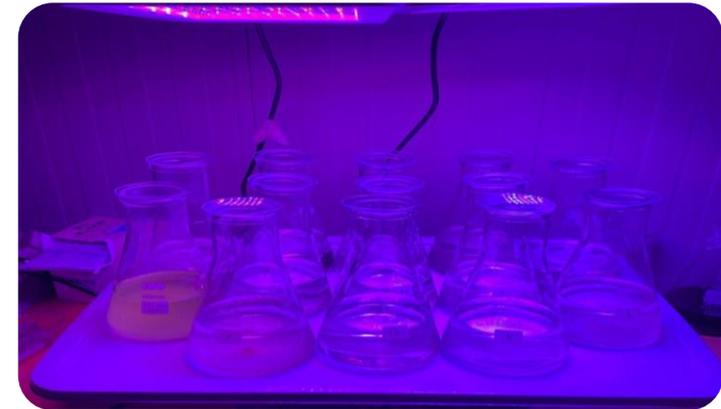
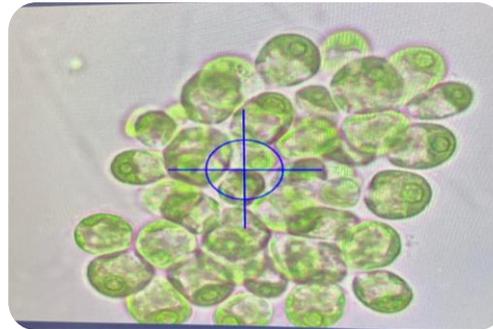
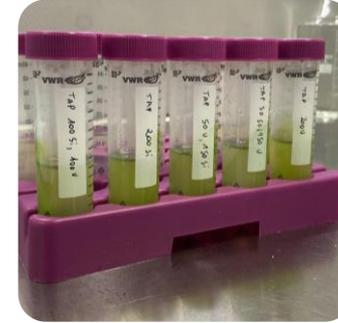




# Circular economy in wastewater treatment – ongoing research

## Main research goals and activities:

- Experimental tests on **microalgae-based technologies** for wastewater treatment and nutrient uptake.
- Using algal biomass for **nitrogen** and **phosphorus** recovery as agricultural fertilizers.
- Using algal biomass to increase **biofuels** and **energy** recovery in anaerobic digestion.
- Introduction of microalgae technology in WWTPs, promoting the reduction of **CO<sub>2</sub>** emissions.
- Life cycle assessment (**LCA**) and life cycle costing (**LCC**) of treatment chains at full-scale plant.

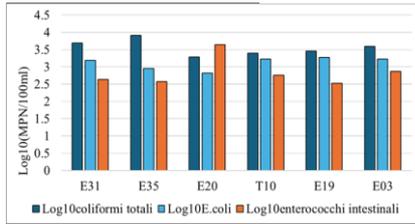
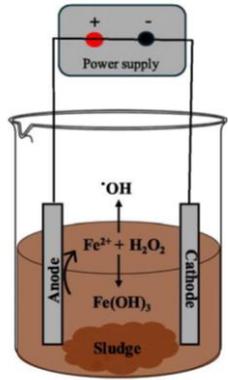




# Treatment of emerging contaminants in (waste)water – ongoing research

## Main research goals and activities:

- Development of an innovative remote monitoring system using unmanned aerial systems (UAS).
- Detection of uncontrolled discharges into waterways through infrared (IR) sensors.
- Removal of emerging contaminants (PFAS) and non-biodegradable compounds (recalcitrant COD) at source (WWTPs) through microalgae technologies, electrochemical advanced oxidation processes (EAOPs) and adsorption with granular activated carbon (GAC).



Contents lists available at ScienceDirect

Journal of Water Process Engineering

journal homepage: [www.elsevier.com/locate/jwpe](http://www.elsevier.com/locate/jwpe)



Potential applications of electrochemical advanced oxidation processes (EAOPs) as tertiary and quaternary wastewater treatments under the new Directive EU 2024/3019: A review

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In addition to his research activities, he is the **Project Manager** of **GRRInPort2 - Water, Waste and Sediment Management to Reduce Pollution Outside Ports** - a project co-financed by the **Interreg Italy - France Maritime Programme 2021–2027**, created to address one of the most pressing environmental challenges in coastal areas: pollution caused by port activities and the river transport of waste and contaminants.



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