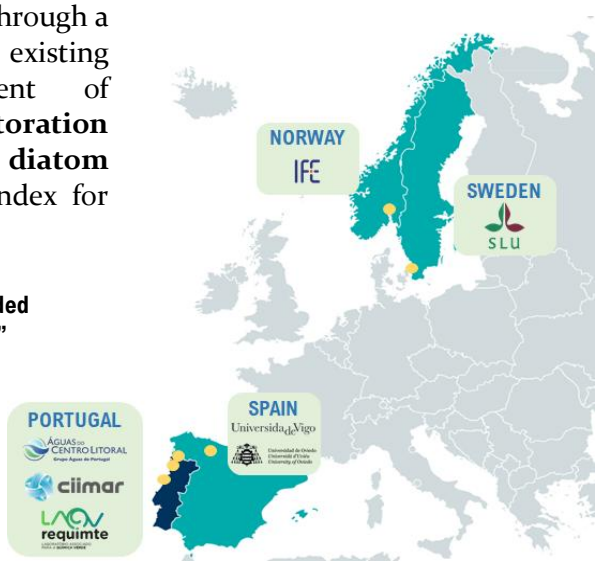
Newsletter 5

June 2025

Biodiversity restoration and conservation of inland water ecosystems for environmental and human well-being

BioReset promotes **ecosystem recovery and conservation** through a combined approach including cutting-edge advances in existing **wastewater treatment processes** and development of **methodologies to assess ecosystem conservation and restoration** provided by these treatments based on investigating **diatom communities**, laying the foundation for a global quality index for ecological status and ecosystem assessment.

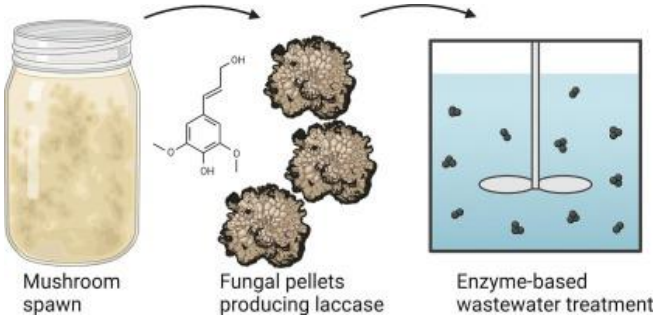


2020 – 2021 Joint COFUND Call on "Conservation and restoration of degraded ecosystems and their biodiversity, including a focus on aquatic systems"

Main results January 2025 – May 2025

Spawn-based pellets of *Pleurotus ostreatus* as an applied approach for the production of laccase in different types of water

J. Microbiol. Methods 2025, 229, 107092; https://doi.org/10.1016/j.mimet.2025.107092



In recent years, oxidoreductase enzymes such as laccases have received considerable attention for their ability to degrade and eliminate organic micropollutants from contaminated water in a process known as enzyme-based wastewater treatment. Thus, methods to produce high laccase activity in water are a point of focus, with white-rot fungi being highlighted as a tool in this context. This study, therefore, explored the applied approach of direct addition of mushroom spawn of the white-rot fungi Pleurotus ostreatus into water and its potential for laccase production under different conditions. Grain spawn was observed to be preferable to sawdust spawn, resulting in laccase activity of 53.9 ± 5.9 U/L and 4.8 ± 0.8 U/L, respectively. Laccase activity was induced by adding kraft lignin (4 g/L), and an eightfold increase to 446.3 ± 43.1 U/L was observed for grain spawn. Lignin accumulated in the spawn over time, resulting in brown pellets composed of spawn, mycelium and lignin. Our results demonstrated that high levels of laccase activity could be obtained in different types of water, including effluent municipal wastewater, using this method. No impact from the addition of inorganic nitrogen (ammonium nitrate, N-levels 14 mg/L, 140 mg/L) or organic nitrogen sources (urea, yeast extract, wheat bran, N-levels 14 mg/L, 140 mg/L) was observed for the treatment with grain spawn and lignin, suggesting that stable laccase activity can be expected under these nutritional conditions.

Occurrence of 97 Pharmaceuticals in Wastewater and Receiving Waters: Analytical Validation and Treatment Influence J. Xenobiot. 2025, 15(3), 78; https://doi.org/10.3390/jox15030078

This study analyzed 97 pharmaceuticals in samples of surface water, as well as influent and effluent from various wastewater treatment plants (WWTPs), during winter 2022 and spring 2023. Approximately 40% of the tested compounds were detected, at amounts ranging from below the methods' detection limits to 5623 ng/L (2-hydroxyibuprofen in surface water) and 12,664 ng/L (caffeine in wastewater). Twelve compounds (acetaminophen, ampicillin, azithromycin, caffeine, fluoxetine, gemfibrozil, 2-hydroxyibuprofen, ibuprofen, ketoprofen, mazindol, naproxen, and salicylic acid) were detected with a 100% frequency in both surface water and wastewater samples. The observed high detection frequency of pharmaceuticals within the nonsteroidal anti-inflammatory drugs/analgesics, antibiotics, and psychiatric drug classes aligns with their high consumption. Caffeine was both the compound with the highest concentration and the most prevalent compound detected. Seasonal differences were observed, with higher concentrations detected during winter. Six of the eleven targeted metabolites and degradation products were detected in at least one sample. Risk quotient assessment revealed potential ecological risks, particularly for atorvastatin, caffeine, carbamazepine, and venlafaxine, exceeding risk thresholds for various trophic levels. The studied WWTPs showed limited removal efficiencies, with some compounds presenting higher concentrations in effluent than in influent, emphasizing the need for enhanced treatment to mitigate micropollutant risks.

News & Events

March - BioReset in another Spanish newspaper

The BioReset project was subject of a news item published in El Periódico Extremadura.


el Periódico

Una investigadora extremeña diseña una herramienta con minas de lápiz que detecta antidepresivos en aguas residuales

Son sustancias con efectos nocivos sobre la vida acuática y la salud humana, cada vez más elevadas, que es preciso detectar.

PUBLICIDAD

María Cerrato, autora del estudio, junto a sus compañeros. / CEDIDA

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