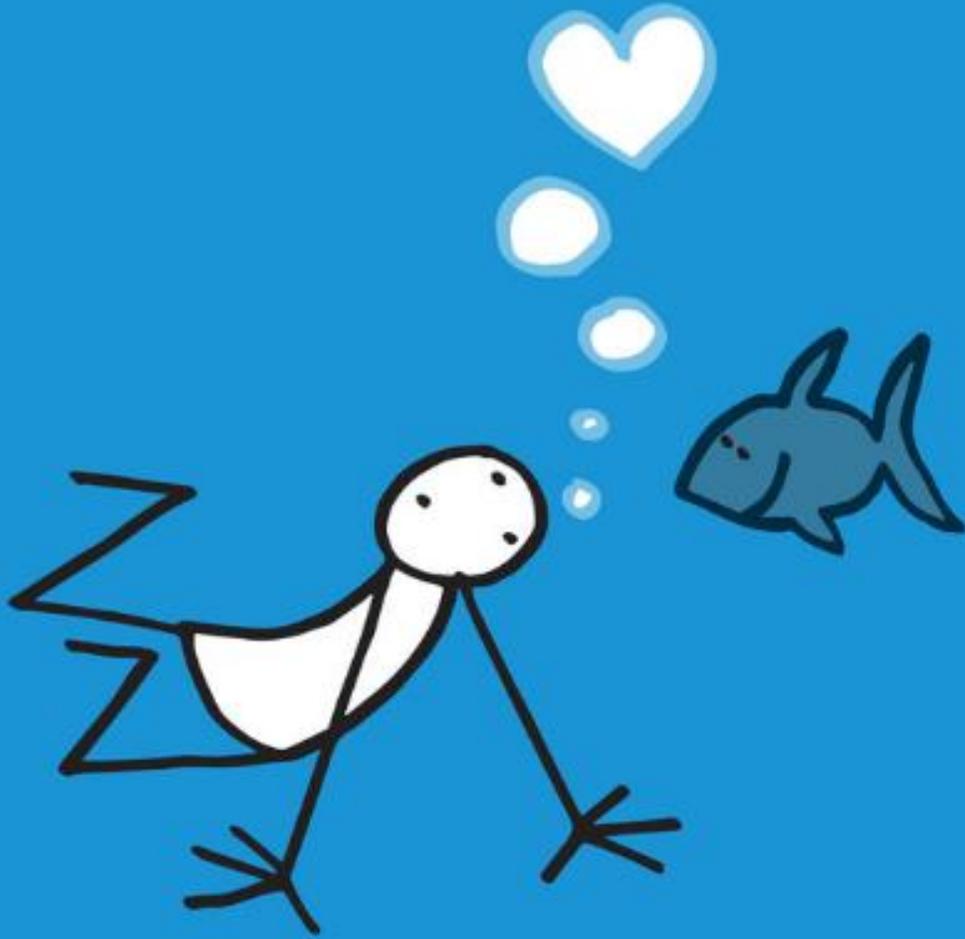


BIORREMEDIAÇÃO E FITORREMEDIAÇÃO: SOLUÇÕES BASEADAS NA NATUREZA PARA A REMOÇÃO DE MICROPOLUENTES

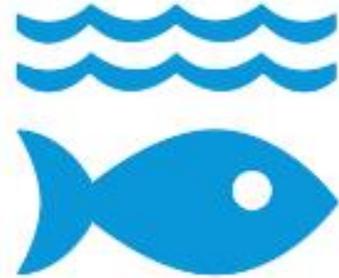
Ana Paula Mucha
CIIMAR / FCUP

O **CIIMAR** é uma instituição de investigação científica e de formação avançada da Universidade do Porto e tem como missão o desenvolvimento de investigação de excelência, a promoção do desenvolvimento tecnológico e o apoio a políticas públicas na área das Ciências Marinhas e Ambientais.





14 LIFE BELOW WATER



To conserve and sustainably use the world's oceans, seas and marine resources



ELYX 6/2016

6 CLEAN WATER AND SANITATION



To ensure access to safe water sources and sanitation for all





Making Peace with Nature

A scientific blueprint to tackle
the climate, biodiversity and
pollution emergencies

“Sem a ajuda da natureza, não seremos capazes de prosperar ou nem mesmo sobreviver. Por muito tempo, temos travado uma guerra sem sentido e suicida contra a natureza. O resultado são três crises ambientais interligadas. **Alterações climáticas, perda de biodiversidade e poluição**, que ameaçam a nossa viabilidade como espécie.”

“Este relatório mostra que temos a capacidade de transformar o nosso impacto no mundo. Uma economia sustentável impulsionada por **energias renováveis e soluções baseadas na natureza**, permitirá criar novos empregos, infraestruturas mais limpas e um futuro resiliente.”

António Guterres
Secretário-Geral das Nações Unidas
Fevereiro 2021



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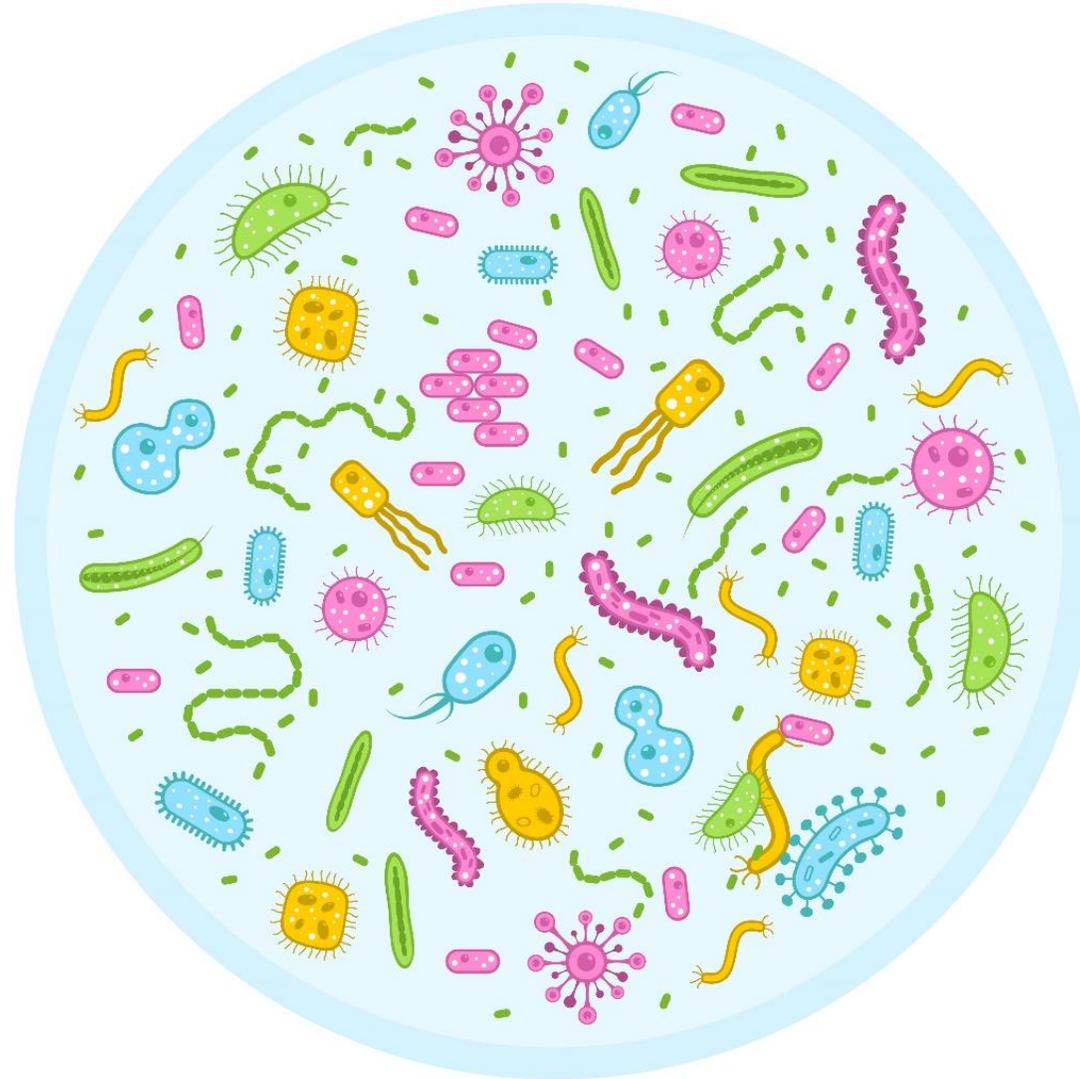
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Poluição

**Soluções baseadas
na natureza**

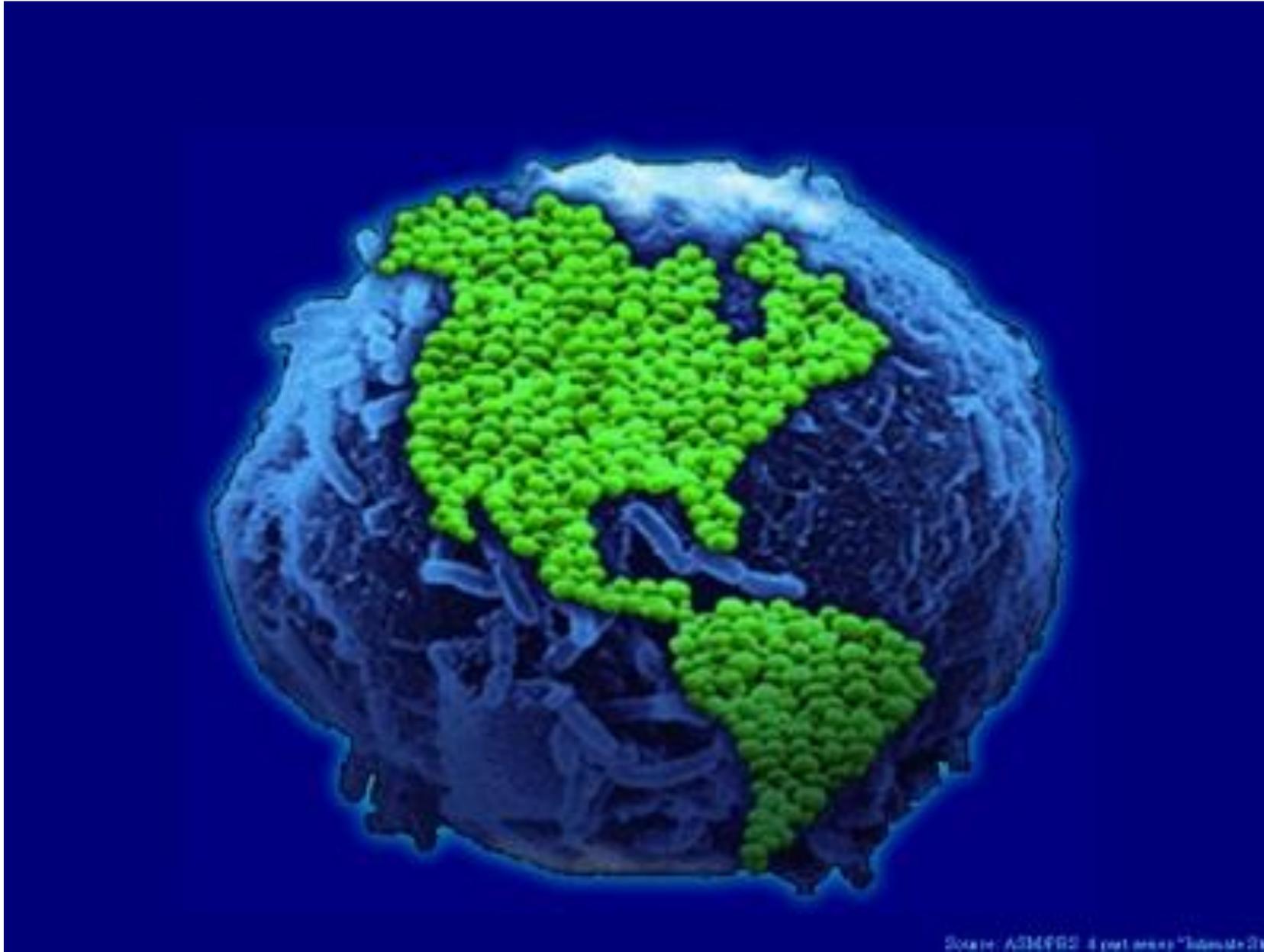
Poluição



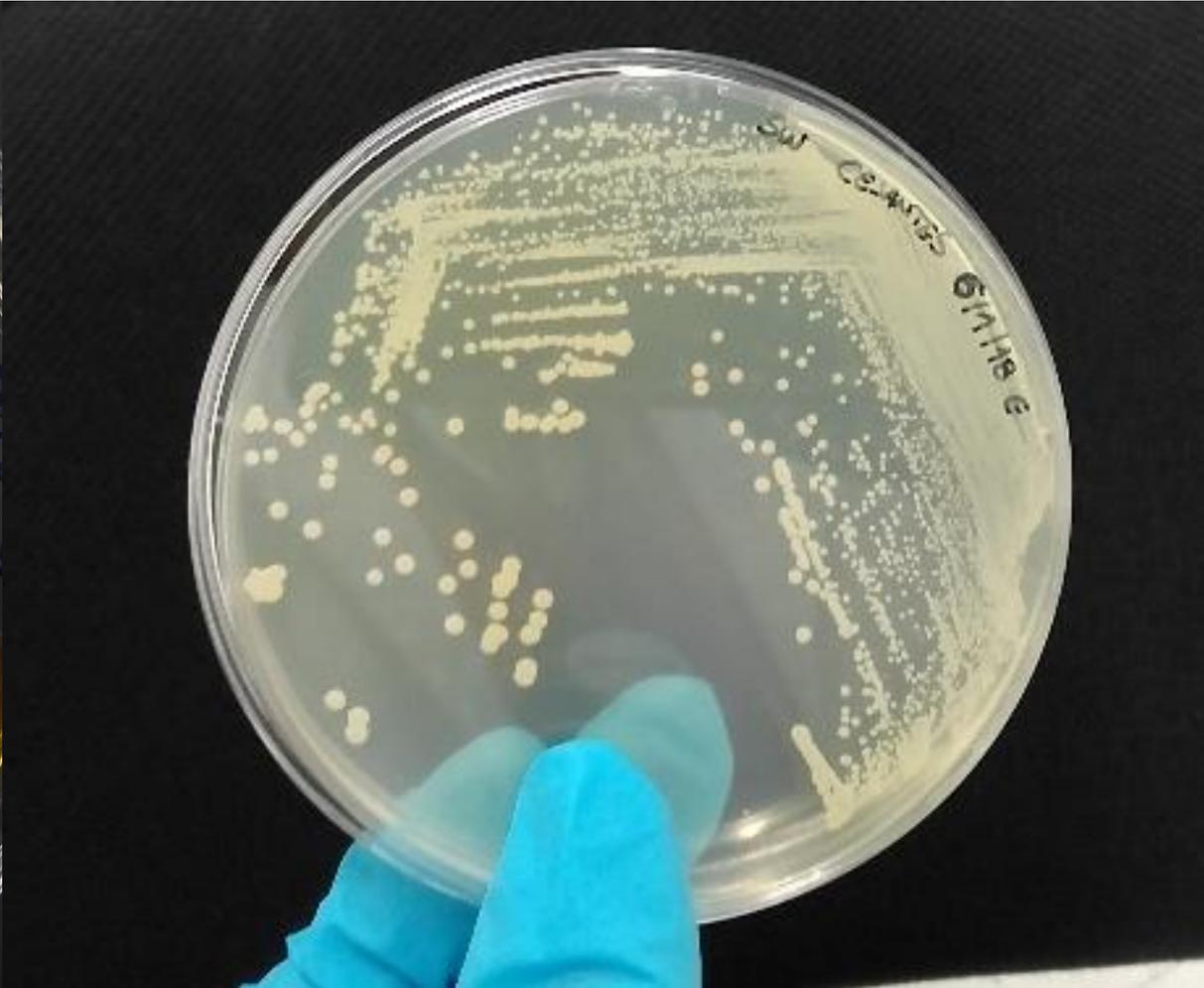
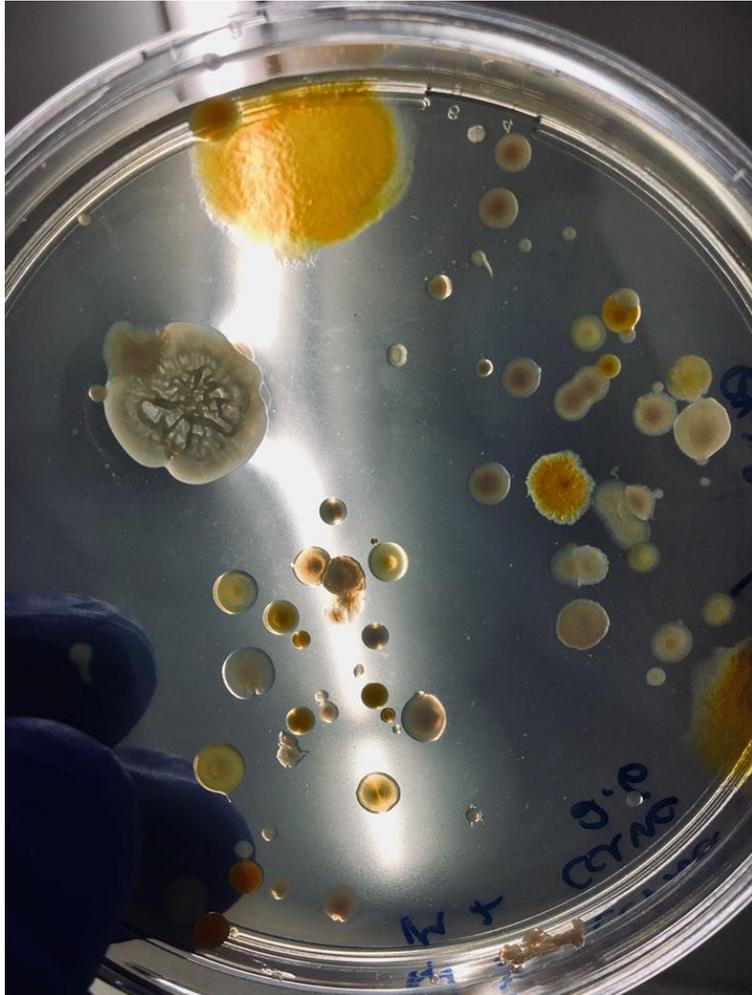
Soluções baseadas
na natureza

Microrganismos



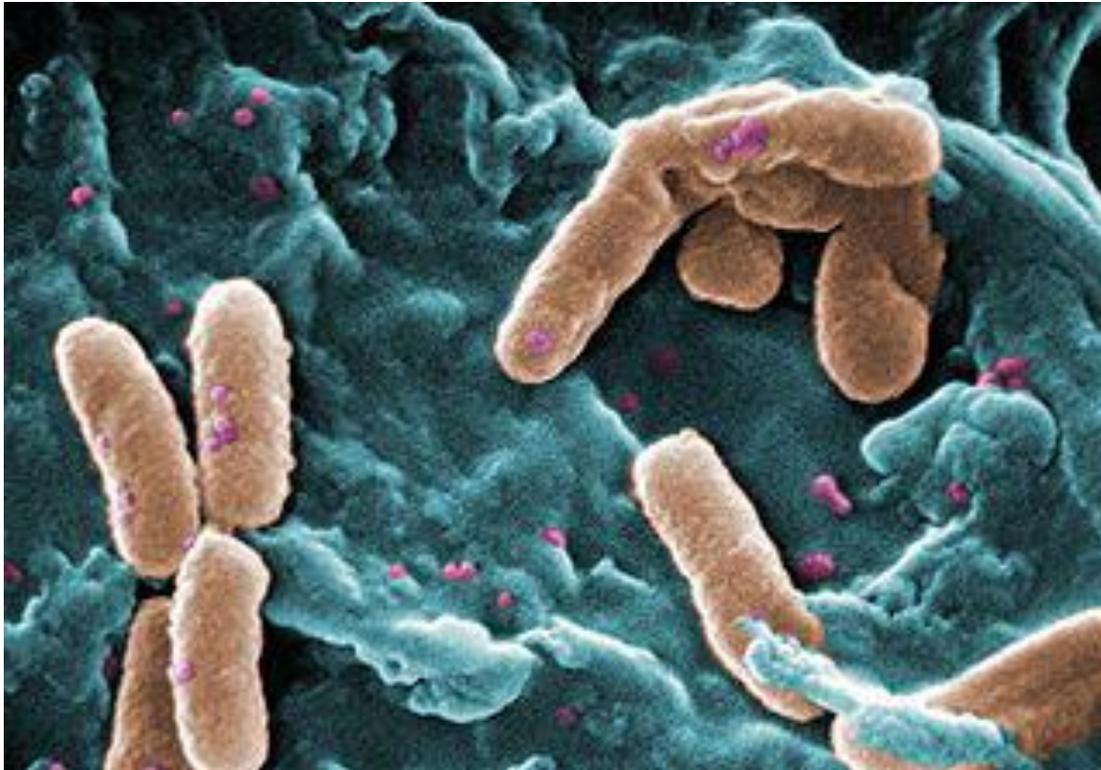






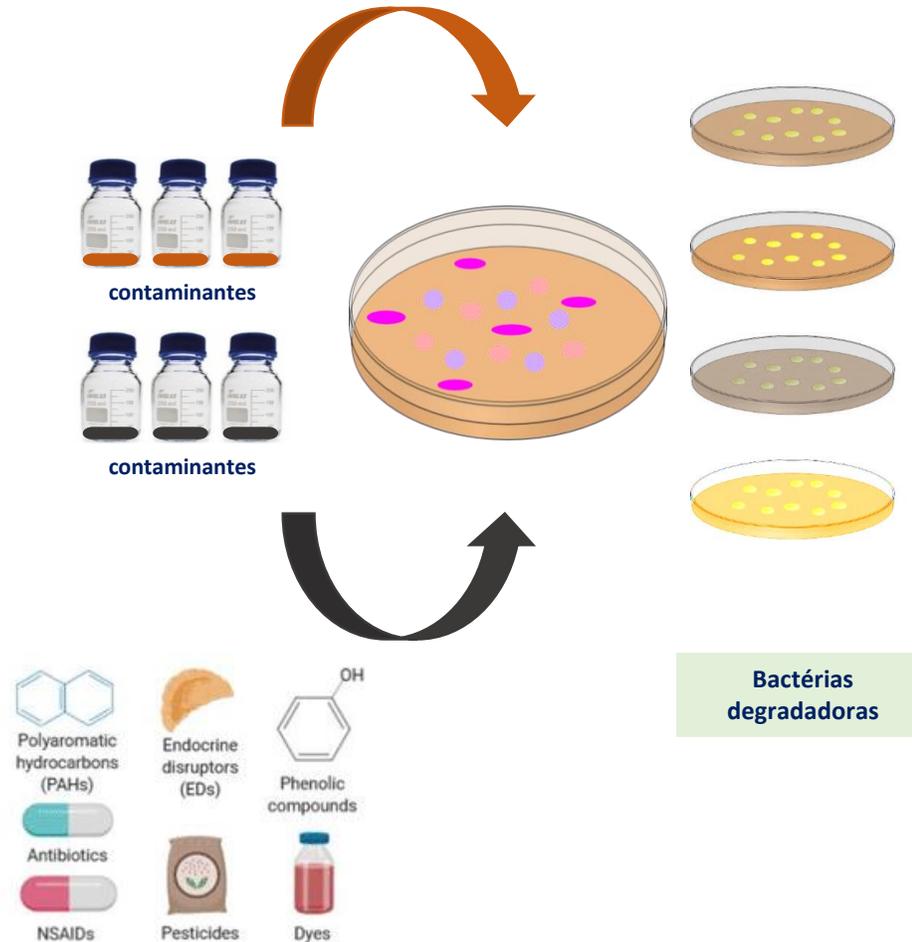


O que é a Biorremediação?

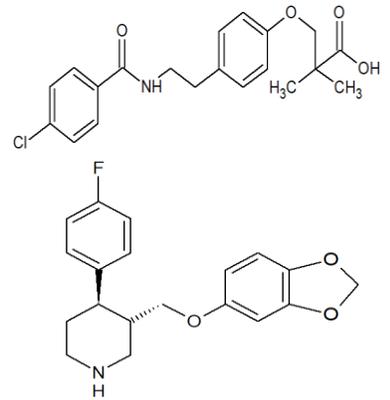


- Os contaminantes orgânicos podem ser degradados através da actividade de microrganismos, dando origem a compostos com menor toxicidade, mobilidade ou biodisponibilidade.
- Esta é a base da biorremediação: a utilização de microrganismos para remediar contaminantes orgânicos no ambiente.
- Mas para que o processo de biorremediação seja efectivo é muitas vezes necessário acelerar as taxas de degradação para além do que é normalmente obtido pelos processos microbianos naturais

Biorremediação com microrganismos autóctones



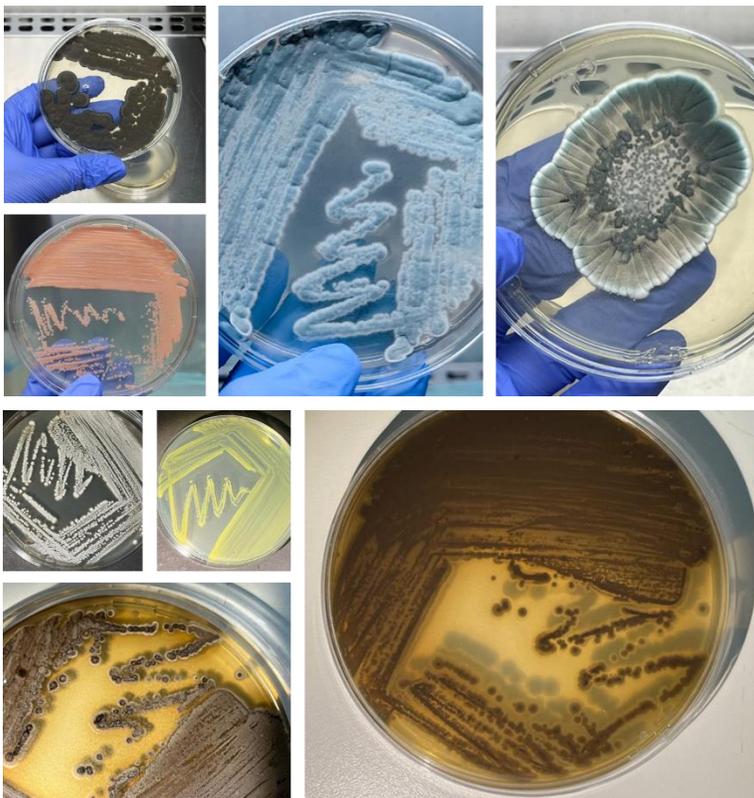
Consórcio bacteriano



Degradação bacteriana



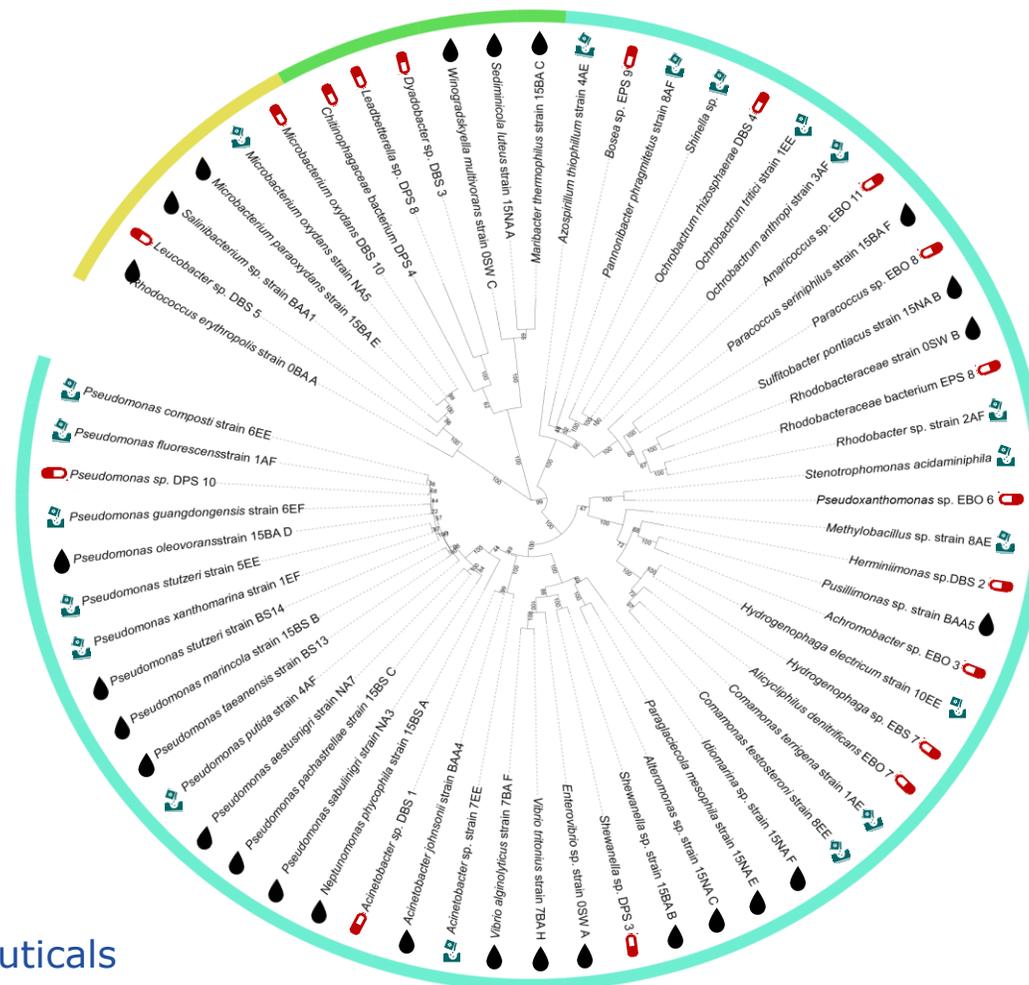
CIIMAR MICROBIAL CULTURE COLLECTION



> 90 estirpes bacterianas com potencial para biorremediação de poluentes

Tree scale: 1

Phylum	
	Actinobacteria
	Bacteroidetes
	Proteobacteria



Pesticides



Pharmaceuticals



Oil-based products





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Bioremediation of bezafibrate and paroxetine by microorganisms from estuarine sediment and activated sludge of an associated wastewater treatment plant



Patrícia Duarte^{a,b,c}, C. Marisa R. Almeida^{a,*}, Joana P. Fernandes^{a,b}, Daniela Morais^{a,c}, Marta Lino^{a,b}, Carlos R. Gomes^{a,c}, Maria F. Carvalho^a, Ana P. Mucha^a

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Journal of Environmental Chemical Engineering

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



Potential of bacterial consortia obtained from different environments for bioremediation of paroxetine and bezafibrate



Joana P. Fernandes^{a,b,*}, Patrícia Duarte^{a,b}, C. Marisa R. Almeida^a, Maria F. Carvalho^a, Ana P. Mucha^{a,c}

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^b Institute of Biomedical Sciences Abel Salazar, University of Porto, University of Porto, Rua de Jorge Viterbo Ferreira, 228, 4050-313 Porto, Portugal

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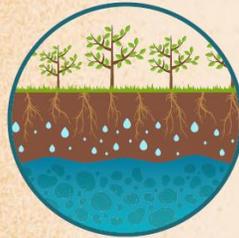
NATURE-BASED SOLUTIONS for WATER

WORKING WITH NATURE TO IMPROVE
THE MANAGEMENT OF WATER RESOURCES,
ACHIEVE WATER SECURITY FOR ALL,
AND CONTRIBUTE TO CORE ASPECTS
OF SUSTAINABLE DEVELOPMENT



WHAT ARE NATURE-BASED SOLUTIONS FOR WATER?

NATURE-BASED SOLUTIONS (NBS) ARE INSPIRED AND SUPPORTED BY NATURE AND USE, OR MIMIC, NATURAL PROCESSES TO CONTRIBUTE TO THE IMPROVED MANAGEMENT OF WATER



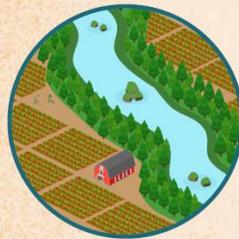
SOIL MOISTURE RETENTION,
GROUNDWATER RECHARGE



NATURAL AND
CONSTRUCTED WETLANDS



REFORESTATION



RIPARIAN BUFFER STRIPS



URBAN GREEN SPACES AND
GREEN BUILDINGS



DRY TOILET

NBS for water can be applied at MICRO- (e.g. a dry toilet) or MACRO- (e.g. landscape) scales



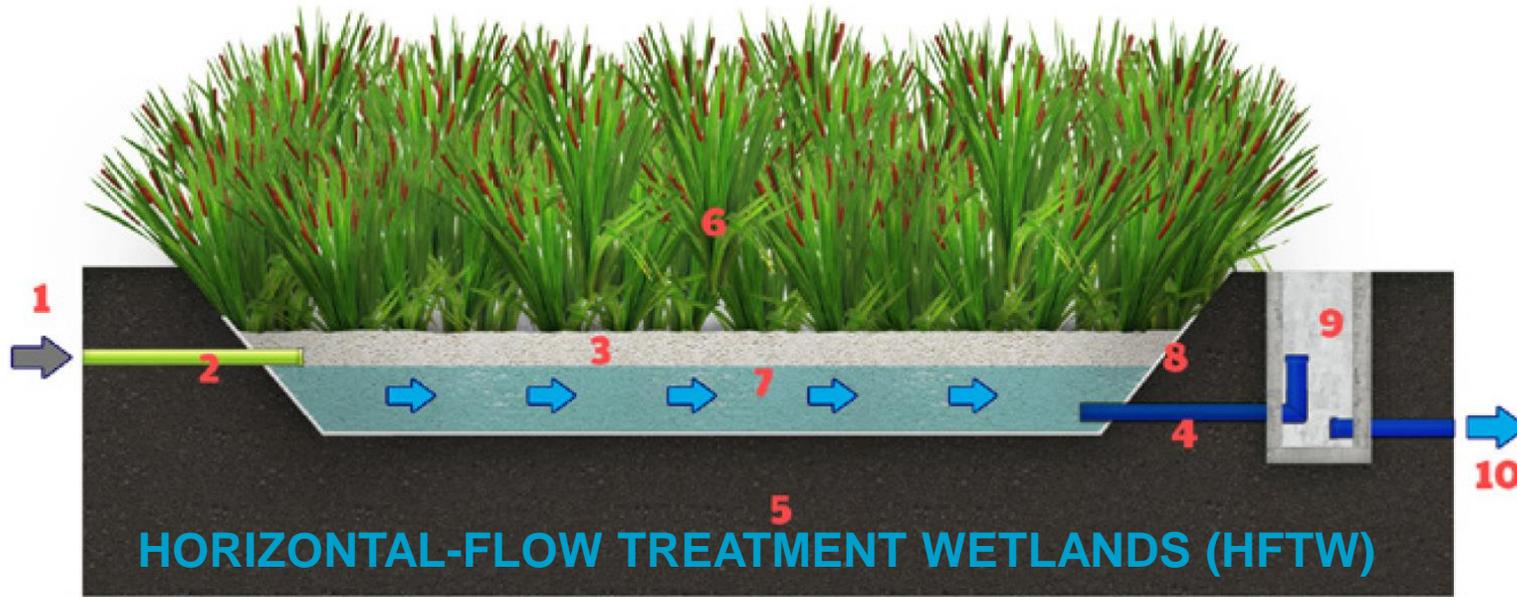
NBS para tratamento de águas residuais

- As NBS usam plantas, solo, meios porosos, bactérias e outros processos e elementos naturais para remover poluentes em águas residuais, incluindo sólidos suspensos, matéria orgânica, azoto, fósforo, patógenos e poluentes emergentes.
- Podem funcionar *per si*, ou combinadas com infraestrutura convencionais de tratamento de águas residuais (ETAR).
- Podem tratar diferentes tipos de águas residuais, incluindo efluentes municipais, agrícolas ou industriais, lixiviados e águas pluviais.

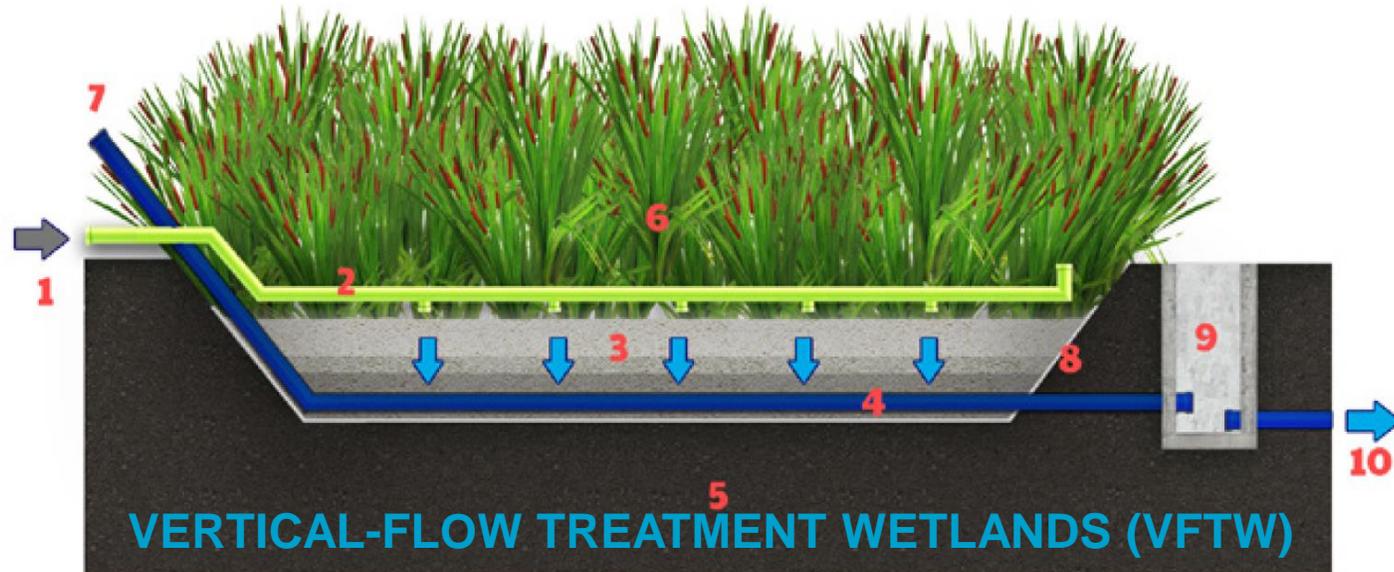
Nature-Based Solutions for Wastewater Treatment

A SERIES OF FACTSHEETS AND CASE STUDIES





- 1 - Inlet
- 2 - Feeding system
- 3 - Porous media
- 4 - Drainage system
- 5 - Original soil
- 6 - Plants
- 7 - Saturated water level
- 8 - Waterproof liner
- 9 - Regulation manhole
- 10 - Outlet



- 1 - Inlet
- 2 - Feeding system
- 3 - Layers of different porous media size
- 4 - Drainage system
- 5 - Original soil
- 6 - Plants
- 7 - Aeration chimney
- 8 - Waterproof liner
- 9 - Regulation manhole
- 10 - Outlet

Article

Potential of Constructed Wetlands for Removal of Antibiotics from Saline Aquaculture Effluents

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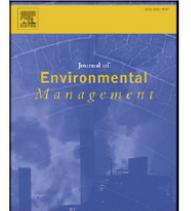
Journal of Environmental Management 326 (2023) 116642



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Research article

Removing chemical and biological pollutants from swine wastewater through constructed wetlands aiming reclaimed water reuse

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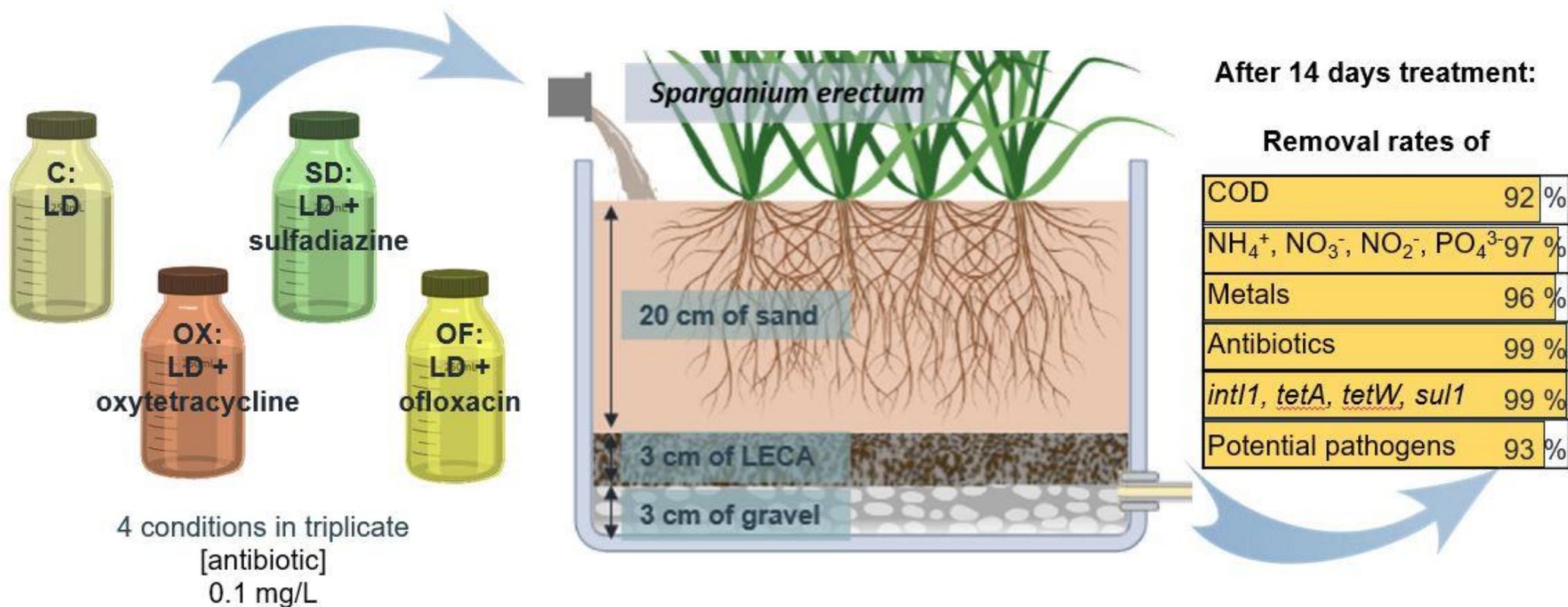
CITATION

Porras-Socias P, Tomasino MP, Fernandes JP, De Menezes AB, Fernández B, Collins G, Alves MJ, Castro R, Gomes CR, Almeida CMR and Mucha AP (2024) Removal of metals and emergent contaminants from

Removal of metals and emergent contaminants from liquid digestates in constructed wetlands for agricultural reuse

Pau Porras-Socias^{1,2,3,4*}, Maria Paola Tomasino¹, Joana P. Fernandes¹, Alexandre B. De Menezes³, Belén Fernández⁴, Gavin Collins³, Maria João Alves⁵, Ricardo Castro⁵, Carlos R. Gomes^{1,2}, C. Marisa R. Almeida^{1,2} and Ana Paula Mucha^{1,6}

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European
Commission

Zero pollution: New rules on treating urban wastewater

26 October 2022
#EUGreenDeal

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**Muito obrigada pela
vossa atenção!**

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