

# IDOUM

## Innovative Decentralized and low cost treatment systems for Optimal Urban wastewater Management



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Water JPI  
IC4Water 2017 Joint call  
6 February 2019, Paris

# MOTIVATION

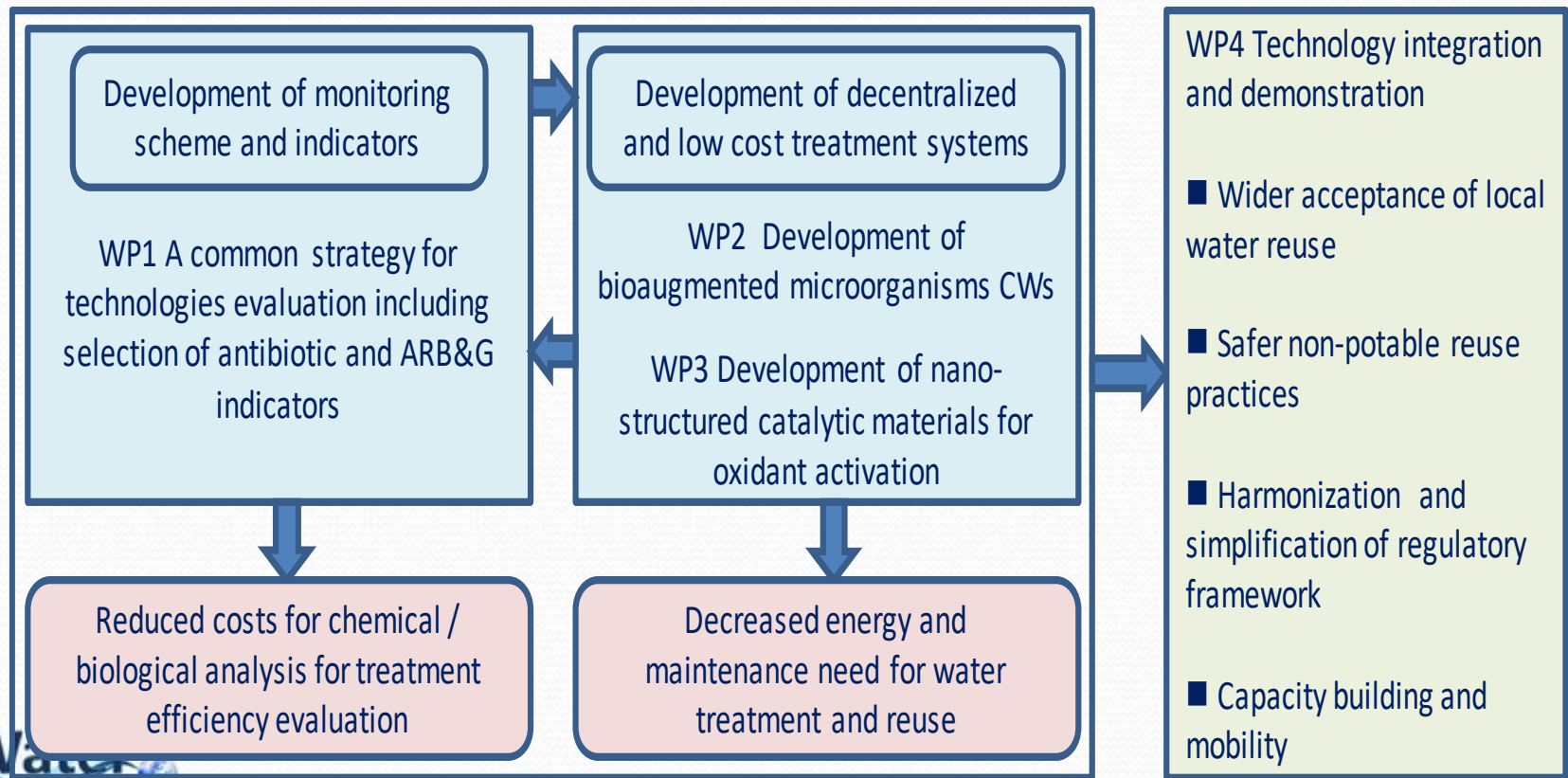
- Wastewater reuse to alleviate water scarcity and decrease the pollution load to surface water
- Cost-effective decentralized water treatment technologies with a focus on alternative water sources for wastewater reuse in agriculture.



- Food safety risk from emerging contaminants including chemicals and pathogens.
- Technologies will be assessed against antibiotics, antibiotic resistant bacteria and genes (ARB&Gs).

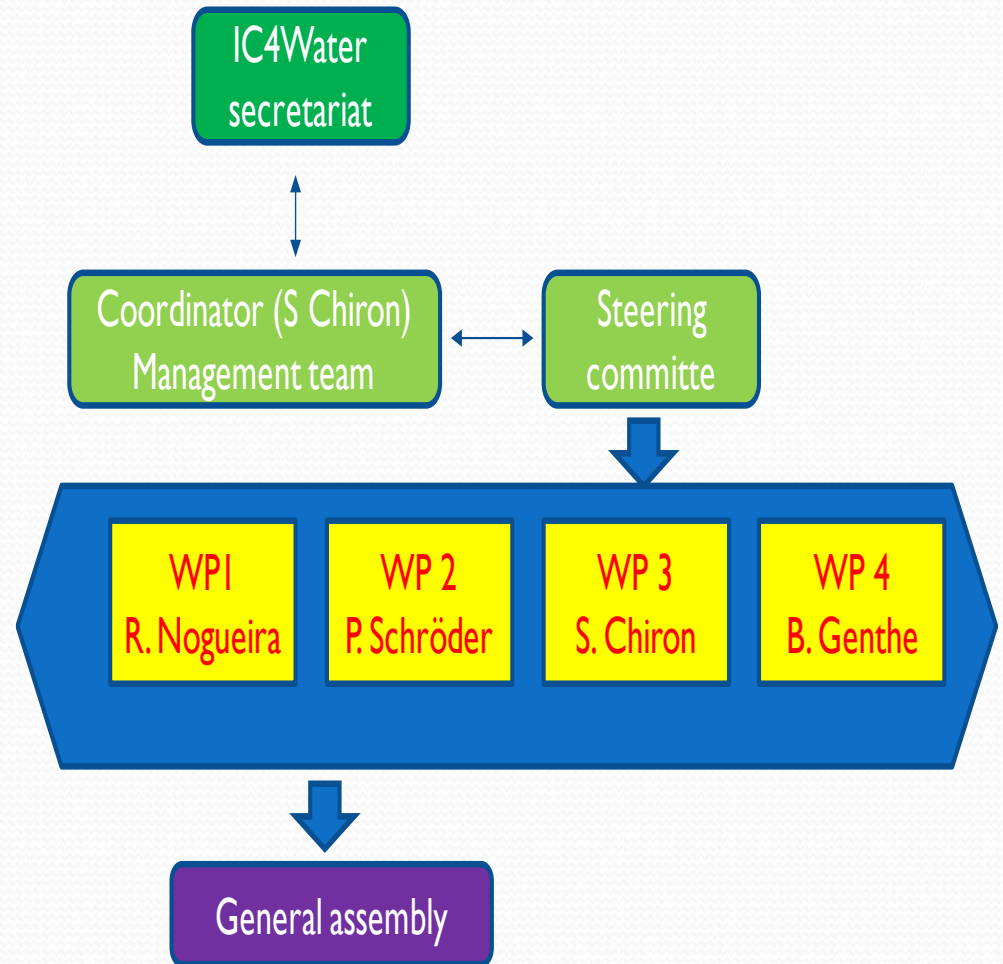
# OBJECTIVES

**IDOUM** is a **multidisciplinary** project that aims at developing new hybrid decentralized low-cost treatment systems using bioaugmented microorganisms constructed wetlands and nano-structured catalytic materials for oxidant activation. These technologies will be tailored to the removal of wastewater-derived indicators (antibiotics and ARB&Gs)



# CONSORTIUM DESCRIPTION

- 2 European countries (Helmholtz Institute and Montpellier University)  
2 non-EU countries (CSIR and Sao Paulo University)
- Collaborating partners: University of Campinas (Br) and University of Stellenbosch (RSA)
- The consortium consists of partners that are experienced in the field of emerging contaminants / risk assessment AND decentralized wastewater treatment and reuse. Interdisciplinary is well established, and transdisciplinary approaches needed to achieve the goals are implemented.



# Expected Impact of the Project

- Transition from traditional centralized energy-intensive water management practices towards satellite production of treated wastewater for its safe local reuse - avoiding large capital cost and reduced operation and maintenance – supporting local water recycling policies
- Depending on the project results, patent application and possibility of job creation for young researchers through spin-off companies
- IDOUM is expected to have an impact on environmental and public health by defining lists of priority contaminants in each participating country
- Knowing which contaminants and pathogens are regularly occurring in wastewater and solutions to eliminate them at source will contribute to UN Goal 6 “to ensure availability and sustainable management of water and sanitation for all”

# How will your project target to following aims of the call:

- IDOUM is promoting multi-disciplinary work with excellent research related to development of monitoring schemes and indicators, micro and nano-structured materials for catalysis, endophytic microorganisms for bioaugmentation
- IDOUM relies on a wide network with public (municipalities, water agencies) and private stakeholders (e. g. water companies SANASA and SABESP (Br), EU funded AfriAlliance project)
- IDOUM is stimulating mobility of researchers within the Consortium
- IDOUM is promoting long-term partnerships with Brazil an South Africa and beyond due to common research interests and complementary expertise in the water field

## **WP I (UNESP-IQ): Selection of a common strategy to compare the performance of different technologies**

- Task I.1: Development of common analytical methods for antibiotics and ARB&Gs
- Task I.2: Screening of antibiotics and ARB&Gs in wastewater in participating countries for defining common contaminant indicators
- Task I.3: Reaching a common protocol for technologies evaluation (e.g. type of effluents, similar hydraulic retention time...)

# WP II (HGMU): Development of bioaugmented microorganisms constructed wetlands at laboratory scale

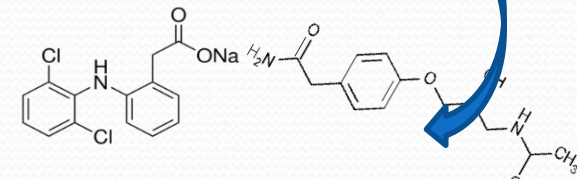
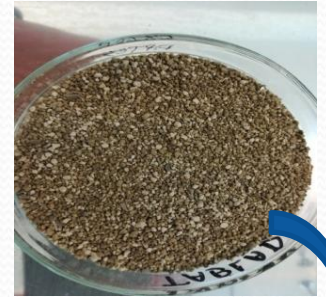
- Task 2.1 (HMGU). Phytoremediation with endophytic bacteria inoculation. *Endophytic microorganisms of Phragmites australis has been identified – Lab-scale constructed wetlands will be inoculated*
- Task 2.2 (CSIR). Phycoremediation with specific algae species. *Under operation for nutrients and E. coli removal – Evaluation for their capacity to eliminate antibiotics and ARB&Gs*
- Task 2.3 (UM-HSM). Mycoremediation with specific commercially available *Trichoderma* species. *Good results under sterilized conditions*





# WP III (UM-HSM): Development of nano-structured catalytic materials for oxidant activation at laboratory scale

- Task 3.1 (UM-HSM). Filtration with CuO-clay composites – removal of pathogens + polar anionic compounds (e.g sulfonamides), regeneration by percolating persulfate solutions
- Task 3.2 Modified iron minerals and iron mining residues for heterogeneous Fenton processes with  $H_2O_2$  - iron-mining residues from Brazilian mining sites contain mainly  $Fe_3O_4$  (25%); possibility of partial substitution of iron with transition metals as copper to improve catalytic activity



# WP IV (CSIR): Technology integration and technology demonstration at pilot scale

- Task 4.1 (all). Technology demonstration - Feasibility and technical capacity of new hybrid treatment systems combining biology-based systems with physical-chemical systems to remove wastewater contaminant indicators
- Task 2.3 (UM-HSM). Technology benchmarking – constructed wetland/sand filtration/UV-C.



*Phragmites  
australis*



*Typha latifolia*



*Lemna minor*



*Cyperus  
alternifolius*