WATERWORKS 2017 RDI FUNDED PROJECTS BOOKLET
Title of the project: Tools and criteria for URBAN groundWATer management
Acronym and LOGO: URBANWAT
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Project partners
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Project structure (WPs description):

WP01 (WP Leader CSIC): Inorganic chemical, CECs sampling and analyses of groundwater. This WP includes: (1) periodic measurement of piezometric levels, insitu parameters (pH, Tª, C.E, Eh, etc.) and installation of continuous measurement sensors in control piezometers; (2) Hydrochemical sampling and analysis (anions, cations, traces, CECs); (3) Emerging contaminants quarterly sampling and analysis by an unconventional methods (non-target); (4) Integration of the data in a geospatial database and their exploitation (H2020 FREEWAT FREE and open source tools for WATer resource management www.freewat.eu); (5) Expansion and improvement of an existing platform to integrate all data from a geo-spatial database; (6) Mapping of the pollutants identified in the water cycle to know their distribution.

WP02 (WP Leader UB): Microbiological sampling and analyses of groundwater. This WP includes: (1) Optimization of viral concentration and detection methods for identification of viruses in groundwater samples (2) Analysis of samples collected in the points 1, 2, 3 and 4 described above for Classical Fecal Indicators (*E. coli* and *Intestinal enterococci*), human and animal viral indicators as well as relevant viral pathogens (3) Metagenomic analysis of selected groundwater samples for new and emergent viral identification.(4) Risk assessment studies on the presence of vpathogenic viruses in groundwater as for their application for irrigation and consumption.

WP03 (WP CSIC): Identification of the origin and behavior of contaminants present in the hydrological cycle. This WP includes: (1) Univariate statistical analysis and bivariate analysis to identify the geochemical processes that control the anomalous concentrations of solutes in groundwater and determine their quality and possible uses; (2) to evaluate the transformation of polar compounds mainly pharmaceuticals. We propose a new workflow using HRMS under (a) laboratory conditions and (b) real environmental conditions. In contrast to the compound-by-compound approach, in the new approach degradation will be assessed for a cocktail of selected compounds subject to the transformation process. Following the identification of TPs at lab scale, a list of suspect TPs will be created and used to screen them in SPE-concentrated groundwater samples.

WP04 (WP Leader TUD-CSIC): Application of environmental friendly DNA-target micro-particles for measuring mobility of pollutants. (1) Use of an innovative, robust, and environmental-friendly silica-protected iron oxide micro-particles tagged with artificial DNA to trace contaminant movement and travel times of water in natural systems (developed by Delft University of technology); (2) Development of a flow and transport model of the hydrological cycle to quantify the water and mass balance and the perspectives of changing the balance in different scenarios; (3)

Simulations of th different scenarios that allow planning the sustainable use of underground water resources and address global changes such as climate change.

WP05 (WP Leader HSM-CSIC): Proposed remediation of runoff water contamination and evaluation of the ecotoxicological risk. (1) Analyse the role of the soil water plant continuum in attenuating pollution testing and analysing the use of selected infrastructures to analyse fate and transport of selected contaminant in the soil-plant continuum and gather further insights in the behaviour of such systems; (2) evaluate the ecotoxicological risk

WP6 (WP Leader TUD): Testing real-scale test facility Delft University of Technology. Transfer the methodology developed for its application in the other cities. Validation of the methodological tools obtained during the development of this project.

Outcomes and expected impact:

The, URBANWAT project will contribute to the following overall impacts of the JPI: (1) **SOCIAL:** The participation of the groundwater organism in this project, especially in the results diffusion task, allows establishing a water policy more effective implementing a close horizontal dialogue with stakeholders interested in clean and healthy water; (2) **ECONOMIC:** The reuse of groundwater safely constitutes a vital complement to water regulations and they can assist in allocating water between competing user demands. Mitigation measures and short-term solutions to overcome emergency situations as water scarcity, which will reduce costs; (3) **TECHNOLOGICAL:** Improvement of the techniques for managing of water resources with interoperability of databases, groundwater quality, risks and modeling. Optimization of concentration and viral detection in groundwater samples. The use of new technologies for the identification of a greater number of organic compounds and for the study to measure temporal and spatial patterns of water and pollutants with encapsulated DNA nanoparticles promises a breakthrough in the investigation of groundwater; (4) **ENVIRONMENTAL:** The integrated models of the entire water cycle, including all compartments and water use have yet to take into account scenarios of water demand and predict the impact of global change (including climate). Water resource observations, experimental work and modeling are required to better understand hydrogeological processes and their connection, and to analyse and forecast the effectiveness of management options. This will support improved decision-making to ensure the long-term availability of water resources and to enable the integrated management of water resources at the national and global scale; (5) **POLICY:** Regulatory measures are

essential tools to ensure compliance with environmental standards for water quality and quantity. Understanding the mechanism leading to improved water management will lead to better policy design and adaptation it will help in the new plans of uses and integrated management of aquifers and it will ensure the good state of this groundwater masses management.

The main barriers that this project would be related to the modeling task where some predictions cannot be verified, since in practice it is not possible to obtain a measurement at all points of the modeled domain, this will be overcome by developing models for different scenarios and evaluating the sensitivity of the models.

List of deliverables expected:

Deliverables: D1.1 Protocol for groundwater sampling; **D1.2** Report on current groundwater quality; **D1.3** Report on occurrence of PMOCs in groundwater; **D1.4** Assessment of PMOCs degradation in groundwaters

Deliverables: D2.1 A SOP of an optimized method for viral concentration from groundwater samples; **D2.2** Report: presence and loads of classical fecal indicator bacteria, human and animal viral indicators as well as relevant viruses in groundwater collected; **D2.3** A SOP of an optimized viral metagenomic analysis for groundwater samples; **D2.4** A report of the different viruses found in groundwater collected at different sites and times during the year by applying metagenomics analysis.

Deliverables: D3.1 Statistical report/geochemical processes; **D3.2** Report related to the developing an analytical methodology for PMOCs determination; **D3.3** Report polar transformation compounds.

Deliverables: D4.1 Report: artificial DNA tracer; **D4.2** Report: Comparison between the use of different tracers; **D4.3** Flow and transport model/Simulations

Deliverables: D5.1: list of soil-water-plants continuum that will be tested; **D5.2**: Development of the experimental setup; **D5.3:** Role of flow rate on retention efficiency; **D5.4**. Parametrization of the removal efficiency in the different scenarios for the chemical and microbial contaminants tested

Deliverables: D6.1 Report about the WP progress. Different phases of testing; **D6.2** End of project show-casing the results of project

Expected research results to communicate and disseminate (in very general terms)	**Target groups for communication and dissemination activities:**
1. Protocols	managers and technicians of water resources
2. Reports and management guides	managers and technicians of water resources
3. Communication in meetings and congresses	scientific community
4. Development of new analysis methodologies	scientific community
5. Current groundwater quality	End users, managers and technicians of water resources
6. Flow and transport model	managers and technicians of water resources
7. Testing real-scale test (Delft)	Scientific community, managers and technicians of water resources
Funder of the project: Institutions: PRCI-CE - Projets de recherche collaborative - International dans un cadre Commission Européenne Country: EU	