ENSURE – Enabling Safe Wastewater Reuse in Urban Areas

Summary

Water scarcity in urban areas facing droughts with increasing frequency and severity is urging for a more efficient use of the available water. Wastewater reuse is considered a key component of a water efficiency strategy, as it can replace the use of drinking water for many non-potable uses, such as the irrigation of golf courses, parks and other urban green spaces, as well as for washing vehicles, streets and garbage containers and for aquifer recharge. Increasing wastewater reuse is one of the targets of the UN Sustainable Development Goal number 6 and part of the EU action plan for the Circular Economy, as reusing the existing water to cope with local demands brings significant environmental, social and economic benefits.

However, only 2% of treated wastewater is reused in Europe. The main barriers to its broader uptake are the lack of a legal framework, currently under development, and of public acceptance. As wastewater treatment technologies are still not able to completely remove microbial contaminants, including pathogens, and emerging contaminants such as pharmaceuticals (PhCs), pesticides and other chemicals of emerging concern (CEC), there are considerable health risks associated with reclaimed water as well as possible environmental risks related to the dissemination of such chemicals into the environment. There is still a lack of information about the actual health risks and on the long-term effects of continuous irrigation with reclaimed water on soils, plants and groundwater bodies. In addition, conventional water resources are generally under-priced which, in comparison, makes wastewater reuse projects costly.

Current international standards on water reuse (e.g., ISO 20426 and others under development) require that all water reuse projects must include a risk analysis, taking into account the water quality of the treated wastewater, the location where it is going to be used, the barriers between the water and people and the irrigation technique (when applicable) for the estimation of the level of risk. In addition to subjectivity in risk estimation and acceptability limits, final decision on whether or not a reuse project is feasible requires a multidimensional approach in which economic constraints must also be considered, as the economic sustainability is crucial for the success of water reuse projects. The aspects to be taken into account in the assessment of the economic viability of water reuse projects are the model of tariff structure, the share of costs among users and recovery of investment costs.

This project aimed at the development of an innovative methodology to assess the feasibility of safe wastewater reuse projects for landscape irrigation in urban areas. The methodology enabled the prioritization of alternative designs for reclaimed water supply systems, based on a multidimensional analysis, comprising risk for public health and the environment as well as construction, maintenance and monitoring costs of the infrastructure and future operation.

The project was based on a case study, Cascais Municipality. The methodology was based on the establishment of possible scenarios of irrigation of parks with treated wastewater. The scenarios were account for i) distance of the point-of-use from the point-of-sale, ii) costs for the reclaimed water distribution system, including construction, maintenance and monitoring and operation, iii) reclaimed water tariff, iv) water needs variation over seasons, v) reclaimed water quality and variations over time, vi) health and environmental risks associated with the reclaimed water quality at the point of-use, given the foreseen barriers and, vii) best location for the irrigation area, taking into consideration the leaching potential for groundwater and the surface runoff.

Risk analysis was carried out for each scenario. Different weights were attributed to each component of the risk analysis. The team was already in possession of data sets on water volumes consumed for irrigation of the municipality's parks and gardens and on the available volumes of treated wastewater with adequate quality for reuse at the nearest wastewater treatment plant (Guia). The municipality was willing to participate in this project by providing all data required, including spatial data (e.g. geology, soil type, digital elevation model, sites, etc.) for studying the reclaimed water distribution system layout.

Project Reference

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Leading Institution

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Project Website

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