

## Infiltration of treated wastewater in a soil-based constructed wetland: usage of time-lapse ERT to monitor saline tracer injection.

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Soil-based constructed wetland, with infiltration in soil of secondary treated effluents is a low-cost technique to reduce the flux of pollutants discharged to surface receiving water bodies. More than 500 soil-based constructed wetlands have been built over the last ten years in France. Nevertheless, these systems are usually designed with empirical rules, with a limited knowledge on the behavior of the hydraulic parameters (i.e. infiltration capacity) versus time when treated effluent is applied. Indeed, depending on the hydraulic load and the quality of the effluents, in particular the organic matter content, the infiltration of treated effluent can lead to biological, chemical or mechanical clogging. The evaluation of the presence or absence of clogging effects is essential, in particular for defining water supply strategies to minimize clogging. The use of conventional hydrological measurements, such as water content measurements or permeability tests, have the advantage of being precise measurements, but these measurements are limited in space and the installation of these sensors is destructive for the soil. In these systems, it is also possible to estimate the incoming and outgoing water fluxes, the difference being affected the infiltration and evaporation fluxes.

But between these two measurement scales, there is a lack of measurement tools at the intermediate scale to fully understand and monitor the phenomena. Geophysics, in particular recent development in electric resistivity tomography (ERT), allows obtaining distributed information on the waste water fluxes in porous media. Thanks to time-lapse monitoring of infiltration of water or combined with saline tracer in a saturated medium, we have monitored 4 saline tracer tests between 2014 and 2016. We have first designed a specific apparatus to investigate very shallow resistivity variation for small borehole under de soil-based constructed wetland. The objective of this abstract is to demonstrate the advantage of discontinuous time-lapse ERT saline tracer injection monitoring for studying soil clogging effect in soil-based constructed wetland. Four time lapse electrical were performed between 2015 and 2017, which show the evolution of clogging over time. This new information leads to improve the design and the operation rules, like with the used of the soil for waste water treatment.