

Using electrical resistivity tomography (ERT) to evaluate the infiltration in land application systems. A case study in the Carrión de los Céspedes wastewater treatment plant (Seville, Spain)

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Received 29 April 2008; Accepted in revised form 14 July 2008

ABSTRACT

One of the non-conventional technologies of wastewater treatment applicable to small communities is the land application system (LAS) or “filtros verdes”, as this technique is called in Spanish. A correct design of LAS may imply to know the mode of occurrence and efficiency of the infiltration. Thus, the geophysical method of electric resistivity tomography (ERT) has been applied to study the infiltration in the LAS of the Carrión de los Céspedes wastewater treatment plant (Seville, Spain), where information of spatial and temporal water content changes was obtained by tracking the changes of resistivity in time-lapse ERT profiles related to an irrigation event. The ERT survey shows that there is a non regular horizontal distribution of the infiltration in the shallowest part of the soil, with distinct zones with a better infiltration. Also, the vertical infiltration efficiency is low since a large amount of the water is retained in the first shallow meter with very little infiltration at depth. This phenomenon is mainly due to soil preparation works affecting the first meter of the ground. That water retention at the shallow level may imply lateral losses of water, giving as result a lower efficiency of the LAS. Finally, the results prove that the ERT technique is a very useful method to know the structure of materials and the infiltration distribution in the ground prior the implementation of the LAS. Being a non invasive technique, ERT can be used for monitoring the efficiency of the LAS in terms of infiltration.

Keywords: Land application systems; Water reuse; Electric resistivity tomography; Infiltration

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