

Geophysical Research Abstracts
Vol. 17, EGU2015-10415-3, 2015
EGU General Assembly 2015
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Estimating harvested rainwater at greenhouses in south Portugal aquifer Campina de Faro for potential infiltration in Managed Aquifer Recharge.

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The Campina de Faro (CF) aquifer system, located on the south coast of Portugal, is an important source of groundwater, mostly used for agriculture purposes. In some areas, this multi-layered aquifer is contaminated with high concentration of nitrates, possibly arising from excessive usage of fertilizers, reaching to values as high as 300 mg/L. In order to tackle this problem, Managed Aquifer Recharge (MAR) techniques are being applied at demonstration scale to improve groundwater quality through aquifer recharge, in both infiltration basins at the river bed of ephemeral river Rio Seco and existing traditional large diameter wells located in this aquifer. In order to assess the infiltration capacity of the existing infrastructures, in particular infiltration basins and large diameter wells at CF aquifer, infiltration tests were performed, indicating a high infiltration capacity of the existing infrastructures. Concerning the sources of water for recharge, harvested rainwater at greenhouses was identified in CF aquifer area as one of the main potential sources for aquifer recharge, once there is a large surface area occupied by these infrastructures at the demo site. This potential source of water could, in some cases, be redirected to the large diameter wells or to the infiltration basins at the riverbed of Rio Seco. Estimates of rainwater harvested at greenhouses were calculated based on a 32 year average rainfall model and on the location of the greenhouses and their surface areas, the latter based on aerial photograph. Potential estimated annual rainwater intercepted by greenhouses at CF aquifer accounts an average of 1.63 hm³/year. Nonetheless it is unlikely that the totality of this amount can be harvested, collected and redirected to aquifer recharge infrastructures, for several reasons, such as the lack of appropriate greenhouse infrastructures, conduits or a close location between greenhouses and large diameter wells and infiltration basins. Anyway, this value is a good indication of the total amount of the harvested rainfall that could be considered for future MAR solutions. Given the estimates on the greenhouse harvested rainwater and the infiltration capacity of the infiltration basins and large diameter wells, it is intended to develop groundwater flow models in order to assess the nitrate washing rate in the CF aquifer. This work is being developed under the scope of MARSOL Project (MARSOL-GA-2013-619120), in which Campina de Faro aquifer system is one of the several case studies. This project aims to demonstrate that MAR is a sound, safe and sustainable strategy that can be applied with great confidence in finding solutions to water scarcity in Southern Europe.