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NBS for Drought risks reduction in the Algarve (Portugal): selected achievements from PT FCT ProWaterMan and from EU FP7 MARSOL projects

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Southern Europe and the Mediterranean region are facing the challenge of managing its water resources under conditions of increasing scarcity and/or floods, besides concerns about water quality. Innovative water management strategies with nature-based solutions, such as the storage of excess water during floods, in Managed Aquifer Recharge (MAR) schemes can greatly decrease the risk of floods while it increases water availability for future use, eventually in drought periods. The Algarve region is the southern most region of Portugal mainland. It has an area of 4,997 km2 and about 451 thousand permanent inhabitants. Selected achievements of two research projects (Portugal FCT sponsored ProWaterMan project and EU FP7 sponsored MARSOL project), will be addressed regarding the Campina de Faro and Querença-Silves aquifers in the Algarve.

In Faro, the idea of harvesting rainwater from the greenhouse rooftops and using this water to recharge aquifers is not new. However, using this NbS as a climate mitigation and adaptation tool with the overall impact and wide range of benefits is a step forward in innovative methodologies. This NbS can have particular positive impacts in Mediterranean conditions with (new) precipitation patterns, more intense but less frequent. The potential greenhouses surface area of about 2.74 km2 can be used by connecting these infrastructures to several large wells aiming to infiltrate an amount of 1.63 hm3/year of harvested water.

There is a strong support from the Portuguese Water Agency (Agência Portuguesa do Ambiente, I.P., Algarve branch), the Water Supplier and Wastewater (Águas do Algarve, S.A.), and the local farmers and land owners which have frequent flood and/or drought problems, represented by HUBEL (a SME that produces most greenhouses for Faro area) in this project. During EU 7FP INO-DEMO MARSOL project, a survey about protection and preservation of groundwater was conducted with a sample of Portuguese farmers of the Algarve region. It included the evaluation of willingness of farmers to collaborate and pay for the use of Managed Aquifer Recharge (MAR) as a nature-based solution to minimize the drought impacts and to manage flood risk in the area. Close cooperation has been established between EIP Water Action Group MARsolutions and FP7 MARSOL INNO_DEMO (http://www.eip-water.eu/close-cooperation-between-eip-marsolutions-and-fp7-marsol-inno-demo-project). In http://www.eip-water.eu/sites/default/files/Rel%20101_15.pdf a LNEC report is available, presenting a descriptive analysis of the responses to a survey about protection and preservation of groundwater conducted with a sample of Portuguese farmers of the Algarve region. It is possible that Direção Regional de Agricultura e Pescas do Algarve is willing to participate on the implementation the nature-based solutions as they will decrease the risk for agriculture losses. The Portuguese Water Agency has precipitation and flow bulletins for the Algarve, e.g. for Faro and Albufeira areas, in http://snirh.pt/index.php?idMain=1&idItem=1.1 .

Concerning the climate change impact in Querença-Silves (QS) Aquifer, LNEC/University of Algarve MARSOL project teams presented descriptions regarding respectively groundwater recharge and flow simulations of future scenarios. E.g. Stigter et al. (2009, 2014) summarized achieved conclusions were "(1) (2020–2050) changes in recharge, particularly due to a reduction in autumn rainfall resulting in a longer dry period. More frequent droughts are predicted at the QS aquifer; (2) toward the end of the century (2069–2099), results indicate a significant decrease (mean 25 %) in recharge at QS aquifer, with an high decrease in absolute terms (mean 134 mm/year); and, (3) scenario modelling of groundwater flow shows its response to the predicted decreases in recharge and increases in pumping rates, with strongly reduced outflow into the coastal wetlands, whereas changes due to sea level rise are negligible".

These results are a useful starting point regarding the role of MAR in aquifer systems, taking into account the future trends of climate change patterns expected in the Mediterranean region.