



Isotopic assessment of the impact of agriculture on the hydrology of the aquifer and wetlands at the Doñana Ramsar site, SW Spain

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The Doñana Ramsar site, located in SW Spain, is composed of large fluvial brackish marshes and hundreds of small, mostly groundwater dependent wetlands, placed on top of an extensive eolian mantle which overlies a sandy aquifer. Aquifer development for agriculture use started in the late 1970s and most of the wells are located close to very sensible freshwater wetlands. The impact on wetlands hydrology due to intensive groundwater abstraction for irrigation and of the use of agrochemicals has been evaluated with the support of sulphur, nitrogen, carbon, oxygen and deuterium isotopes, combined with hydrogeochemical, hydrogeological and modelling tools (flow and hydrochemistry). Some wetlands showed clear changes in their hydroperiod due to a generalized water-table drawdown. Hydroperiod changes induced new hydrogeochemical processes in the wetlands sediments whose ecological consequences have not been fully evaluated. Also, NO₃ and SO₄ associated to agricultural practices are found down to 30-35 m in the aquifer and in the surface water of some wetlands receiving excess irrigation water.