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Interactive comment on "Anthropogenic wetlands due to over-irrigation of desert areas; A challenging hydrogeological investigation with extensive geophysical input from TEM and MRS measurements" *by* Ahmad A. Behroozmand et al.

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The MS "Anthropogenic wetlands due to over-irrigation of desert areas; A challenging hydrogeological investigation with extensive geophysical input from TEM and MRS measurements" by Behroozmand et al. addresses a topic that is of critical importance for improving (i) the knowledge on the surficial water – groundwater interaction in "arid wetlands" and (ii) the effective management of water resources in reclaimed desert areas. The authors show an original approach based on the integration of magnetic resonance sounding and ground-based transient EM survey outcomes. Geophys-

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ical data, calibrated by hydrogeological (e.g., continuous core sampling, pumping and recovery tests) investigations and chemical analyses, allowed to delineate the main hydro-stratigraphic units and characterize the groundwater quality of the upper 100m subsoil setting. Remote sensing investigation (i.e. DEM and satellite images) completed the assessment of the hydrological and geomorphological setting of the study area. All these information produced the input data for building a regional groundwater flow model, a local density-dependent flow model and a transport numerical model used to reconstruct the evolution of the aquifer system (i) and to develop scenarios of artificial aquifer recharge using the treated waters (ii). The simulations of the hydrological response of the lowlands to the reclamation activity carried out in the 1984 – 2014 period point out the surplus of irrigation water as responsible for the formation and the growth of the pond as well as the inefficient use of the freshwater resources. Finally, the local-scale density-dependent groundwater flow and transport model provide key information on the possibility to reuse treated wastewater for aquifer recharge. The general concept of the study is interesting and really nice and the MS presents novel data and results. The experimental application is well-designed and described, and it could be widely applicable in various “arid wetlands”. The MS is well written, pleasant to read and of interest for a broad scientific community. The introduction gives a good overview on the relevant questions and properly motivates the goal of the study. Results are well supported by data.

I congratulate the authors for this nice scientific contribute. I would strongly recommend the MS for publication once the following comments are address. None of them affect the overall quality of the MS.

P2_L69 -75. I do think it would be useful to improve this section. This is just to avoid possible misunderstanding. It is not clear which parts of this section refer to "natural wetlands" or "artificial wetlands. For instance, P2_L68-69: “. . . can evolve into anthropogenic perennial in-land wetlands even in arid or semi-arid regions. These "Arid wetlands", i.e. natural humid zones in an arid or semiarid climate, . . .”. If the authors

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refer the “Arid wetlands” to the anthropogenic perennial in-land wetlands, I suggest to change “natural humid zones” with “man-induced humid zones” (or artificial humid zones). Otherwise, I suggest: The “arid wetlands” . . ..

P2_L72-73. Similarly, ”. . . Worldwide arid wetlands are threatened by increasing anthropogenic pressure. . ..”. What do the authors mean with Worldwide arid wetlands? Are both natural and artificial arid wetlands? It is not clear whether the arid wetlands are only those induced by man.

P3_L05-06. “. . . coastal areas through re-injection of treated water - http://www.improware.eu/) project aimed at evaluating the possible reuse of treated wastewaters (TWW) in this area. . .” I recommend the authors to better specify the connection between the focus of the paper (i.e. P3_L96-03) and the re-injection of treated water. For instance, is the “treated water” used for reinjection from the surface water accumulation?

P4_51-52. What do the authors mean with “the climatic conditions” (e.g., temperature and humidity)?

P4_52-53. I recommend to add at least one reference on the “Hydrogeological investigations at the regional scale”.

P4_53. As “regional scale” has been considered, what do the authors mean with the upper 200m? Do they refer to the whole area shown in Figure 2 or only the lowlands sector?

P4_52-55. This part is not adequately clear: “Hydrogeological investigations at the regional scale highlight the presence of loose coarse Miocene sands with clay lenses in the upper 200 m overlain by Pliocene. . .” I suggest: Hydrogeological investigations at the regional scale highlight the presence of loose coarse Miocene sands with clay lenses overlain by Pliocene deposits in the upper 200 m of subsoil. The Pliocene units consist mainly of estuarine clayey facies at the base, passing upward to fluvio-marine

and shallow marine limestones. The uppermost units are exposed in the lowest parts of the landscape and their vicinities.

P4_L56 “. . .unit. . .”, perhaps, units or deposits?

P5_L65. What do the authors mean with “contemporary”? Perhaps you mean “recent” or 2014 (i.e. contemporary the acquisition time of DGPS data).

P5_L81. Check "Error! Reference source not found”

P5_93. Delete “red triangles in” as it is already reported in the figure caption.

P5_01. Check "Error! Reference source not found”

P6_26. Check "Error! Reference source not found”.

P7_71. Could the authors confirm that the climate conditions were reasonably similar during WalkTEM and MRS surveys, i.e. December 2013 and January 2014, respectively?

P7_L77&80. Check "Error! Reference source not found”.

P8_11. Overall, the. . .

P9_L39. I suggest to delete “Contemporary”.

P9_L47. I suggest to use “retrieved or “obtained” instead of defined.

P11_L5. Delete “Within the framework of IMPROWARE” (it is already mentioned in the previous lines)

P12_L56-57. . . .lowest portion of the limestone. . . I suggest to add the depth range of the borehole intakes.

P19_Table 1. Groundwater and Pond Water vs 2003, 2011, 2014 are not clear.

P22_Fig.1. Satellite images source is missing.

P24_Fig.3. Satellite images source is missing.

P25_Fig.4. Satellite image source is missing (the inset).

P26_Fig.5. Satellite image source is missing.

P31_Fig.10. Satellite images source is missing.

P32_Fig.11. Satellite images source is missing.

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