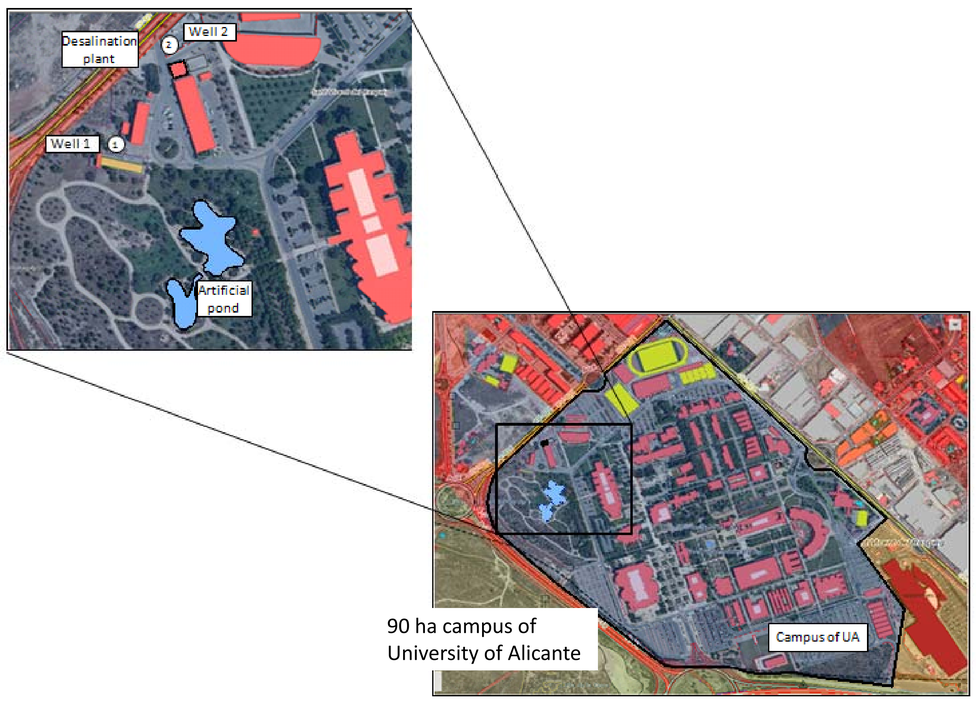
WATER RESOURCES MANAGEMENT AT THE UNIVERSITY OF ALICANTE FOR LANDSCAPE IRRIGATION FROM GROUNDWATER DESALINATION

J. Valdés-Abellán[1], L. Candela[2], M. Cano[1], a. Tenza-Abril[1]

[1]Dep de Ingeniería de la construcción, Obras Públicas e Infrastructura Urbana, Universidad de Alicante, Spain. javier.valdes@ua.es
[2]Department of Geotechnical Engineering and Geoscience, UPC-Barcelona, Jordi Girona 1-3, 08034 Barcelona, Spain, lucila.candela@upc.es

INTRODUCTION

The southeastern part of the Iberian Peninsula is an area of water resources scarcity and important seasonal demand. Moreover, aquifers with low quality water for consumption due to salinity also exist precluding its further use. However, since the important concern of water shortage has been growing, possible exploitation of low quality groundwater has been taken into consideration. An example of sustainable use of the treated saline water developed by University of Alicante (UA) is presented, where pumped groundwater from the in campus existing aquifer is applied for landscape irrigation after RO desalination by the existing plant.



METHODOLOGY

Currently water for irrigation is pumped from well number 2 and directly conveyed to the desalination plant. After desalination, $Ca(OH)_2$ is added to water in order to increase the low pH (6), and finally, stored in a deposit prior to its final use. After pumped to an artificial pond which acts as a regulation deposit, water is ready for irrigation, being distributed through the irrigation supply system in campus. During the summer season and when demand increases, well number 1 comes into functioning while water from well number 2 is directly pumped into the pond, bypassing the desalination process.
In order to improve the efficiency of the system, both drip and sprinkler irrigation is applied. The first-one is used for trees watering and the second one for grass, extending over most of the cultivated land.

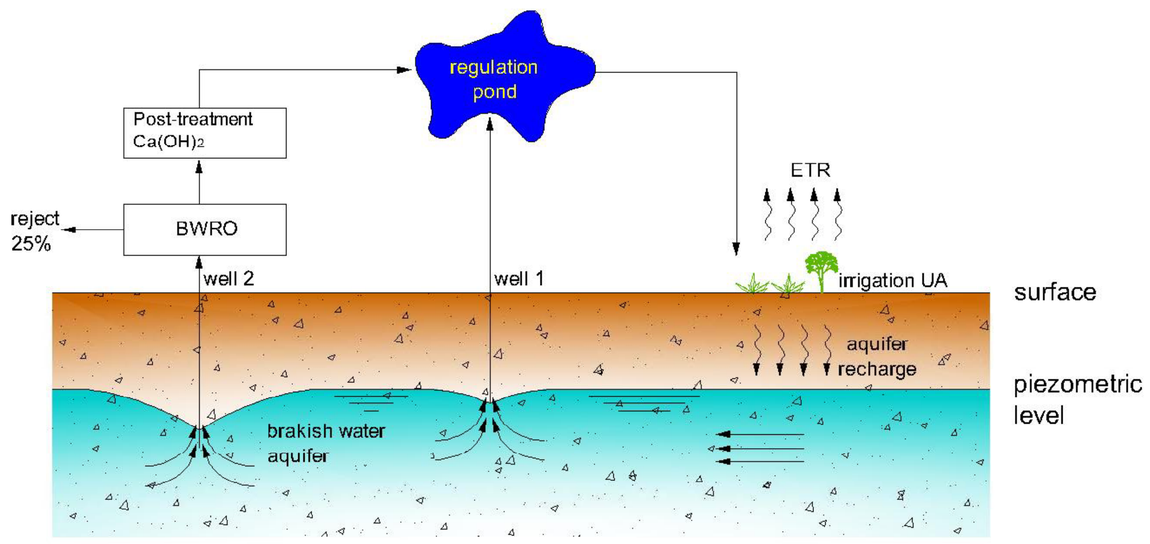
MAIN CHARACTERISTICS OF THE SYSTEM:

Irrigated area:	90ha
Losses of the system:	reject effluent (25% of pumped water) and ETR
Production of the plant:	450m^3/day
Maximum capacity (with well 1):	550m^3/day

CHARACTERISTICS OF DIFFERENT WATERS:

	aquifer (well 2)	desalinated water	regulation pond
pH	6.97	6.51	7.33
HCO_3^- (mg/l)	319.6	32.9	108.6
Cl^- (mg/l)	1417	77	407
SO_4^{2+} (mg/l)	1777	8	289
NO_3^- (mg/l)	148	36	52
Na^+ (mg/l)	1115.2	76.1	329.1
K^+ (mg/l)	22	1.5	78.1
Ca^{2+} (mg/l)	228.8	0	44.5
Mg^{2+} (mg/l)	318.8	0.4	78.1

FLOW-PATH OF THE COMPLETE CYCLE:



BWRO: Brakish Water Reverse Osmosis

RESULTS AND CONCLUSIONS

In this work, an efficient model of irrigation water management for a wide area in a region where water scarcity is a common feature has been presented. Although the groundwater quality renders the aquifer not suitable for its use, water desalination from the university experimental plant has proved to enhance water resources for recreational demand. Soil-water interaction processes still remain unknown. Despite of the accurate irrigation schedule and the continuous effort to improve the efficiency of the system, the irrigation return flow to the aquifer accounts for a substantial portion of the total aquifer recharge, and the effects and extent along the unsaturated zone and aquifer of the desalinated water reuse is not known. Moreover, presence of a range of compounds, such as heavy metals, emerging contaminants (PPCPs, i.e., anti-inflammatory drugs, antiscalants, antimicrobial agents etc) which may be present in the applied water and rejected brines needs of further research.

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