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Editorial
Sustainable management of the Water Cycle in terms of quality, quantity and economy

This special issue of *Desalination and Water Treatment* presents a collection of nine papers initially presented at the 2nd EWaS International Conference "Efficient and Sustainable Water Systems toward Worth Living Development". The conference was held on June 1-4, 2016, in Platanias/Chania, Crete, Greece (http://www.ewas2.tuc.gr). The conference was co-organized by the University of Thessaly/Civil Engineering Department and the Technical University of Crete/School of Environmental Engineering, (Co-chairmen: Assoc. Prof. V. Kanakoudis-University of Thessaly, Prof. G. Karatzas-Technical University of Crete). EWaS series of conferences started in 2013, when the 1st EWaS Conference was held in Thessaloniki.

The conference highlighted the need to improve the efficiency and sustainability of all water systems in a changing and fragile environment, especially under the frustrating economic conditions we are facing today. The current special issue of Desalination and Water Treatment was guest-edited by Associate Professor Vasilis Kanakoudis and Dr. Stavroula Tsitsifli, (Civil Engineering Department, University of Thessaly, Volos, Greece). The papers included in this special issue are based on the ones initially presented at the conference. However, they have been extended and revised by at least 50%, having gone through the standard peer-review process of the *Desalination and Water Treatment* journal. A short insight on each paper follows:

Basdeki et al. (2017) investigated the site selection, design and performance evaluation of rain gardens, using an urban neighborhood of Thessaloniki, Greece as case study. The study area suffers from street and sidewalk inundation during rain events of medium intensity. Selection of 8 rain garden sites, based on qualitative criteria, is discussed and further supported by preliminary calculations, regarding local sewer efficiency and rain runoff. Results have shown that rain garden construction at the selected sites can alleviate street and sidewalk inundation problems. Finally, design of certain technical features is discussed, taking into consideration large street slopes, typical of the study area, which might be useful in studies of other urban contexts.

Dimkić (2017) investigated temperature (T), precipitation (P) and river discharge (Q) trends in Serbia. Initially the observed multiyear T, P and Q trends in Serbia were identified, estimating the long-term average yearly trends. The results showed that temperature is expected to increase, precipitation is expected to slightly decrease (significant differences between western and eastern part of the country) and the river discharge is expected to decrease. Examining the average correlations between air temperature increase and changes in river discharges and precipitation, the results showed that an inversely proportional correlation between average annual temperatures and annual river discharges exists at all selected monitoring stations. Examining the low-discharge months (July through October), it is found that a considerably lower negative river discharge trend (close to zero) is noted, as a result of an upward precipitation trend during these months, but also due to human impact. Finally, the study's results (based only on observed changes, where regional

climate and hydrologic models (RCMs) were not used) are compared to the results obtained by RCMs for the near future in different projects and studies by other authors.

Kanakoudis and Tsitsifli (2017) reviewed the techniques used on monitoring, modelling and optimization for drinking water security assessment. The paper identifies the major factors affecting drinking water quality in water distribution systems. The paper presents the interconnecting tools that need to "work together" in early warning systems, providing the water managers with enough time to act effectively. These tools include monitoring tools to monitor in real time at least the most crucial water quality characteristics; modeling tools to simulate the transport of any harmful contaminant along with calculate the variations of its concentration; and optimization tools to define the optimal locations and density of the monitoring sensors and disinfection stations. The paper proposes an integrated approach consisting of risk assessment methods and the use of "simheuristics" to deal with drinking water security.

The paper of ***Karvelas et al. (2017)*** examined the use of magnetic nanoparticles for cleaning potable water from heavy metals. The authors present a numerical methodology that combines computational fluid dynamics and evolution strategy technics for the optimum magnetic navigation of particles in water. The method is based on an iterative algorithm that aims to minimize the deviation of particles from a desired trajectory by continuously adjusting a gradient magnetic field in an appropriate way. For the evaluation of the performance of this computational method, several series of simulations are performed with different number of adjustments of the magnetic field gradient. The study's results showed that the increase of the number of adjustments of the magnetic field gradient results in the decrease of the particles' deviation from the desired trajectory. Finally, the percentage of particles that are following the desired trajectory increases as the concentration of the simulated particles increases.

Kučera et al. (2017) present alternative procedures and agents, such as water glass and nanoiron for removing heavy metals and nutrients from water. The authors performed laboratory experiments to remove chromium and phosphorus from water. During the experiments, it was revealed that there is a dependence of the removal of the given pollution on the dose of the agent. The authors also developed the effectiveness curve of removal of selected pollutants from water, searching for the optimal dose of the agents.

The paper of ***Kourgialas et al. (2017)*** presented a 4-year study where the effects of a) sustainable soil management with weed mowing during spring and addition of compost without tillage (SUST) and b) intensive management with soil tillage and use of herbicides (INT) on soil properties related to water storage and salinity were determined in a drip-irrigated olive orchard in Crete-Greece. The results showed that higher annual levels of soil moisture were observed in SUST (+12%) as compared to INT, as well as in the rainy period (October–March) (+40%) as compared to the irrigation period (April - September). Mean soil moisture content was increasing by soil depth. Soil pH was unaffected while increased electrical conductivity was observed in the superficial soil layer, as compared to deeper soil layers as well as in SUST, as compared to INT. The authors presented a sustainable olive orchard management system that reduces soil erosion risk, enhances water storage in the root zone and, through mineral nutrient recovery at the local scale, contributes to energy savings by reducing use of chemical fertilizers.

Pappa et al. (2017) assessed the effectiveness of different methods of saltwater intrusion management in a coastal aquifer, using the study area of Hersonissos in Crete, Greece. The study area suffers from saltwater intrusion, being a significant threat for the sustainability of the local groundwater resources. The MODFLOW program coupled with the SWI2 package was used to calculate the hydraulic heads in the area and to estimate the position of the seawater intrusion front. Various saltwater intrusion management methods were examined such as the artificial recharge of the aquifer with reclaimed wastewater, the optimization of the pumping rates of the supply wells, and the extraction of saltwater at locations where the problem is more acute, indicated by the thickness of the intrusion zone. The above management options are evaluated individually and in combination, to assess their relative and joint effect in managing the saltwater intrusion problem in the area.

Taktikou et al. (2017) evaluated the capability of soil water content predicted from remote sensing to indicate the soil/canopy water content at short time and space scale, through comparisons with daily soil moisture data determined in situ, using dielectric devices. The paper focuses on the estimation of daily soil moisture content from MODIS remote sensing data, during the growing- (or summer-) period. The evaluation of all resulting predictions, indicate that there is an appreciable proximity of the experimental values of soil moisture averaged, as daily means for the depth of 10 cm.

Tsitsifli et al. (2017) developed and applied a novel methodology to determine the socially fair drinking water price based on the Full Water Cost recovery principle and taking into consideration Non-Revenue Water, allocating its cost to the water users. The full water cost is estimated according to the WFD 2000/60/EC and

then a methodology allocating Non-Revenue Water costs to water users (consumers and the water utility) is applied. The final outcome is a socially fair average water price. The methodology is applied in Kozani (Greece) water distribution network. The final average water price is derived after simulating the water price fluctuations due to the water price elasticity of demand.

Zeleňáková et al. (2017) investigated temporal and spatial variation of precipitation in 487 stations in Slovakia during the period 1981-2013. Statistical methods (Nonparametric Mann Kendall test, Spearman's Rho test and Theil Sen analysis methods) were used. The results showed that precipitation trends show high variability, showing an increasing trend, especially in the month of July. The authors showed that these results can be used as the basis for the development of river basin management plans and within the framework of risk assessment they will address all aspects of environmental risk management focusing on prevention, protection, preparedness (including forecasts and early warning systems) and considering the characteristics of each river basin.

The Guest Editors would like to thank all the authors for their worthy contributions to this special issue of *Desalination and Water Treatment* Journal. Furthermore, we would like to express our thanks to the Journal Editor-in-Chief, Prof. Miriam Balaban, for the faith she showed to the Guest Editors, and her help throughout the handling of manuscripts. We are also thankful to the several reviewers for the time and efforts they sacrificed to ensure high standards for the submitted manuscripts.

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