Water Resources and Environment

Vassilios A. Tsihrintzis¹ · Harris Vangelis¹

Published online: 15 December 2018

© Springer Nature B.V. 2018

The 10th World Congress on Water Resources and Environment, “*Panta rhei*”, was organized by the European Water Resources Association (EWRA) in Athens, Greece, 5–9 July 2017 (<http://ewra2017.ewra.net>). The organization was undertaken by the Centre for the Assessment of Natural Hazards and Proactive Planning and the Laboratory of Reclamation Works and Water Resources Management, School of Rural and Surveying Engineering, National Technical University of Athens. Key issue of the Congress was the non-stationarity of variables and processes, something expressed by the ancient Greek philosopher *Heraclitus* (544 to 484 B.C.), who is well-known for his ideas on continuous change as being the governing law of the universe, as expressed by his saying “*Panta rhei*,” i.e., “everything flows.”

Part of the organization was the celebration of the 30-year anniversary of the journal *Water Resources Management* with the publication of a special issue (Tsakiris 2017) under the theme “*Facets of Modern Water Resources Management*” (Volume 31, Issue 10, 2017). This benchmark issue of the journal included 22 review papers on a spectrum of diverse topics.

Nine specialized conferences were organized within the Congress on the following themes: (1) Advances in Hydrological Processes; (2) Climate and Water Resources; (3) Water Resources Management; (4) Droughts and Water Scarcity; (5) Water Quality and Environmental Processes; (6) Urban Water Networks; (7) Agricultural Water Management; (8) Groundwater Hydrology and Contamination; and (9) Legislation and Policies. A great number of scientists and engineers from fifty countries around the world participated in the Congress presenting more than 300 high quality papers in oral and poster form.

The next EWRA congress, the 11th World Congress on Water Resources and Environment, is already planned. Paper submission is open until December 31, 2018. It has the general theme “*Managing Water Resources for a Sustainable Future*” and will be held in Madrid, Spain, 25–29 June 2019 (<http://ewra2019.ewra.net/>).

✉ Vassilios A. Tsihrintzis
tsihri@survey.ntua.gr; tsihrin@otenet.gr

Harris Vangelis
harrivag@central.ntua.gr

¹ Centre for the Assessment of Natural Hazards and Proactive Planning & Laboratory of Reclamation Works and Water Resources Management, School of Rural and Surveying Engineering, National Technical University of Athens, 9 Iroon Polytechniou St., Zografou, 157 80 Athens, Greece

This special issue of *Water Resources Management*, with the title “*Water Resources and Environment*”, was guest-edited by **Professor Vassilios A. Tsihrintzis** and **Dr. Harris Vangelis**, both from the National Technical University of Athens, Athens, Greece. Originally, 52 papers presented at the conference were pre-selected for peer review and possible publication in the journal. The authors were notified to expand the paper and submit it for peer review. Finally, the following 23 papers passed the journal’s peer-review process and made it to publication. The topics dealt in these papers are briefly presented below.

Iglesias et al. (2018) discuss adaptation of water resources management to climate change. The paper presents visions on availability, accessibility and adequacy of water resources. Improved efficiency, optimisation of governance, enhancement of participation, development of risk-based choices, and economic instruments are included among the adaptation strategies. Constraints and barriers to implement these strategies are also discussed.

Das et al. (2018) focus on uncertainty associated with GCMs and climate change scenarios using Reliability Ensemble Averaging (REA) and possibility theory. It was observed that the uncertainty associated with GCM is more significant than the scenario uncertainty, while there is no significant difference in the outcomes observed between REA and possibility theory.

Dugdale et al. (2018) discuss the climate change effect on thermal habitats for fish in eastern Canadian rivers. The study presents the different effect of temperature increment on two key species in a large and socio-economically important watershed. Results are based on water temperature assessment for three future periods derived from a hydrological-water temperature model, calibrated against river temperature observations and driven using meteorological projections from a series of RCMs.

Climate change impacts on flood regime in the Southeastern South America region cannot be considered definite according to Silva and Portela (2018). Stationary models can be considered sufficiently robust for engineering design, given that sample sizes are adequate, although flood probabilities exhibit a strong year-to-year dependence on El Niño-Southern Oscillation.

Karnib (2018) presents a generic scenario-based framework of using Q-Nexus Model, to quantify the direct and indirect interconnections between water, energy and food systems. Numerous key challenges are quantified and simulated, and effective policy options are presented, thus bridging Science and Policy in Water-Energy-Food Nexus.

Risva et al. (2018) provide a simple and effective tool for low flow forecasting up to six months ahead, with minimal data requirements. The proposed framework is evaluated at 25 Mediterranean rivers of different scales and flow dynamics. The model exhibits very satisfactory predictive capacity in most of the examined catchments.

Effective and innovative approaches for the design and management of urban stormwater systems are discussed by De Paola et al. (2018). A Decision Support System for the optimal design of Low Impact Development (LID) practices for urban runoff control is presented and discussed, aiming at assessing the effectiveness of LIDs application in reducing both the flooded and conveyed volumes, at the expense of cost-effective solutions.

Park and Um (2018) developed a framework for an evaluative decision-making system, which was applied to the strategic environmental assessment (SEA) for dam planning in South Korea. The system compensates for information deficiencies by considering the sensitivity of weight factor criteria. The framework was tested in ten potential dam sites comparing dam construction effects using environmental adequacy criteria.

Temporal rainfall variability over a large area is investigated by Caloiero et al. (2018). A homogeneous monthly rainfall dataset of 559 rain gauges with more than 50 years of

observation has been used. Different values of tendencies have been observed, with the most significant the negative seasonal trend in winter and autumn.

Roozbahani et al. (2018) developed a framework using Bayesian Networks (BNs) model to predict groundwater levels under uncertainty. Groundwater resources planning and management scenarios, which can be employed for reducing the risk of aquifer level declining, were ranked using Multi-Criteria Decision Making methods (MCDM).

Margonis et al. (2018) studied the hourly actual evapotranspiration (AET) taking into account the canopy resistance. The study was based on experimental data measured at an olive orchard. The approach proposed by Priestley and Taylor (PT) and Katerji-Perrier (KP) models were evaluated as the most appropriate for the prediction of AET.

A two-dimensional analytical model describing the groundwater flow in a coastal leaky aquifer of wedge shape affected by the tides and bounded by two estuarine rivers is presented by Chuang and Yeh (2018). It is concluded that parameters such as diffusion, included angle and tidal river coefficients have significant effects on the head fluctuation of the aquifer.

Kouziokas et al. (2018) investigated the application of multilayer feed forward network models for forecasting groundwater levels. Multiple training algorithms and network structures were tested and several multilayer feed forward models were created. The results have shown a very good forecasting accuracy.

Increasing efficiency in water resources management in the Nile region was investigated by Stamou and Rutschmann (2018) under a water-energy-food nexus approach. A Pareto optimization was adopted for exploring optimal solutions and trade-offs that may support decision making process.

Gaur et al. (2018) developed Artificial Neural Network (ANN) and Bagged Decision Trees (BDT) models coupled with Particle Swarm Optimization (PSO) model to solve the well-field management problem. The results show that the coupling of piping network model with simulation-optimization model is very significant for finding the cost effective and realistic design of the new well-field system.

Srdjevic et al. (2018) discuss the water-related public participation (PP) problems. The Grounded Theory Methodology (GTM) is used to analyse the data collected. The results obtained for the Krivaja River basin in Serbia are similar to the results in developing countries, in terms of the distinction between official and non-official attitudes and views, the objectives of PP and the justification for introducing PP.

Identification of the suitable location of a water storage structure is discussed by Ahmad and Verma (2018). Remote Sensing (RS) and Geographic Information System (GIS) techniques are utilised. In the overlay process of GIS, the relative importance determined by Analytic Hierarchy Process (AHP) is applied to produce suitable locations.

Ramos et al. (2018) provide a systematic review of the use of environmental flows within the process of the Water Framework Directive (WFD) implementation and their contribution to the achievement of environmental objectives. Member States (MSs) have been looking to integrate ecological flows in the River Basin Management Plans (RBMPs) and Programmes of Measures (PoMs). The authors assess the progress of incorporating environmental flows within the 2nd RBMPs.

Informational Entropy method is introduced by Baran et al. (2018), as an alternative test method to test the goodness of fit of probability functions. The method was applied in precipitation data from 60 stations from different spatial regions and varying meteorological characteristics in Turkey, with positive results.

The incorporation of data uncertainty into multi-criteria decision analysis (MCDA) models that support policy making with respect to Water, Sanitation and Hygiene planning is explored by Ezbakhe and Perez-Foguet (2018). Two models are compared as to the management of data uncertainty and the results are thoroughly analysed.

Vieira et al. (2018) present a methodology supporting the simulation and evaluation of water reservoir systems operation by taking into consideration the implementation of ecological flows. The methodology may be used with several climate projections in order to generate data at the watershed scale. It is applied in a multi-reservoir system in Portugal.

The problems of lagged variable selection, hyperparameter handling, and comparison between machine learning algorithms and classical algorithms were explored by Papacharalampous et al. (2018) under the framework of an extensive multiple-case study. Empirical evidence on the solutions to the aforementioned problems is provided.

Mahmoodian et al. (2018) present a hybrid surrogate modeling strategy aiming at simplifying and accelerating a detailed urban drainage simulator. The proposed strategy was implemented in a small urban drainage network in Luxembourg. The results showed that the hybrid surrogate modeling strategy provides a reliable method to simplify the simulator and reduce its run time.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

References

- Ahmad I, Verma MK (2018) Application of analytic hierarchy process in water resources planning: a GIS based approach in the identification of suitable site for water storage. *Water Resour Manag*. <https://doi.org/10.1007/s11269-018-2135-x>
- Baran T, Barbaros F, Güllü A, Onuşluoğlu G (2018) Entropy as a variation of information for testing the goodness of fit. *Water Resour Manag*. <https://doi.org/10.1007/s11269-018-2144-9>
- Caloiero T, Coscarelli R, Ferrari E (2018) Application of the innovative trend analysis method for the trend analysis of rainfall anomalies in southern Italy. *Water Resour Manag*. <https://doi.org/10.1007/s11269-018-2117-z>
- Chuang MH, Yeh HD (2018) An analytical solution of groundwater flow in wedge-shaped aquifers with estuarine boundary conditions. *Water Resour Manag*. <https://doi.org/10.1007/s11269-018-2125-z>
- Das J, Treasa A, Umamahesh NV (2018) Modelling impacts of climate change on a river basin: analysis of uncertainty using REA & possibilistic approach. *Water Resour Manag*. <https://doi.org/10.1007/s11269-018-2046-x>
- De Paola F, Giugni M, Pugliese F, Romano P (2018) Optimal design of LIDs in urban stormwater systems using a harmony-search decision support system. *Water Resour Manag*. <https://doi.org/10.1007/s11269-018-2064-8>
- Dugdale SJ, Allen Curry R, St-Hilaire A, Andrews SN (2018) Impact of future climate change on water temperature and thermal habitat for keystone fishes in the lower Saint John River, Canada. *Water Resour Manag*. <https://doi.org/10.1007/s11269-018-2057-7>
- Ezbakhe F, Perez-Foguet A (2018) Multi-criteria decision analysis under uncertainty: two approaches to incorporate data uncertainty into water, sanitation and hygiene planning. *Water Resour Manag*. <https://doi.org/10.1007/s11269-018-2152-9>
- Gaur S, Dave A, Gupta A, Ohri A, Graillat D, Dwivedi SB (2018) Application of artificial neural networks for identifying optimal groundwater pumping and piping network layout. *Water Resour Manag*. <https://doi.org/10.1007/s11269-018-2128-9>
- Iglesias A, Santillán D, Garrote L (2018) On the barriers to adaption to less water under climate change: policy choices in Mediterranean countries. *Water Resour Manag*. <https://doi.org/10.1007/s11269-018-2043-0>
- Karnib A (2018) Bridging science and policy in water-energy-food nexus: using the Q-Nexus model for informing policy making. *Water Resour Manag*. <https://doi.org/10.1007/s11269-018-2059-5>
- Kouziokas GN, Chatzigeorgiou A, Perakis K (2018) Multilayer feed forward models in groundwater level forecasting using meteorological data in public management. *Water Resour Manag*. <https://doi.org/10.1007/s11269-018-2126-y>

- Mahmoodian M, Carbajal J-P, Bellos V, Leopold U, Schutz G, Clemens F (2018) A hybrid surrogate modelling strategy for simplification of detailed urban drainage simulators. *Water Resour Manag.* <https://doi.org/10.1007/s11269-018-2157-4>
- Margonis A, Papaioannou G, Kerkides P, Kitsara G, Bourazanis G (2018) Canopy resistance and actual evapotranspiration over an olive orchard. *Water Resour Manag.* <https://doi.org/10.1007/s11269-018-2119-x>
- Papacharalampous G, Tyralis H, Koutsoyiannis D (2018) Univariate time series forecasting of temperature and precipitation with a focus on machine learning algorithms: a multiple-case study from Greece. *Water Resour Manag.* <https://doi.org/10.1007/s11269-018-2155-6>
- Park D, Um MJ (2018) Robust decision-making technique for strategic environment assessment with deficient information. *Water Resour Manag.* <https://doi.org/10.1007/s11269-018-2066-6>
- Ramos V, Formigo N, Maia R (2018) Environmental flows under the WFD implementation. *Water Resour Manag.* <https://doi.org/10.1007/s11269-018-2137-8>
- Risva K, Nikolopoulos D, Efstratiadis A, Nalbantis I (2018) A framework for dry period low flow forecasting in Mediterranean streams. *Water Resour Manag.* <https://doi.org/10.1007/s11269-018-2060-z>
- Roobahani A, Ebrahimi E, Banihabib ME (2018) A framework for ground water management based on bayesian network and MCDM techniques. *Water Resour Manag.* <https://doi.org/10.1007/s11269-018-2118-y>
- Silva AT, Portela MM (2018) Using climate-flood links and CMIP5 projections to assess flood design levels under climate change scenarios: a case study in southern Brazil. *Water Resour Manag.* <https://doi.org/10.1007/s11269-018-2058-6>
- Srdjevic Z, Funamizu N, Srdjevic B, Bajčetić R (2018) Public participation in water management of Krivaja river, Serbia: understanding the problem through grounded theory methodology. *Water Resour Manag.* <https://doi.org/10.1007/s11269-018-2132-0>
- Stamou AT, Rutschmann P (2018) Pareto optimization of water resources using the nexus approach. *Water Resour Manag.* <https://doi.org/10.1007/s11269-018-2127-x>
- Tsakiris G (2017) Facets of modern water resources management: prolegomena. *Water Resour Manag* 31(10): 2899–2904. <https://doi.org/10.1007/s11269-017-1742-2>
- Vieira J, Conceição Cunha M, Luís R (2018) Integrated assessment of water reservoir systems performance with the implementation of ecological flows under varying climatic conditions. *Water Resour Manag.* <https://doi.org/10.1007/s11269-018-2153-8>