
Editorial

Ioannis K. Kalavrouziotis*

School of Science and Technology,
Hellenic Open University,
Tsamadou 13-15 and Saint Andrea,
262 22 Patras, Greece
Email: ikalabro@eap.gr
*Corresponding author

Andreas N. Angelakis

National Agricultural Research Foundation (NAGREF),
Iraklion Institute,
71203 Iraklion, Crete, Greece
Email: info@a-angelakis.gr

Biographical notes: Ioannis K. Kalavrouziotis received his PhD in Environmental Geochemistry from the Department of Geology, University of Patras, Greece in 1999. Currently, he is an Associate Professor in the Hellenic Open University, School of Science and Technology, in Wastewater Management (from 2013) and is the Director of the MSc program 'Waste Management'. From 2000 to 2013, he was working as an Associate Professor in the Department of Environmental and Natural Resources Management, in Agrinio, University of Western Greece. He is serving as an editorial member of several reputed journals like *Water Reuse and Desalination (IWA)*, *Environment and Pollution* (Canadian Center of Science and Education), *Journal of Environmental and Analytical Toxicology* and *Frontiers in Green and Environmental Chemistry Journal*.

Andreas N. Angelakis is a Water Resources Researcher at the National Agricultural Research Foundation (NAGREF), Institute of Iraklion, Hellas. He is also Technical Consultant of Hellenic Union of Municipal Enterprises for Water Supply and Sewerage (EDEYA.) He received his BS in Agricultural Sciences from the Agricultural Univ. of Athens, Hellas and in Civil Engineering from the Univ. of California, Davis, USA. Also, he received his MS in Water Resources and PhD in Soil Physics from Univ. of California, Davis, USA in 1977 and 1981, respectively. His scientific fields of interest are: environmental engineering; aquatic wastewater management systems; water and wastewater management for small and decentralised systems; treated wastewater renovation and reuse; and water and wastewater technologies in ancient civilizations. He is author/co-author of over 400 publications. He has over 2100 SCH citations and an i10-index of 45. More on this at <http://www.a-angelakis.gr/>.

In the long history of humankind the basic, most powerful, propelling force that shaped man's action was the need to secure food and water. All early civilisations had one thing in common; they were located near sources of water such as springs, rivers, lakes or streams. During the Neolithic age (*ca.* 5,700–3,200 BC), the first successful efforts to

control water flow were made in Mesopotamia and Egypt by constructing dams and irrigation systems, for the protection of the communities, and for securing water for food needs. The first known effort for water supply and wastewater management was undertaken during the Neolithic Age in El Kowm (or Al Kawm), located between the Euphrates River and the city of Palmyra in contemporary Syria. This location was one of the first places that domestic infrastructure for water and wastewater was built. The early Mesopotamian cities at the end of the 4th millennium BC to the beginning of the 3rd millennium BC had networks of wastewater and stormwater drainage. Some of these cities included Habuba Kebira, Mari, Eshnunna, and Ugarit. Wastewater disposal facilities such as drainage facilities were available in the Late Uruk Period (*ca.* 3,300–3,200 BC) at Habuba Kabira.

The first successful effort for developing advanced, comfortable, and hygienic lifestyle, as manifested from long-term very efficient water supply and sewerage systems, bathrooms and flushing toilets, were Minoans in the island of Crete (*ca.* 3200–1100 BC) and an unknown civilisation (*ca.* 2600–1900 BC) in Indus valley at Mohenjo-Daro, Harappa, and Lothal. The contacts of Minoans with Egypt intensified from the period of the first palaces (*ca.* 1900–1700 BC) onwards suggesting thus, a possible influx of technology related to water, wastewater, and stormwater management, in this particular era should be existed. In addition, based on the similarities of hydrotechnologies developed by Mesopotamians and Egyptians, Minoans, and Indus valley civilisations possible intercontacts of them should be suggested. These technologies were further improved during the Classical, Hellenistic, and Roman periods as well as during several Chinese Dynasties and Empires and pre-Columbian civilisations. On the other hand, unsanitary conditions and overcrowding were widespread throughout Europe and Asia during the Middle Ages, resulting periodically in cataclysmic pandemics such as the Plague of Justinian (541–542 AD) and the Black Death (1347–1351 AD), which killed tens of millions of people and radically altered societies.

However, the rapid technological progress in the last century, created a disdain for the past achievements. At the same time, a great deal of unresolved problems, appeared, related to the management principles, such as the decentralisation of the processes, the durability of the water and wastewater projects, the cost effectiveness, and the sustainability and especially the protection from floods and droughts. In the developing world, such problems were intensified in an unprecedented degree. Moreover, new problems have arisen such as the rapidly increasing urbanisation and contamination of water sources. Naturally, intensification of unresolved problems led societies to think of the past and to re-examine the successful past achievements. To their surprise, those who attempted this retrospect, based on archaeological, historical, and technical evidences, they were impressed by two things: the similarity between the principles applied now and the past ones, and the advanced level of past management of water, storm water and wastewater. Thus, today it is well-documented that most of the technological principles related to water and wastewater are not achievements of present-day, but date back to three and four thousand years ago.

In the two volumes of this special issue issues of water, stormwater and wastewater management in ancient civilisations, with the view to underline the contribution of the ancient water technology to the advancement of the contemporary methods of water and wastewater management are mainly presented. Some papers examine modern environmental themes trying to trace old influences. Some others refer to philosophical and scientific, rather than technological, aspects, examining the historical evolution of

water sciences. The contributions are basically an attempt of man's continuous and uninterrupted effort to control and efficiently manage water and wastewater throughout the centuries and to the advancement of human civilisations from its dawn to the present time.

The 12 papers included in this volume of the special issue, cover a wide spectrum of water and wastewater thematology, extended from prehistoric (including mythology) to present times. The first paper highlights the correlation of numerical simulation of wind currents with field data measured in the coastal and offshore zone of the Old and New Patras port in western Greece. A number of papers are dealing with the management of water systems (such as reservoirs, distribution systems and water supply of Hammams, i.e., Ottomans baths). Another three papers are reviewing the evolution of meteorology, the variability of hydrometeorological parameters, and the vulnerabilities of water and sanitation at households and community levels in face of climate variability and change. Also, the water use efficiency, the quality of domestic water, and the management of wastewater and stormwater, by improvement of water and wastewater services and/or increase their size are considered in couple of papers. Two more papers are focused on the present times water, sanitation, and environment problems, the determination of pesticide residues in fruits and vegetables and the application of the clean technologies for the treatment of winery's wastewater. The last paper of the second volume is considering a case study for the irrigation history in Barcelona, Spain.