Water and Wastewater Technologies in Ancient Civilizations: Conclusions

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Our symposium on ancient water and wastewater technologies has come to its end after three fruitful conference days and several months of preparation, which demanded substantial efforts from the organizing committee and the contributors. The aims of the symposium were:

(a) to reveal the cultural heritage in several regions of the world and to make visible the archaeological remnants of technologies which have contributed to the development of the existing technologies in water and wastewater management;
(b) to describe and evaluate the old technologies, which on a long term may contribute to water and wastewater management systems and to the development of integrated methodologies; and
(c) to develop small systems based on old technologies using new equipment, which may be of great significance for water, wastewater and environmental management in the future, particularly in developing countries.

It is a joint conviction of all participants that the symposium succeeded in its objectives. The organizing committee was impressed by the large participation, the diverse themes of presentations and the substantial advancement of a topic which is not well studied to date. 80 papers shaping a volume of 800 pages, and over 200 contributors and participants are some statistical data giving this impression an objective character. The symposium was an international one, with scientists and professionals from 30 countries (Table 1). Simultaneously, it was an interdisciplinary symposium, with representatives of several scientific and technological disciplines and with additional participation of the industry (Table 2).

Table 1: Distribution of the contributors and participants of the symposium by country.

Country	# participants	Country	# participants	Country	# participants
Algeria	2	Greece	92	Libya	1
Australia	2	Hong Kong	1	Mexico	2
Bangladesh	1	Hungary	1	Morrocco	2
Belgium	6	Iran	14	Palestine	3
Canada	10	Ireland	6	Slovakia	1
China	2	Israel	3	Spain	8
Egypt	2	Italy	17	Sri Lanka	1
France	1	Japan	2	Turkey	2
Finland	3	Jordan	3	UK	10
Germany	5	Lebanon	1	USA	7

Table 2: Scientific, technological and professional fields of the contributors and participants of the symposium.

Agriculture	Environment	Meteorology
Archaeology	Geology	Mineralogy
Architecture	Governance	Public Health
Biology	History	Photography
Classical Studies	Hydrology	Physics
Chemistry	Jewellery	Soil Sciences
Economics	Land Management	Tourism
Engineering	Life Sciences	Water Resources

We have attempted to draw a few general conclusions that summarize the state of the art in the field and the symposium contribution. Here is the list of the five most important, in our opinion, conclusions:

1. The history of water science and technology …
    - … is currently not widely known;
    - … contains biased, inaccurate or inconsistent bits of information and has a lot of gaps;
    - … is important to know; and
    - … should be re-written, particularly in those chapters where biases and inaccuracies have been already located.
2. There is interest on revisiting past water technologies and management practices, which is justified by the understanding …
    - … of the diachronic similarity of problems;
    - … of the deadlocks and intensification of problems in the current situation;
    - … that history is the best teacher for future (the past is the key to the future); and
    - … that ancient civilizations have developed advanced knowledge, wisdom and sustainable practices.
3. History teaches that water management is important for the sustaining of civilizations and that sightless or insufficient management may result in civilization collapses; particularly, civilization collapses have been resulted from …
    - … inability to deal with climate changes, which seem to have been occurred several times in the past;
    - … persistent, multiyear droughts;
    - … destructive and recurrent floods that destroyed hydraulic infrastructures; and
    - … negative human impacts on the environment (deforestation, erosion, desertification).
4. History teaches that many civilizations all over the world have developed magnificent technologies and management practices characterized by …
    - … sustainability and durability (operation for millennia, as opposed to today's design horizons of 20-50 years);
    - … safety and security (as opposed to today's insecure structures);
    - … wise combinations of small-scale and large-scale projects and measures (as opposed to today's dominance of large- or mega-scale projects);

5. There is a lot to learn from ancient technologies and practices; the current symposium is a successful first step and the continuation of this research will certainly suggest improved solutions for current and future problems.

For the continuation of this research the Symposium proposes the establishment of a Specialist Group on Water and Wastewater in Ancient Civilizations, within the frame of International Water Association, and the organization of a second symposium in Italy. Furthermore, the Symposium, taking into consideration the importance of archaeological monuments and remnants as the main source of information of the of ancient water and wastewater technologies, addresses an appeal to national and international organizations for the protection of these monuments.