

A Brief History of Water and Health from Ancient Civilizations to Modern Times

Water is life – and life on earth is linked to water. Our existence is dependent on water, or the lack of it, in many ways, and one could say that our whole civilization is built on the use of water.

This article examines the influence of water on public health throughout history. Farming and the development of settlements lead to the beginning of the problem that faces mankind today – how to get drinkable water for humans and cattle and how to manage the waste we produce. The availability of water in large quantities has been considered an essential part of civilization throughout the different periods: Roman baths needed a lot of water, as do the water closets and showers used in current Western civilization. The importance of good quality drinking water has been established for years. However, the importance of proper sanitation was not understood until the 19th century.

This article outlines the importance of water throughout history. special attention is paid to the first urbanization of ancient civilizations, particularly in ancient Greece and Rome (Vuorinen 2007). However, the second, third and fourth phases of urbanization are also briefly described. Finally, the major findings and their implications for current water management and policies are discussed.

Early Systems and Innovations

Modern humans (*Homo sapiens*) have dwelled on this earth for some 200 000 years, most of that time as hunter-gatherers and gradually growing in number. Approximately 50 000 years ago modern man began to inhabit every corner of the world and people were constantly on the move. Occasionally people were troubled by pathogens transmitted by contaminated water, but the general aversion for water that tasted revolting, stank and that looked disgusting must have developed quite early during the biological and cultural evolution of humankind. It has been postulated that the waterborne health risks of hunter-gatherers were small.

Archaeological and written sources concerning water and sanitation can, however, only be found from relatively recent times. Thus, in reconstructing the history of water and sanitation of this hunter-gatherer phase, we have to rely on the analogies of later societies. Modern anthropological studies and recorded mythologies of indigenous peoples play an important role in these analogies while observing primates and other more evolved mammals can also give us useful information.

Some 10 000 years ago, when people adopted an agrarian way of life, mankind established permanent settlements. This new type of livelihood spread everywhere and the population began to expand faster than ever before. Sedentary agricultural life made it possible to construct villages, cities and eventually states, all of which were highly dependent on water. This created a brand new relation between humans and water. Pathogens transmitted by contaminated water became a very serious health risk for the sedentary agriculturists. In this world guaranteeing pure water for people became a prerequisite for successful urbanization and state formation.

The earliest known permanent settlement, which can be classified as urban, is Jericho from 8000–7000 B.C., located near springs and other bodies of water. In Egypt there are traces of wells, and in Mesopotamia of stone rainwater channels, from 3000 B.C.. From the early Bronze Age city of Mohenjo-Daro, located in modern Pakistan, archaeologists have found hundreds of ancient wells, water pipes and toilets. The first evidence of the purposeful construction of the water supply, bathrooms, toilets and drainage in Europe comes from Bronze Age Minoan (and Mycenaean) Crete in the second millennium B.C.

The experience of humankind from the very beginning testifies to the importance and safety of groundwater as a water source, particularly springs and wells. The way in which water supply and sanitation was organized was essential for early agricultural societies. If wells and toilets were in good shape, health problems and environmental risks could be avoided.

The realization of the importance of pure water for people is evident already from the myths of ancient cultures. Religious cleanliness and water were important in various ancient cults. Ideas of the salubrity of water were connected to the general “scientific” level of the society. The first known Greek philosophical thinkers and medical writers also recognized the importance of water for the public health.

Ancient Greece and Rome

The first urbanization in Europe occurred during antiquity (500 B.C. – 500 A.D.) around the Mediterranean region. The share of urban population reached some 10–20 % in the centuries around the birth of Christ. The most urbanized areas were the Eastern Mediterranean, Egypt, North Africa (modern Tunisia), the Apennine Peninsula (modern Italy), and the southern part of the Iberian Peninsula, most of which were areas of quite modest rainfall. In this period the archaeological and written sources become richer, and consequently improve our possibilities to study the relationship between water and health of people.

Alcmaeon of Croton (floruit ca. 470 B.C.) was the first Greek doctor to state that the quality of water may influence the health of people. (Aëtius, *On the opinions of the philosophers* V.30.1) Hippocratic treatise *Airs, Waters, Places* (around 400 B.C.) deals with the different sources, qualities and health effects of water in length. (*Airs, Waters, Places*. 1, 7, 8, 9) Various other Hippocratic treatises (mostly written around 400 B.C.) contain short comments on the influence of water on the health of people (*Internal Affections*. 6, 21, 23, 26, 34, 45, 47; *Diseases I*. 24; *Epidemics II*. 2.11; *Epidemics VI*. 4.8, 4.17; *Aphorisms*. 5.26; *Humours*. 12; *Regimen IV or Dreams*. 93).

According to B.C. Vitruvius from the late first century, marshy areas must be avoided when the site of a city is chosen. (*De Architectura*. I.iv.1) Pliny the Elder in the first century A.D. had in his works a long section concerning the different opinions on what kind of water is the best. (Plinius *NH*, XXXI, xxi–xxiii). One of the most famous doctors during antiquity Galen (2nd century A.D.) summarises the preferable qualities of water (Galen. *De Sanitate Tuenda*. I.xi).

The quality of the water was examined by the senses: taste, smell, appearance and temperature. Also the health of the people and animals using a water source was considered (Vitruvius *De Architectura*. I.iv,9,10; VIII, iv,1,2). Throughout antiquity tasty or tasteless, cool, odourless and colourless water was considered the best, and stagnant, marshy water was avoided. These ideas were held until the end of antiquity as expressed by Palladius (5th century, *Opus Agriculturae*. I, 4) or Paulus Aeginata (7th century, Paulus Aeginata I.50). The ancient Greeks and Romans were also quite aware of the dangers of water coming from hills and mountains where mining was practised (*Airs, Waters, Places*. 7; Vitruvius. *De Architectura*. VIII,iii,5).

The ancient authors have thus made some comments about the influence of different kinds of water on the health of people, but had these comments any influence on the health of people is hard to infer. Because of the inadequacy of sources, it is practically impossible to evaluate the health of ancient populations and the role of water in it. It is, however, quite safe to conclude that despite the impressive measures used to obtain pure potable water, urban centres had serious public health problems. The ancient Greek or Roman society did not have the interest or the means to deal adequately with matters of public health (Nutton 2005: 26).

The Greeks and Romans used different methods to improve the quality of the water if it did not satisfy their quality requirements. From written sources and archaeological excavations, we know that using settling tanks, sieves, filters and the boiling of water were methods used during antiquity. At least boiling of water, which was widely recommended by the medical authors during antiquity, would have diminished the biological risks of poor quality water. Although the boiling of water might have been feasible from a hygienic point of view, it was ecologically and economically not feasible in extensive use since firewood and other combustibles would sooner or later have become a scarce resource around the Mediterranean.

The poor level of waste management, including wastewater, most probably involved a major risk for public health during antiquity. For instance, toilet hygiene must have been quite poor. The abundance of water that was conducted to the bath could also be used to flush a public toilet. The Romans, however, lacked our toilet paper. They probably commonly used sponges or moss or something similar, which was moistened in the conduit in front of the seat and then used to rinse their bottoms. In public toilets facilities were common to all; they were cramped, without any privacy, and had no decent way to wash one's hands. The private toilets most likely usually lacked running water and they were commonly located near the kitchens. All this created an excellent opportunity for the spreading of intestinal pathogens.

Water-borne infections must have been among the main causes of death. Dysentery and different kinds of diarrhoeas must have played havoc with the populations. Although the ancient medical writers described different kinds of intestinal diseases, the retrospective diagnoses are difficult and the causative agents cannot be identified. Summer and early autumn, when water resources were meagre in the Mediterranean world, must have been a time when drinking water was easily contaminated, and intestinal diseases were rife as presented in several passages in the Hippocratic writings (e.g. *Airs, Waters, Places*. 7; *Aphorisms*. III, 11, 21, 22; *Internal Affections*. 26, 45). The mortality of children, especially recently weaned, must also have been high (*Prorrhetic II*. 22).

Furthermore, it should be kept in mind that the salubrity of the water supply must have differed markedly in accordance with the social status of people in the Roman towns. The rich had running water in their homes; the poor had to fetch their water from public fountains. The rich had their own baths and toilets, while the poor had to use public toilets and baths. All this must have led to different health conditions and levels among rich and poor people.

A lot of the water in a Roman town was consumed in bath(s) connected to the aqueduct(s) (Figure 1). Ideally shining marble walls and limpid water were considered a feature of a bath in Rome, the cleanliness of which was watched over by aediles (Seneca. *Ad Lucilium epistulae morales*. 86). Baths were probably also beneficial for public health in towns where there was an abundance and rapid turnover of water. However, in towns where water was in short supply, cisterns had to be used and the turnover of water was slow, the role of baths was probably negative for public health.



Figure 1. Aqueduct in Agia Napa, Cyprus (Photo: P. Juuti).

Water supply and sanitation for military needs was a primary concern of the authorities of an imperial power like the Roman Empire needing a strong military machine. The Romans did know how to obtain adequate amounts of drinking water for their garrisons, cities and troops in the field and thus successfully planned their operations according to the availability of water. Army veterans were well accustomed to baths and to an ample water supply during their active service, and they may have been a quite important pressure group for building an aqueduct and bath in a town.

The contamination of water by lead has been a topic in the discussions concerning the health of people in Roman times. Roman authors expressed doubts concerning the use of lead pipes and recommended the use of ceramic pipes (Vitruvius. *De Architectura*. 8.6.10–11; Palladius. *Opus Agriculturae*. 9.11; Columella. *Rei Rusticae* 1.5.2; Plinius. *NH*. XXXI.31.57). However, in practice it seems that although ceramic pipes were used, water was in many situations routinely distributed by lead pipes, as revealed by both written sources (Vitruvius *De Architectura*. 8.6.1, 4–6; Frontinus. 25.2, 27.3, 29.1, 30.1, 39–63, 105.5, 106.3, 115.3, 118.4, 129.4–6) and archaeological remains (Bruun 1991: 124–127; Hodge 1992: 307–315). Yet, there are two reasons to believe that exposure through water was quite minimal, as pointed out by A. Trevor Hodge (Hodge 1981 and 1992: 308). Firstly, as a consequence of the quality of the water, a calcium carbonate coating separated the lead and the water in most cases. Secondly, because of the constant flow, the contact time of water in the pipe was too short for contamination by lead.

The indirect public health effects of water might have been greater than the direct effects during antiquity. Agriculture depended on the proper amount of available water. Droughts and floods led to food shortages and famines. Food, people and pathogens moved most easily by water during antiquity. Maritime trade was especially vigorous around the Mediterranean in the period 200 B.C.– 200 A.D.. This meant that the Mediterranean world became more or less a common pool of infectious diseases (McNeill 1979, 78–140). Two important diseases caused by parasites were intimately connected with water and the ways water was managed during antiquity: namely malaria and schistosomiasis.

The breeding of mosquitoes depended on water and mosquitoes spread malaria, which was a serious and widespread health problem around the Mediterranean during antiquity. Malaria was well documented by Greek and Roman medical authors from the Hippocratic writings onwards. Among the cases in *Epidemics I* and *III*, a serious complication of chronic malaria, blackwater fever, has been identified by Mirko D. Grmek at least in one patient, Philiscus, but probably also in another, Pythion (*Epidemics I*, fourteen cases, case 1; *Epidemics III*, sixteen cases, case 3; Grmek 1989: 295–304). A fine description of malarial cachexia is to be found in *Airs, Waters, Places*, (*Airs, Waters, Places*, 7; Grmek 1989: 281).

Schistosomiasis (bilharzias) has been for millennia a scourge in Egypt. The parasite (blood-vessel inhabiting worms) has an intricate relationship between the human host and a snail intermediate host. The type of agriculture (irrigation, flooding of the Nile) must have spread the disease. Although the evidence from ancient Egyptian medical papyri remains hard to interpret, there is strong paleopathological evidence of schistosomiasis in human remains from ancient Egypt.

Frontinus expressed clearly that a water system needed constant maintenance to function efficiently (Frontinus 116–123). For instance, calcium carbonate incrustation that formed inside the conduits needed constant removal, otherwise the flow of water would eventually

stop (Hodge 1992: 227–232). In Italy aqueducts and baths seem to have been maintained even after other monumental buildings in the towns, with the exception of town walls and palaces, fell into disuse in late antiquity (Ward-Perkins 1984: 31, 128). In Antioch and other Near Eastern towns, at least part of the ancient water system was maintained into the Byzantine period and possibly up to the Era of Islam (Kennedy 1992). Although there were continuities from antiquity to the Middle Ages, the water supply was more limited and the Christian water patronage replaced the classical one: it was a move from luxuria to necessitas (Ward-Perkins 1984: 152).

The Second Urbanisation: Period of Slow Development

After the fall of the Roman Empire, water supply and sewage systems experienced fundamental changes in Europe. Medieval cities, castles and monasteries had their own wells, fountains or cisterns. Usually towns built a few modest latrines for the inhabitants, but these were mostly inadequate for the size of the population. The lack of proper sanitation increased the effects of epidemics in medieval towns in Europe.

Fundamental changes began to appear: science and knowledge were institutionalized for the first time when the development of modern universities started in the 13th century, and the agricultural world set out to industrialize from the 18th century onwards. Consequently, the growth of world population increased (Figure 2). All this profoundly affected

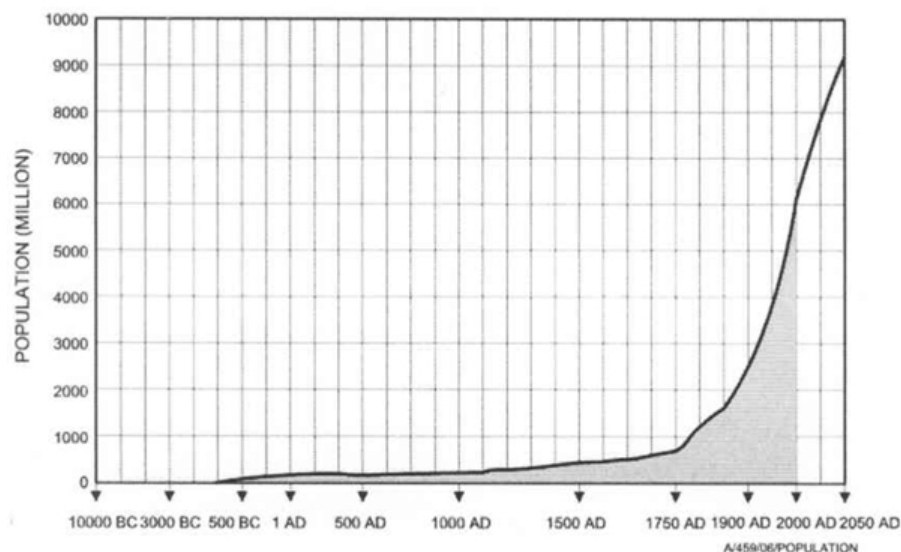


Fig 2. Estimated human population growth from 10 000 B.C. until year 2050 (Source: Juuti et al 2006: 13).

Along with the industrialization and urbanization of the Western world, enlightened people were fascinated with the idea of progress. Ever since the 18th century, science and reason were considered to be able to lead humankind towards an ever-happier future. This was the period when the first actual water closet was developed. By 1900, the water closet became a generally accepted cultural necessity in the Western world – the same way aqueducts had been in the Roman Empire. The water closet was seen as a victory for public health without any consideration for where the human excreta went through sewer pipes.

The start of industrialization and the related growth of cities created a situation where public health and environmental problems overwhelmed city governments to a greater degree than before, and novel technology was often seen as the solution. In the 19th century, Great Britain was seen as the forerunner of modern water supply and sanitation systems, but the innovations soon spread to Germany, other parts of Europe, USA and later also elsewhere.

Sanitation in towns around Europe was one of the great achievements of the 19th century. During the century the role of water in the transmission of several important diseases – cholera, dysentery, typhoid fever and diarrhoeas – was realized. The final proof came when the microbes causing these diseases were discovered. Especially cholera served as a justification for the sanitary movement around the world in the 19th century.

Sensory evaluation of water quality was complemented with chemical and microbiological examination. During the 19th century, filtering of the entire water supply of a town was introduced and the systematic chlorination of drinking water started in the early 20th century. The discovery of microbes and the introduction of efficient ways of treating large amounts of water paved the way to an era in which the public health problems caused by polluted water seemed to belong to history.

The Third Urbanisation: Modern Urban Infrastructure

The 1900s was a period of extensive population growth – the global population about quadrupled while the urban population increased 13-fold (Figure 2). By 2000 A.D., in almost every country, over half of the population lived in urban areas. During the century industrial production increased 40-fold and the consumption of energy by a factor of tens. Water and sanitation services had a definite role in this rapid socio-economic change of the entire globe.

In the early 20th century the health problems associated with water pollution seemed to have been resolved in the industrialized countries when chlorination and other water treatment techniques were developed and widely taken into use. Microbiological problems related to water were largely considered a problem of the developing world. However, in the late 20th century the biological hazards transmitted by water emerged again in the post-modern Western world. Anxiety about chemical and radioactive environmental hazards and their impacts on human health mounted in the 1960s. The overall amount of known biological and chemical health hazards transmitted by water increased manifold during the last half of the 20th century.

In today's world around 10 000 people die every day due to diseases like dysentery, cholera, and various diarrhoeal diseases, caused by a lack of safe water and adequate sanitation. Yet, since most of those who die are children and old people, whose death is considered “natural”, or people who are more or less marginalized in their societies (e.g. refugees, the poor) or living outside areas that are important for the global economy, mortality due to these waterborne diseases is too often considered unavoidable.

The Fourth Urbanisation: Future Challenges

In the historical context, the growth of urban centres has been a continuous and even an escalating trend. Many of these centres are today located in developing economies, while the ensuing problems are concentrated on the poorest people – as always. The most severe constraints include poor living conditions, a lack of democracy, poor hygiene, illiteracy, corruption and a lack of proper water and sanitation services. Especially women and children suffer from these constraints.

Today there is a global shortage of potable water. When making fundamental decisions concerning water supply and sewerage, it is also necessary to be ready to make big investments. Services that are now at a high operational level were not achieved easily and without massive inputs and efforts. This is something to keep in mind when assessing future options and considering required strategies.

The level of water supply and sanitation in a society is not necessarily bound with time and place as much as the capability of that society to take responsibility for developing the living environment of its citizens and proper policies. In some cases, the situation was even better earlier than nowadays. Decisions have been made concerning water and sanitation systems – e.g. the universal acceptance of the water closet as a cultural necessity – that through path dependence have limited future options. There have also been situations where the choice of a technology has been regarded as problematic from the first beginning but has been chosen anyway. For instance, lead pipes were considered hazardous for health already in antiquity but continued to be used in house connections until recently.

Water supply and sanitation systems have always required continuous maintenance and adequate rehabilitation. This was already evident with the Roman aqueducts: calcium carbonate incrustation forming within the conduits needed to be removed constantly or it would have stopped the flow of water. The same is true for modern systems: they must be maintained to function properly.

Major Findings and their Relevance

The 30 cases from all the continents covering various historical phases indicate that the level of water supply and sanitation is not necessarily bound with time and place as much as the capability of society to take responsibility for developing the living environment of its citizens.

Below we will shortly discuss some of the key findings according to the horizontal themes of the book: population growth, health, water consumption, technological choices and water governance.

Population density & poverty

Throughout the history major problems seem to be concentrated largely on the same people - the poor, if not the poorest of the poor. They suffer from poor sanitation, lack of good water, ensuing health problems, poor education and often lack of good governance and basic democracy. Women, children – and especially girls – are often the ones who fetch the water from distant sources of water. This daily task prevents the latter going to school, learning to read etc. Eventually they become adults who might not be able to act as an active citizen and all in all have effect on their own lives let alone the society as a whole.

From the point of view of our and the environment's wellbeing, it is essential that water is good and safe – regardless whether it is from piped systems or point sources like wells. The same is the case with sanitation – it is a question of being connected either to the sewer or using proper on-site sanitation solutions. It is just vitally important to operate and maintain the systems properly. A well and an eco-toilet, especially in areas with scattered settlements, will also provide in future durable and ecological solutions. Investing in water supply and sewerage and thus also in the environment is always worthwhile. Studying wells and toilets needs more resources, so that we could find the best solutions and paths of action for different conditions – there is no such thing as cookie-cutter solution for systems which have such direct interaction with the environment.

For economic but also for several other reasons, it is not feasible to have waterborne sewerage everywhere while obviously they are needed in densely-populated areas at the moment. In dispersed rural areas at least such alternative on-site systems can be considered.

These alternative systems seem particularly be subject to local conditions.

Health

Public health has always been a major factor influencing the ways how water supply has been solved by societies. The source of water supply was chosen according to its salubrity: clear, odourless water e.g. from springs or wells was preferred. Already from antiquity it was known that certain kinds of water caused health problems. Stagnant and marshy waters were avoided throughout times. New waterborne health hazards were recognized from the 19th century onwards: microbes, chemical pollutants.

We know that people have used their senses to perceive the quality of drinking-water at least from antiquity and most probably long time before. Related to the technological development new methods to study the quality of water were introduced from the 19th century onwards including chemical and microbiological studies. Concerning these two factors in historical perspectives we can see a clear continuity and also strong changes that both are depending on the scientific and technological level of the society.

Already in antiquity various methods like sieves, filtration and boiling were used to improve the quality of drinking-water. However, it was only in the 19th century that filtration of drinking water in urban centres became a common practise. Disinfection of drinking-water by different methods was introduced in the early 20th century. By proper use of the water treatment technologies the salubrity of drinking-water could be guaranteed to ever growing population.

The importance of good quality drinking-water for urban population was realized already in antiquity. Yet, the importance of proper sanitation for the health of town people was not discovered until the 19th century. The building of “modern” urban sewerage systems started in Britain and rapidly spread all over the globe.

Water use

Water used in large quantities has been deemed as an essential part of civilized way of life in different periods: Roman baths needed a lot of water as does the current way of life with water closets, showers and jacuzzis. Particularly high rates of water use are noticed when it is not properly charged for. The evidence indicates that as soon as water but also wastewater are charged according to the real costs wastage diminishes remarkably. Although at the global scale the great majority of water is used for irrigation, the highest priority of water use purposes is for the community water supply.

Throughout history there have been different solutions to guarantee an ample amount of water for human settlements. Indigenous people have been very ingenious in drawing their water. They have considered water a very crucial and often a sacred element. In the long run the availability of abundant or adequate amount of water has been one of the crucial factors for the development of a society – cities and communities.

Technological choices

In some cases the technological choices may have been erroneous or less successful. Example of these are lead pipes, used in the antique and continued to be used in house connections until recently. Ultimately water supply and sanitation systems need continuous maintenance and adequate rehabilitation. This was already evident in the Roman aqueducts: calcium carbonate incrustation formed inside the conduits needed constant removal, while otherwise stopping the water flow. The same is true for the modern systems, the maintenance of them must be taken care of otherwise they do not function properly. The bigger – if not the biggest – problem is related to the need of continuous replacement and rehabilitation.

One long-term debatable issue has been, and still is, whether to use ground or surface water as raw water for community purposes, or more generally, what sources to use. For small systems often ground water was available but for bigger systems surface water was needed. This is connected to the current question how far is it economically feasible to expand such systems. Once the systems expand other criteria such as vulnerability are also to be considered.

Governance

World Water Development Report 2003, produced practically by all the UN family and thus almost all the sectors of human life and society, pointed out how the water crisis is largely a crisis of governance. The report pointed further “many of the leading obstacles to sound and sustainable water management: sector fragmentation, poverty, corruption, stagnated budgets, declining levels of development assistance and investment in the water sector, inadequate institutions and limited stakeholder participation”

The findings of our book refer to the need of good governance – as pointed recently by several international water policy documents.

are largely along the same lines. People should be allowed and encouraged to use their own experiences and abilities to solve their problems. Such empowerment will most probably have more sustainable results than any mere top-down approaches. In overall good and effective water governance We obviously need to balance the centralised requirements such as legislation and decentralised requirements of water services management at local levels of cities, communities and households. It is The findings of this book also imply the important to involve all the stakeholders in decision-making in their proper roles as well as participation of users and citizens – the ultimate users, beneficiaries and payers of these services.

Interestingly enough, some of the basic principles of sustainable and viable water governance and services were written more than 2000 years ago. Using these principles many of the present problems could be avoided and solved. In spite of this mankind does not use largely these principles due to lack of proper governance but also resistant attitudes among people. It seems to be difficult, if not impossible, to resist advantages and profits gained on short-run by some, instead of thinking of long-term benefits potentially achieved by far many.

It seems to be very challenging for mankind to adopt systems and issues of fundamental importance – such as water supply and sanitation. Unfortunately it is psychologically much easier to promote bottled water or handing-over water services to international private operators – both interested mainly on short-term profits. Indeed, any sustainable water services will require long-term actions and planning, which the current western culture largely ignores. The time frame and related thinking seem to become shorter and shorter.

Yet, change itself should not be an end in itself. Decisions made in antiquity and in the late 19th century had a minimum frame of a century and often even more. In the foreseeable future such time frame should also be used if any sustainable results are to be achieved.

More than just a commodity, water is an economic and social good. This places responsibility for its management and oversight in the public sphere. Balancing of water use priorities, water quantity and water quality is of high importance for the futures. While water supply will continue to have the highest priority water quality issues will be relatively even more important than quantity. At the same time it is more and more important to use water wisely and avoid wastage of this important natural resource. In global context water pollution control and sanitation are probably the biggest challenges – removing substantially wastewater loadings from communities, industries and agriculture in many parts of the world.

Finally, the historical cases reveal that there is probably wider diversity of options and development paths – whole sets of institutional arrangements – than believed or recognised so far. The role of capital cities has not been as dominant as earlier assumed. In many cases remarkable networking of professionals has taken place in the early phases.

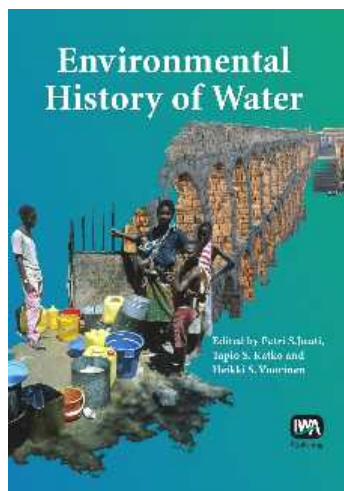
There is a huge variety of development paths and solutions in urban water supply and sanitation. Local conditions, traditions and people have to be in the core of decision making when future solutions are considered. However, since water sources for every city have their own unique location and quality, and each city has its own unique physical, social and administrative morphology, solutions of one city may not work for another.

In the long historical perspective it is evident that regardless of the political system good local solutions can be found based on local conditions, needs and traditions. Although water – and particularly water services – are largely dependent on local conditions. Yet, it is useful to make comparative studies between cities and communities in various regions and cultures, and identify possibly applicable and replicable principles and practices.

Resources

This article summarizes the general outline and the main results of the book, *Environmental History of Water: Global View of Community Water Supply and Sanitation* (<http://www.iwapublishing.com/books/9781843391104/environmental-history-water>) by Petri S. Juuti, Tapio S. Katko, and Heikki S. Vuorinen published by IWA Publishing. The focus of the book, *Environmental History of Water*, is on water, sanitation services and their evolution. Altogether, 34 authors were invited to put together 30 chapters for this multidisciplinary book. The book is divided into four chronological parts; from ancient cultures to the challenges of the 21st century, each part includes an introduction and conclusion written by the editors. The authors represent such disciplines as: the history of technology, the history of public health, public policy, development studies, sociology, engineering and management sciences.

The book emphasizes that the history of water and sanitation services is strongly linked to current water management and policy issues, as well as future implications. Geographically the book consists of local cases from all inhabited continents. The key penetrating themes of the book include population growth, health, water consumption, technological choices and governance. The history of water and sanitation services is strongly linked to current water management and policy issues, as well as future implications. Cross-sectional and historical intra-national and international comparisons have been recognized in many contexts as a valuable method of studying different sectors of human life - including technologies and governance. With regards to the latter, the World Water Development Report 2003 pointed out the extensive problem that: 'Sadly, the tragedy of the water crisis is not simply a result of the lack of water but is, essentially, one of poor water governance.'



Book Reviews

The book has been reviewed in several journals, such as *Natural Resources Forum* 32 (2008) 168–170 and *Water Alternatives* 1(2): 289–291.

Editors' Affiliations

Petri S. Juuti - PhD, Adjunct Professor, Department of history, University of Tampere, Finland

Tapio S. Katko - Doctor of Technology, Adjunct Professor, Tampere University of Technology, Finland

Heikki S. Vuorinen - MD, Adjunct Professor, Department of Public Health, University of Helsinki, Finland

References

Juuti, Katko & Vuorinen Eds., *Environmental History of Water: Global View of Community Water Supply and Sanitation*, IWA Publishing, 2007, ISBN: 9781843391104

Aëtius, *On the opinions of the philosophers V.30.1*. In Longrigg, J. *Greek Medicine. From the Heroic to the Hellenistic Age. A Source Book*. London: Duckworth, 1998, p. 31.

Airs, Waters, Places. In *Hippocrates Volume I*, with an English translation by W. H. S. Jones. The Loeb Classical Library

Aphorisms. In *Hippocrates Volume IV*, with an English translation by W. H. S. Jones. The Loeb Classical Library.

Bruun, C. (1991). *The Water Supply of Ancient Rome. A study of Roman Imperial Administration*. Helsinki: Societas Scientiarum Fennica. *Commentationes Humanarum Litterarum* 93.

Columella. *Rei Rusticae. Lucius Junius Moderatus Columella on Agriculture in three volumes; with a recension of the text and an English translation by Harrison Boyd Ash*. The Loeb Classical Library.

Diseases I. In *Hippocrates Volume V*, with an English translation by Paul Potter. The Loeb Classical Library.

Epidemics I. In *Hippocrates Volume I*, with an English translation by W. H. S. Jones. The Loeb Classical Library.

Epidemics II. In *Hippocrates Volume VII*, edited and translated by Wesley D. Smith. The Loeb Classical Library.

Epidemics III. In *Hippocrates Volume I*, with an English translation by W. H. S. Jones. The Loeb Classical Library.

Epidemics VI. In *Hippocrates Volume VII*, edited and translated by Wesley D. Smith. The Loeb Classical Library.

Frontinus Sex. Iulius. *De aquaeductu urbis Romae. The stratagems and The aqueducts of Rome; with an English translation by Charles E. Bennett; edited and prepared for the press by Mary B. McElwain*, The Loeb Classical Library.

Galen. *De Sanitate Tuenda. A translation of Galen's Hygiene (De Sanitate Tuenda) by Robert Montraville Green. With an introduction by Henry E. Sigerist*. Springfield: Charles C. Thomas, 1951.

- Grmek M.D. (1989). *Diseases in the ancient Greek world*. Translated by Muellner, M. and L. Baltimore: The Johns Hopkins University Press.
- Hodge A.T. (1981). *Vitruvius, lead pipes and lead poisoning*. *American Journal of Archaeology*, 85, 486–491.
- Hodge A.T. (1992). *Roman Aqueducts & Water Supply*. London: Duckworth.
- Humours. In *Hippocrates Volume IV*, with an English translation by W. H. S. Jones. The Loeb Classical Library.
- Internal Affections. In *Hippocrates Volume VI*, with an English translation by Paul Potter. The Loeb Classical Library.
- Juuti P.S., Katko T.S., and Vuorinen H.S. (Edited by) (2006). *Environmental History of Water – Global View of Community Water Supply and Sanitation*. IWA Publishing
- Kennedy H. (1992). *Antioch: from Byzantium to Islam and back again. The City in Late Antiquity*, J. Rich (ed.). London: Routledge, pp. 181–198.
- McNeill W.H. (1979). *Plagues and Peoples*. Harmondsworth: Penguin Books.
- Nutton V. (2005). *Ancient Medicine*. London and New York: Routledge.
- Palladius. *Opus Agriculturae*. In *Palladii Rutilii Tauri Aemilian Vri Industris. Opus Agriculturae, De Veterinaria Medicina, De Insitione*. Bibliotheca Scriptorum Graecorum et Romanorum Teubneriana. Leipzig: B.G. Teubner Verlagsgesellschaft, 1975.
- Paulus Aeginata. *Paulos von Aegina des besten Arztes Sieben Bücher*. Uebersetzt und mit Erläuterungen versehen von I. Berendes. Leiden: E.J. Brill, 1914
- Pliny (the Elder). *Natural History*; in ten volumes; with an English translation by H. Rackham, The Loeb Classical Library.
- Prorrhetic II. In *Hippocrates Volume VIII*, edited and translated by Paul Potter. The Loeb Classical Library.
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- Vuorinen H.S. (2007). *Water and health in antiquity: Europe's legacy*. *Environmental History of Water -Global view of community water supply and sanitation*, P.S. Juuti, T. S. Katko and H. S. Vuorinen (eds.). IWA Publishing, pp. 49–71.
- Ward-Perkins B. (1984). *From Classical Antiquity to the Middle Ages. Urban Public Building in Northern and Central Italy AD 300–850*. Oxford: Oxford University Press.

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